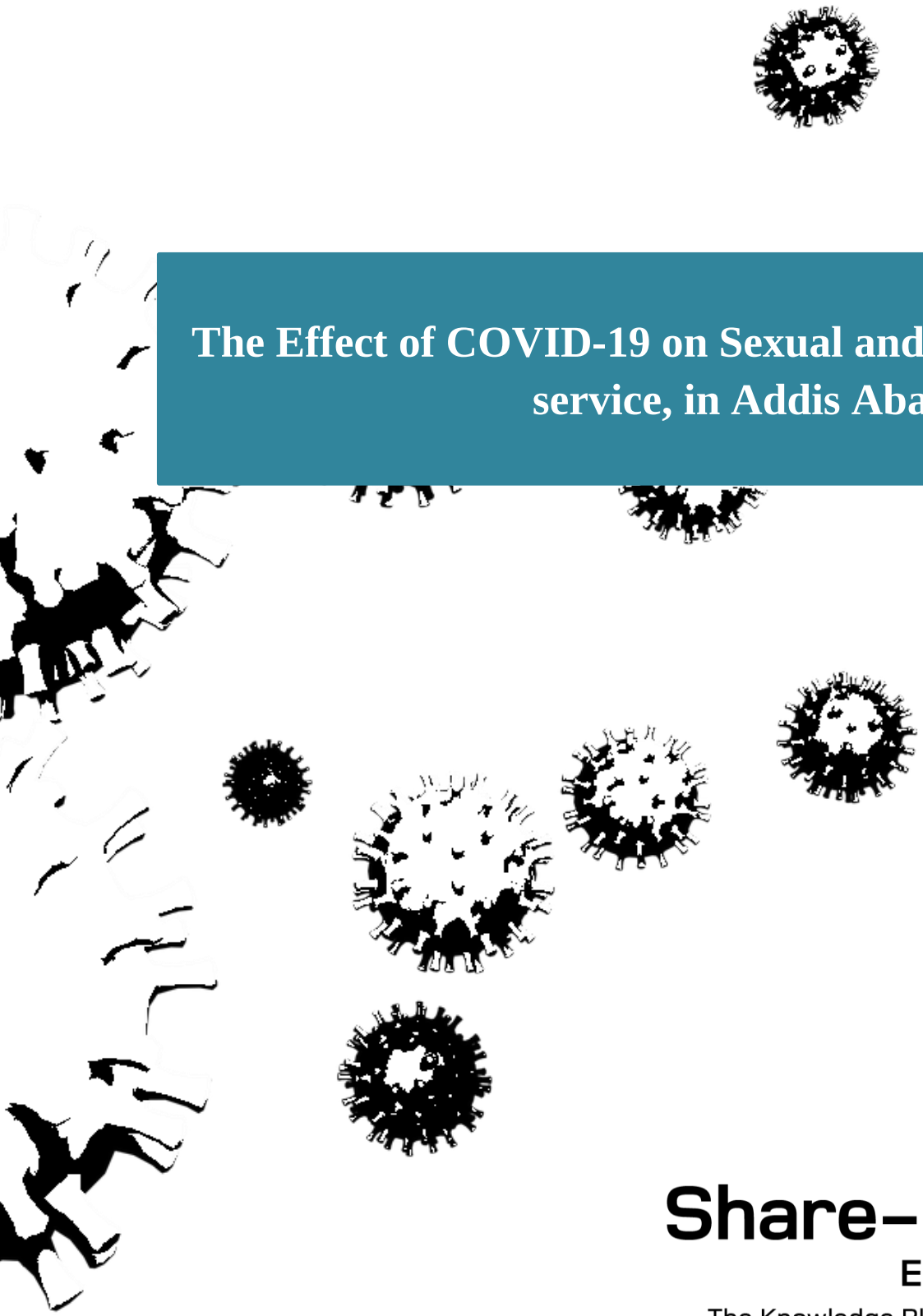

The Effect of COVID-19 on Sexual and Reproductive Health service, in Addis Ababa

Share-Net
Ethiopia
The Knowledge Platform on
Sexual and Reproductive Health & Rights

April, 2022

The Effect of COVID-19 on Sexual and ReproductiveHealth service, in Addis Ababa

By: Negussie Deyessa (MD, Ph.D.)[1]

Affiliation:

Department of Preventive Medicine, School of Public Health, College of Health Sciences, Addis Ababa University

Addis Ababa

April 2022

Table of contents

Summary

Background: Covid 19 pandemic is a serious public health problem affecting the public's health, social, and economy. The pandemic affects different public members, including men, women, the youth, the elderly, adults and children, although it affects children, adolescents, and women who need seriously preventive health services related to reproductive and sexual health. Measuring the extent of reduction in implementing maternal, child, and adolescent health services burden due to the pandemic is not well recognized.

Objective: The primary purpose was to assess the effect of the COVID-19 pandemic and related lockdowns on providing essential reproductive, maternal, child, and adolescent health services in health facilities in Addis Ababa.

Methods: Using a mixed approach having a cross-sectional design with secondary data from health facilities in Addis Ababa and qualitative methods, the study assessed the deficit in maternal, childhood, and adolescent health. Three sets of data were collected, the first having six months collected a year before the COVID-19 pandemic, the second data collected a year later after the pandemic to compare to time within six months since the starting month COVID-19 pandemic collected from 80 governmental and non-governmental health facilities. The qualitative data used in-depth interviews of experts on the program and beneficiary women of the service and was analyzed to triangulate and supplement the quantitative outcomes. The study used general linear measures using repeated longitudinal tests to measure the deficit at each health facility level compared to the time before the pandemic.

Results:- Regarding the health facilities, health services like childhood immunization and antenatal care dominate in governmental health centers, while births attended, immediate postpartum family planning, safe abortion, and family planning (newly) visiting services were significantly high in the non-governmental clinics. Furthermore, clients visiting for postnatal care and teenage pregnancy were marginally higher in non-governmental clinics. The study appears the effect of the COVID-19

pandemic to show immediate dropping of maternal and child health services, and governmental health centers copping the problem and come back to the routine number of clients a year later, while non-governmental clinics are still affected by the pandemic a year later.

At the beginning of the COVID-19 pandemic, most maternal, childhood, and adolescent health services have shown a fringe to a substantially high reduction in most health facilities. However, there was a difference in the monthly mean number of clients a year later. In governmental health centers, most services like FP, antenatal care, postnatal care, births attended, and immunization have come to serve similar to pre-pandemic time or come to serve substantially higher clients a year later after the initiation of the pandemic. Whereas non-governmental clinics have experienced performing a considerably lower number of clients than before the pandemic for services like family planning, antenatal care, immediate postpartum family planning, attending births, safe abortion, teenage pregnancy, and childhood immunization a year later. The clinics have also shown slightly increased clients a year later after the initiation of the pandemic for injectable contraceptive utilizers, while health centers serve marginally lower pill contraceptive users.

Conclusion/ Recommendation: - Based on the research finding that showed the effect of COVID-19 on maternal, adolescent, and childhood health dominating in non-governmental clinics, and the burden is related to the economic crisis, and the government should act in the macro and microeconomic scenario. Understanding the share of non-governmental clinics in the maternal, youth, and childhood health service is high in Addis Ababa, policymakers should strengthen the economy of small and middle enterprises by settling some control mechanisms. Non-governmental clinics that keep user-fee services should maximize the subsidy to attract clients to take a higher share of the service than before the COVID-19 pandemic by further improving services' quality.

Keywords: COVID-19, maternal and child, adolescent reproductive health

.

Introduction

Coronavirus belongs to a large family of viruses, some causing illness in people and others that circulate among animals, including camels, cats, bats, etc. The etiologic agent responsible for the present outbreak of COVID-19 is SARS- CoV-2, which is a novel coronavirus (2, 3). The epidemic of respiratory illness caused by the novel (new) coronavirus has gained attention globally and is recognized as a severe public health threat by the World Health Organization, including the US Centers for Disease Control and Prevention (CDC).

The first case was detected in Wuhan City, Hubei Province, China, and has spread rapidly (2). As of February 1, 2020, the World Health Organization (WHO) declared that the outbreak of COVID-19 is a Public Health Emergency of International Concern, with more than 150 countries now reporting more than half a million confirmed cases and more than one thirty-thousand deaths to date (3).

The disease has clinical symptoms, including fever, dry cough, fatigue, dyspnea, headache, myalgia, or arthralgia, similar to pneumonia, fever of unknown origin, and the common cold (4). The disease is a severe illness with high morbidity and mortality, mainly in the elderly and people with compromised chronic diseases like diabetics, cardiovascular disease, and chronic kidney disease (5-7). The condition also has an adverse social and economic impact, affecting both the developed countries and the developing world (8).

The disease is a contagious infectious disease affecting anyone, and most people infected with the COVID-19 virus experience mild to moderate respiratory illness and recover without requiring special treatment (9-11). Older people with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illnesses (5, 6). Transmission of coronavirus can occur through respiratory secretion as well as nosocomial information has been documented in COVID-19 (12), and it has an incubation period ranging from 2-7 days (13, 14).

Since the pandemics of the COVID-19 were reported, Ethiopia started screening passengers at Bole international airport and used to send a laboratory to South Africa to confirm suspected cases. After reporting the first COVID-19 case in March 2020, Ethiopia exemplified what a whole-of-government response should look like in an emergency of this nature and magnitude. In response to the call from the PM, government agencies and non-governmental organizations showed greater coordination than ever before (15).

During the COVID-19 pandemic in the country, the health system, including the sexual and reproductive health service in the country, may not be to its maximum effect (16). Due to the preponderance for protection of the pandemic, including staying at home, banning transport, fear for the avoidance of transmission, the health service system, mainly the maternal, child, and adolescent health service system in the country, may be affected maximum (17). The lockdown strategy made at the initiation of the pandemic in the country continued when the pandemic worsened through time has minimized the public's health-seeking behavior, resulting in the reduction of the health service delivery related to maternal, child, and adolescent health. The pandemic perceived by health authorities may have shifted the human resource, the medical supply, and financing of the health system related to reproductive health services. Such shifts of reorganizing the health service also may have a direct and indirect effect on the change made to the leadership and governance of the facilities (18).

The COVID-19 pandemic threatens to disrupt the provision of essential services due to barriers to the supply and demand for services in reproductive health. Modelling estimates using the Lives Saved Tool (LiST) model show that COVID-19-related disruptions could leave many women, children, and adolescents without access to essential services and result in increased maternal and child morbidity and mortality (19).

The hypothesis of this study would be to measure the extent of reduction in the implementation of maternal, child, and adolescent health services in Addis Ababa. Specifically, the study hypothesized that 1) the reproductive, maternal, child, and adolescent health service delivery given in the country after the COVID-19 would be reduced in coverage and quality of services; 2) due to shifting to

prevention and management for COVID-19, the health workforce working in reproductive, childhood and adolescent health service would be reduced after the COVID-19 pandemic than it was.

Furthermore, the study hypothesized that there would be a reduction in medical products related to procurement and supply programs to maternal, childhood, and adolescent health. The primary purpose of this study is to generate and share the extent to which the COVID-19 pandemic and related lockdowns had affected the provision of essential reproductive, maternal, child, and adolescent health services in health facilities in Addis Ababa.

1.2 Literature review

In previous epidemics, the health systems have struggled to maintain routine services, although decrement in the utilization of services may occur. During outbreaks, there may be a shift in health service coverage, human resources, health information, health care financing, and medical supplies due to the attempt to respond to the emergency tackling the epidemic. Such a shift in the service often leads to the neglect of basic, regular, and essential health services like maternal and child health, including adolescent reproductive health. Members of the community having health problems unrelated to the epidemic, especially women and children, find it challenging to access health care services (20).

During this COVID-19 Pandemic, governments and health professionals commit procedures that restrict population movement by closing borders, banning public transport, faltering non-essential actions, making to stay at home, and issuing shelter-in-place orders (21). These restrictions negatively affect the economies that may result in the loss of income, increased prices of goods, and overburdening of social safety nets to push vulnerable groups further into poverty and improve financial and other barriers to healthcare access (22). Movement restrictions reduce physical access, exacerbated by reduced transport availability and the actual or perceived threat of prosecution for travelling in public spaces (23).

Many countries have committed resources and efforts toward strengthening health systems. Still, actionable plans and approaches to building resilient health systems have not achieved consensus, and health systems are unprepared for disasters. Even in highly developed countries, they cannot provide essential services (24, 25). The current COVID-19 crisis challenges delivering critical services to the most affected segments of the population and children and families who are already vulnerable due to socio-economic exclusion (26). those who live in overcrowded settings are, particularly at risk. If exceptional measures are not taken, we observe the worsening of monetary and multidimensional potential regression of the country's development objectives gains so far achieved (26).

1.2.1 Effect of COVID-19 on the Health Service, Human resource and medical supply

According to a WHO survey, since the COVID-19 pandemic began, prevention and treatment services for non-communicable diseases (NCDs) have been severely disrupted. The survey, completed by 155 countries for three weeks in May, confirmed global impact, but low-income countries are most affected (27). The COVID-19 also is known to shift the human resource and medical supplies to tackle the pandemic through ignoring or neglecting the routine health service (28). The reason for the shift in health service coverage for its reduction may be the direct restrictions made to prevent the pandemic. The lockdown strategy made at the pandemic's initiation and continued when the pandemic worsened through time may reduce the health-seeking behavior of the public, causing the dropping of coverage in the health service delivery.

Moreover, the high increase in the number of patients affected by COVID-19 in health facilities may discourage patients that need health services within facilities. The pandemic perceived by health authorities as a serious health problem may have shifted the health system's human resources, medical supply, and financing. Such shifts of reorganizing the health service may, directly and indirectly, affect the change made to the leadership and governance of the facilities (18).

1.2.2 Effect of COVID-19 on the maternal and child health

The COVID-19 situation might deprive many women and couples of vital sexual and reproductive health services. COVID-19 has several effects on women's capacity to utilize contraception, including supply chain disruptions, which affect the manufacturing, distribution, and availability of contraceptive commodities, resulting in stock-outs (29). Some healthcare facilities are cutting back on their offerings (30, 31)); COVID-19 has shifted healthcare providers away from offering family planning services and toward responding to the virus (32). It may also be due to lockdowns or fear of exposure to COVID-19 many women cannot access healthcare institutions (33). When women's and couples' family planning requirements aren't satisfied, the number of unwanted pregnancies is bound to grow, with long-term consequences for women and their families.

Limitations in the supply and utilization of health services, as well as changes to the enabling environment, are likely to cause declines in child morbidity during the COVID-19 pandemic (34). Reduced coverage of prenatal care, postnatal care, and facility and community-based breastfeeding support and counselling might result from a shortage of competent health professionals and women's unwillingness to use the health system (34).

According to anecdotal data, certain health institutions improperly isolate newborns from their mothers and limit nursing due to erroneous worries about COVID-19 transmission through breastmilk (34, 35). These circumstances may lead to a decrease in early postpartum nursing missing the child's first natural vaccination (colostrum) and, as a result, exclusive breastfeeding (35).

1.2.3 Effect of COVID-19 on the adolescent reproductive health

Ethiopian schools and colleges have been shuttered since the COVID-19 outbreak. Furthermore, the public has enacted measures to relieve strain on the healthcare system, such as the suspension of non-emergency medical treatment and elective surgery. These disturbances significantly impacted individuals' physical and emotional health and quality of life. So far, there has been limited information on COVID-19's impact on sexual and reproductive health

COVID-19 may influence several areas of sexual and reproductive health in sexually active young people, who are facing an increasing number of health concerns internationally (36, 37). On the one hand, many young people are under financial and psychological strain due to job loss or school suspension. Separation from sexual partners and a lack of access to comprehensive health care services, on the other hand, may increase the likelihood of unfavorable sexual health outcomes (38).

Conceptual framework

Covid 19 is considered to affect the health facility by reducing the availability of the health workforce both in quality and quantity, by shifting the skill to mitigate the COVID-19 pandemic. At the same time, the economic crises supplemented by a shift of supplies to the treatment of COVID-19 reduce the drug supply and equipment. Both services could facilitate the provision of health like maternal and child health and adolescent reproductive health.

Similarly, COVID-19 is also known to reduce the public's demand for medication and other health problems by reducing the health-seeking behaviour [fearing the pandemic]. Moreover, partial and complete lockdowns and transportation problems may also facilitate access to health services. Both, in turn, may reduce health service utilization, resulting in reduced coverage in all health service categories.

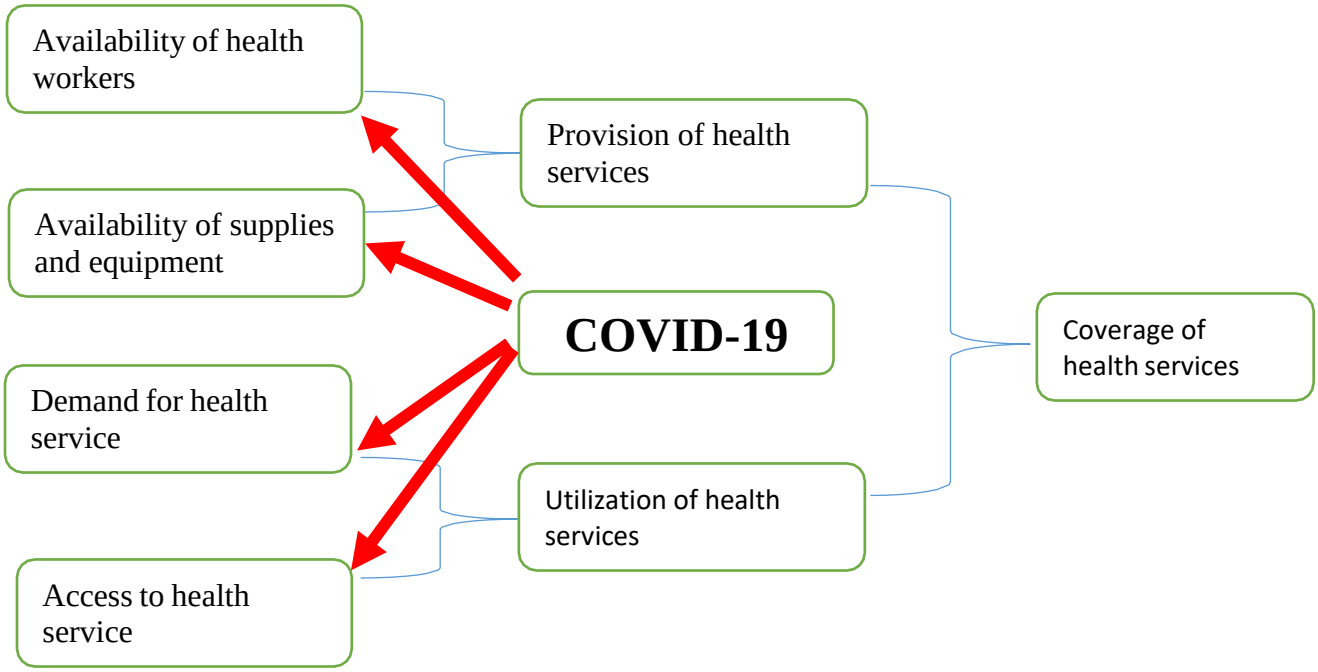

Fig 1. Conceptual framework, adopted from Roberton, T. et al. 2020,(1)

Objective

General Objective

The study's primary purpose was to assess the effect of the COVID-19 pandemic and related lockdowns on providing essential reproductive, maternal, child, and adolescent health services in health facilities in Addis Ababa.

Specific Objectives

The study explored the following specific objectives

- To determine the magnitude of reduction in the health service delivery of the essential reproductive, maternal, child, and adolescent health services during the COVID-19 pandemic compared to before the pandemic in Addis Ababa.

- To assess the extent of reducing the use of essential reproductive, maternal, child, and adolescent health services by type of health facility during the COVID-19 pandemic in Addis Ababa.
- To explore the extent of the essential reproductive, maternal, child, and adolescent health services during the COVID-19 pandemic in Addis Ababa.

Methodology

Study Design

The proposed research project used a mixed design approach having both quantitative and qualitative methods. A retrospectively cross-sectional survey was used to assess the different health facilities' records of events using secondary data from the Health Management and Information System (HMIS) at Woreda and Sub-city health offices immediately and similar months before the COVID-19 pandemic and after months during the pandemic. The study also used qualitative methods mainly, in-depth interviews and focus group discussions on supplementing data found using the quantitative design.

Study setting

The study was conducted in Addis Ababa City. Addis Ababa city administration is the country's capital city, the quarter office for many national and international organizations, including the African Union. It is a centre for more than 120 embassies and residence for many tourists. The city administration is divided into 11 sub-cities and 120 woredas. The majority of the population lives in urban settings (39). A Woreda/ District is the basic decentralized administrative unit and has an administrative council composed of elected members.

The city has about 5.005 million population as of Sept 2021, based on Worldo-meter elaboration of the latest United Nations data, of which 50.02% are female in gender (40). According to the Health and Health-Related Indicators, Addis Ababa has 35 Hospitals, 100 Health Centers, and clinics of

different levels (41). The city also has various youth-friendly non-governmental health facilities. Based on the Ethiopian health service delivery, health facilities in Addis Ababa are restructured into a three-tier system; a primary, secondary, and tertiary level of care (42). The primary level of care includes primary hospitals, health centers. The second level of referral consists of the general hospital, and the tertiary level of the referral system includes specialized hospitals. A specialized hospital serves an average of five million people. The primary and secondary levels of the referral health facilities are governed by regional states, while the specialized hospitals at the tertiary level of the referral system are governed by the federal government (42). The health facilities serve the public, mainly women, children, and adolescents reproductive health, including basic antenatal care (ANC), delivery service, postnatal care (PNC), postnatal family planning, adolescent and youth-friendly reproductive health services, neonatal health care, immunization of children, growth monitoring, Vitamin A and iron supplementation.

Source population

The source population for the study included secondary data from HMIS, health providers working in maternal, child, and adolescent health in governmental and non-government health facilities, including women and youth beneficiaries visiting health facilities in Addis Ababa. The source population includes the sub-city health offices and the regional health bureaus to assess the reproductive, maternal, child, and adolescent health services.

The study population for each maternal, child and adolescent health service entity was records and documents from governmental and non-governmental health facilities collected within six similar months a year ago, six similar months after a year, and six consecutive months after the first COVID-19 pandemic was declared in the country (Fig 2). The study population included the local administration, woreda health office, sub-city health offices, and the regional health bureau. Furthermore, the study population consists of a sample of the technical and administrative staff of private and governmental health facilities and women and youth beneficiaries visiting the facilities.

Inclusion/ exclusion criteria

Inclusion criteria

The study included government and non-government health facilities that work in maternal, child, and adolescent reproductive health services and report monthly records to their sub-city health office within Addis Ababa Regional Health Bureau. The qualitative data collection included health providers operating in maternal, child, and adolescent reproductive health services in those eligible health facilities. Moreover, the study also incorporated records of the eligible health facilities from sub-city health offices.

Exclusion criteria

The study excluded health facilities established less than two years at the onset of the pandemic, health facilities converted to or serving as a COVID-19 designated institution. It further excluded health facilities not involved in maternal, child, and adolescent health services. Of course, the study also excluded eligible study subjects who did not consent to participate in the study.

Sample size

The study calculated sample size using the Chow 2008 method for calculating sample size for before and after studies (43, 44). Considering the standard normal deviate for $Z\alpha$ of 1.96, and Z_β of 0.84 taking a minimal effect size deficit of 0.5 units, and a standard deviation of the alteration of 1.2 units from a previous study (45), and considering a grouping of 1:3 between government and non-government, a total of 54 health facilities from government and another 18 from non-government health facilities were enough to study the difference before, during and a year later after the initiation of the pandemic. After considering a 10% increment for non-response due to the exclusion criteria, the study included 80 health facilities, 20 non-governmental and 60 governmental health facilities.

$$n = r * (Z_\alpha + Z_\beta)^2 \quad / (E/S_\Delta)^2$$

Where n is the sample size, r stratified group of health facilities, Z_α and Z_β are the normal standard deviation for α and β, respectively, 'E' describing the effect size and S_Δ standard deviation of the effect size. For the in-depth interview, the study selected purposefully health providers who work as focal personnel for maternal, child health, and adolescent reproductive health and women, girl beneficiaries, and it included study subjects until the information saturation.

Sampling procedure

For the quantitative design, the study randomly selected eight Sub-cities. After assessing the eligibility of the health facilities reporting to the sub-cities, the study was stratified by government and non-governmental facilities. The sample of health facilities from each sub-city was determined based on the proportion to the size of eligible governmental health facilities. In case if the non-governmental health facilities were low in number, adjustments were considered. The selected health facilities reporting to the sub-city health office HMIS were included, and their data was collected using a semi-structured questionnaire on the Open Data Kit (ODK). For the qualitative data, a group of health providers directly working in the reproductive health services was be key informants for the in-depth interview. Moreover, a group including women and adolescent beneficiaries were recruited purposefully for a focus group discussion.

Data collection procedure

The study included an in-depth interview and review of records. There was an interview guide for the qualitative data to perform in-depth interviews of key informants. Furthermore, the study developed a checklist using ODK that is important to capture facts from records to assess the indicators related to reproductive health, maternal, child, and adolescent health service reported from eligible health facilities. Data collection tools were pre-tested, and modifications were made accordingly. Therefore, the study compared data from 2020 (onset of the pandemic), 2021 (a year later) compared to the non-epidemic time in 2019 to show the dose-response effect of the pandemic (fig 1).

Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**2019**
Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**2020**
Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**2021**

Fig 2. Timing of months for comparison and describe the effect size of the deficit

The study employed eight experienced data collectors with second-degree educational backgrounds, one for each sub-city, and was provided with training for a day. Data collectors were trained to verify an eligible health facility, necessary indicators related to maternal, child, and adolescent health services. Two supervisors were recruited to supervise the quantitative data collection process. They also serve as moderators for FGD and the in-depth interview. They were also oriented on the contents of the interview guide and in-depth interviews to capture essential facts of the health system. The in-depth interview questions of the qualitative method were made based on the focal personnel area of concentration.

Measurement

The survey had a checklist developed to analyze the maternal, child, and adolescent health service indicators from health facilities surveyed six months ago, six consecutive months during the pandemic, and six months a year later during the COVID-19 pandemic. The checklist used what existed monthly for six months before the epidemic, six consecutive months during the epidemic, and six months a year later after the pandemic on the maternal, child, and adolescent health service for health service coverage, the health workforce availability, and the medical supply availability and in use.

The service delivery component captured the number of women who received mainly maternal health, including family planning, antenatal care (ANC), delivery service, postnatal care (PNC), and postnatal

family planning. It also included the number of adolescents who received adolescent and youth-friendly reproductive health services, including safe abortion, post-safe abortion, family planning, and teenage pregnancy positive testing. Furthermore, it captured the number of children who received child health care and immunization [BCG, Penta-3, and Measles].

Analysis

Data from the survey, the qualitative, and record review was entered directly from the Open Data Kit (ODK) android software into the appropriate aggregate server and was exported into SPSS for windows version 26. Data were categorized by the indicators, type of health service, and time by the month of activity performed, as six consecutive months during the COVID-19 pandemic and six months a year later after the pandemic was compared against six similar months a year before the COVID-19 pandemic.

Data were analyzed by categorizing by the time of month collected before and after the epidemic for each reproductive health of the maternal, child, and adolescent health services. Mean number service for each item maternal, child, and adolescent health services performed was made and was computed between each other. A repeated measure for longitudinal data within the general linear model (GLM) was used to compare the collected data of the same six months during the pandemic (2020) against six months before the COVID-19 pandemic (2010).

Cohen's d test, taking the difference between two means and expressing it in standard deviation units, was used to calculate for effect size deficit by COVID-19 pandemic (46). The study described the mean service coverage of each indicator and the effect size deficit due to the pandemic and was illustrated by six months and by type of health facilities, and could enable to extract the effect size deficit for each indicator due to the effect of the COVID-19 pandemic.

The qualitative interviews' qualitative data were transcribed verbatim and translated into English by the qualitative interviewers. The English version was prepared in text files and entered into computer

software to handle qualitative data. The data analysis was done by grouping into the main themes of the study on Microsoft Excel. Based on the deep understanding of the context and the finding from the quantitative research, the findings were made to supplement the quantitative result and keep triangulation of the results to complement the issue of immunization activities affected by the COVID-19 pandemic.

Ethical consideration

The study got ethical approval from the Institutional Review Board (IRB) of the Ethiopian Public Health Association (ref. no. EPI-IA/06/ 525/21, written on November 08, 202 l) and the ethical committee of the Addis Ababa Health Bureau. As to the ethical issues, every possible care was undertaken in designing the development tools for data collection. Study participation was voluntary, and respondents were informed (oriented) that they were free to withdraw from the study at any time during the data collection process. Similarly, informed consent was obtained from the health facility head or a focal person for record reviewing and interviewing. Identifiers of individuals were not included in the instruments. Study subjects participating in the study were informed to answer or refuse to answer any specific question, and each participant will obtain informed consent . Strict confidentiality and privacy were maintained throughout the study. All respondents were provided with the name, telephone number, and email of the principal investigator and the IRB of the Ethiopian Public Health Association if they had any questions about the survey.

Results

Characteristics of the health facilities

The survey included 83 health facilities from Addis Ababa City Administration's eight sub-cities, 17 owned by non-governmental and non-profit clinics. Almost 80% of the data came from government health clinics (Figure 1). Only seven health facilities from the Bole sub-city were included in the study, with seventeen from Addis Ketema. Most health facilities provided antenatal care, family planning, and prevention of HIV transmission from mother to child, whereas less than half of the health institutions provided immediate postpartum family planning, safe abortion, and post-abortion care (Table 1).

Table 1. Type, place, and ownership of health facilities from in Addis Ababa, Dec 2021

Characteristics	Number	Percent
Type of health facility		
Health center	66	79.5
Clinics	17	20.5
Ownership		
Government	67	80.7
Non-government (non-for-profit)	16	19.3
Sub-city where HF is situated		
Addis Ketema	17	20.5
Akaki Kaliti	9	10.8
Arada	10	12.0
Bole	7	8.4
Kirkos	10	12.0
Lemi-Kura	9	10.8
Nefas-silk Lafto	11	13.3
Number of HF rendering		
EPI (childhood immunization)	74	89.2
Family planning	80	96.4
Immediate Post Partum FP	16	19.3
Antenatal care	80	96.4
Delivery service	75	90.4
Postnatal care	78	94.0
Safe abortion	56	67.5
Post-abortion care	34	41.0
Teenage girl service	54	65.1
PMTCT	80	96.4

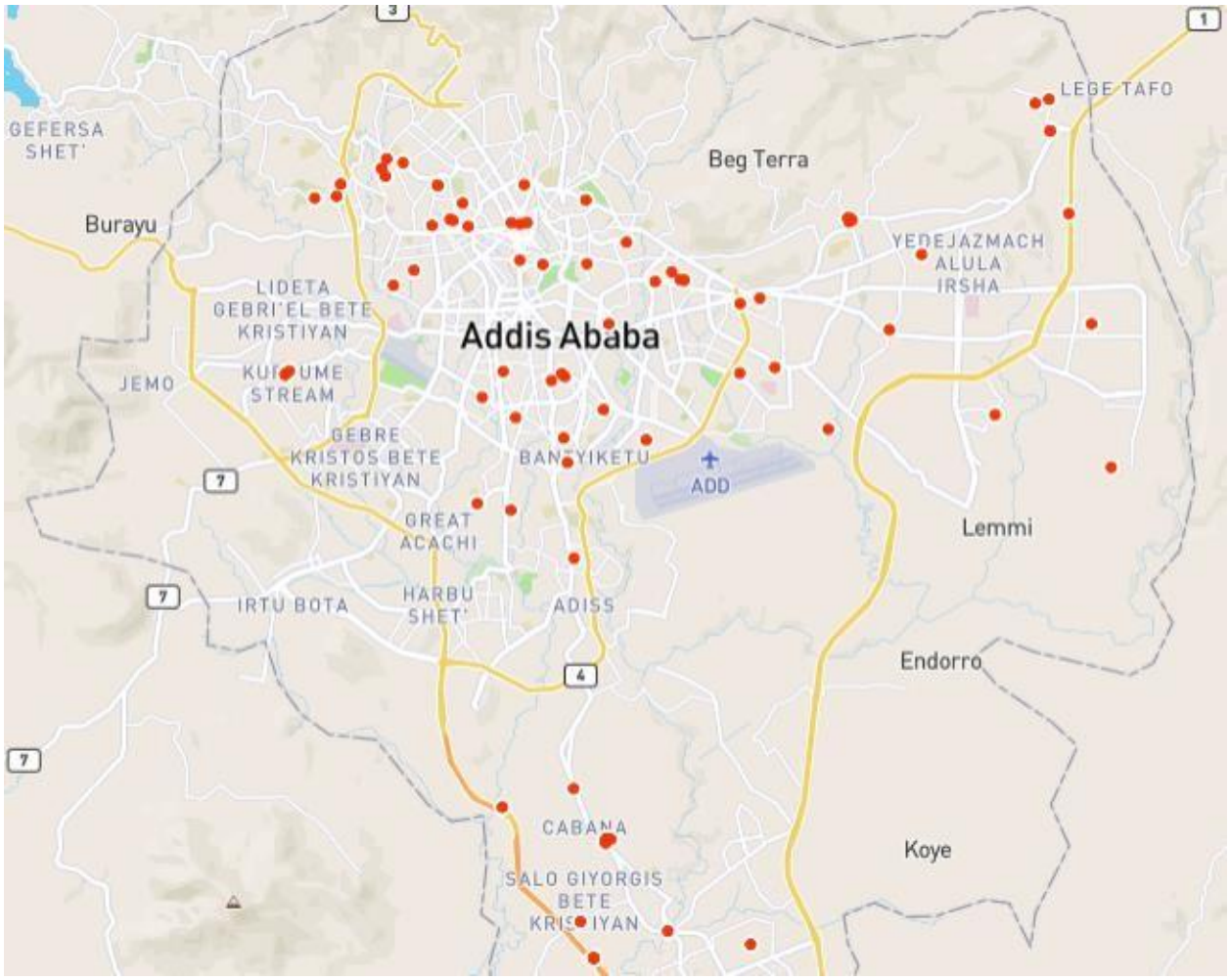

Fig 1. Distribution of health facilities included in the study from eight sub-cities of Addis Ababa City, Ethiopia, Dec 2021 [dots are health facilities assessed in this study]

Facility and human resource of Core Maternal and Child Services

The research looked at the Expanded Program of Immunization (EPI), Family Planning (FP), and Antenatal Care offices, rooms, and human resources. Two-thirds of health institutions have at least one EPI room, with approximately 61% having good or very-good rooms, and they are typically staffed by nurses or health officials. Similarly, the majority of health institutions (93%) have a room (s) for family planning services, which are staffed by nurses (93%) and health officers (12%). Almost three-quarters of the institutions provide good family planning services.

Antenatal care is available in more than 87% of health care facilities, with nurses (in 97% of facilities), health officers (18%), and a physician at one facility. Three-quarters of health facilities have at least one ANC room, and 12% have two or more. However, 11 facilities have no ANC room. Almost two-thirds of the rooms in the facility are good or very good (Table 2).

Table 2. Characteristics of the maternal and childhood health service in health facilities of eight sub-cities in Addis Ababa, Dec 2021

Characteristics	Number	Percent
Number of rooms (EPI)		
None	7	8.4
One room	57	68.7
Two or more	19	22.9
Condition of EPI rooms		
Good/ V good	51	61.4
Intermediate	24	28.9
Not good condition	8	9.6
Staffed (EPI)		
Health officer	10	12.0
Nurses	76	91.6
Others	4	4.8
Number of rooms (FP)		
None	6	7.2
One room	59	71.1
Two or more	18	21.7
Condition of FP rooms		
Good/ V good	63	75.9
Intermediate	20	24.1
Not good condition	= =	= =
Staffed (FP)		
Physician	1	1.2
Health officer	15	18.1
Nurses	81	97.6
Others	5	6.0
Number of rooms (ANC)		
None	11	13.3
One room	62	74.7
Two or more	10	12.0
Condition of ANC rooms		
Good/ V good	56	67.5
Intermediate	21	25.3
Not good condition	6	7.2
Staffed (ANC)		
Physician	3	3.6
Health officer	19	22.9
Nurses	77	92.8
Others	13	15.7

Effect of COVID 19 on Family Planning service

The mean number of new clients coming to health facilities for family planning services was higher in NGO-based clinics than in public health centers. However, the monthly average number of reproductive-age mothers visiting health facilities repeatedly was slightly higher in governmental health facilities than clinic clients. The study also found the changes made in family planning services, where FP service for new clients in health centers showed the presence of a decrement in the average number of users at the onset of the pandemic, but it was raised back even to a higher level than before the pandemic, and the change was statistically significant [F (1.6, 103.6) = 5.009; P = 0.014]. A similar finding was observed for repeat user clients of contraceptives, having a statistically significant change (1.8, 120.7); 5.078; P=0.009. This change was statistically significant for age groups between 20 and 29 for new FP users and clients aged 30-49 years.

In general, the average number of new clients of FP, in general, was remarkably higher in NGO-based clinics, whereas for repeated users of FP, it was slightly higher in governmental health centers.

*The average number of new and repeatedly using clients of FP in **governmental HCs** showed marked decrement, but after a year of the pandemic, it showed a higher increment than the baseline before the pandemic.*

The finding for NGO-based clinics, both for new and repeat clients using these facilities, the mean number of clients was observed to decrease during the initial pandemic markedly, and it was still lower after a year of the pandemic.

Although not statistically significant, the finding for NGO-based clinics, both for new and repeat clients using these facilities, the mean number of clients was observed to decrease during the initial pandemic markedly, and it was still lower after a year of the pandemic. This continuation of decrement during the pandemic was observed more in the age groups between 20 and 29 years (Table 3).

Table 3. Family planning service by age provided to mothers of adolescent and reproductive age by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	Mar-Aug 2019 Mean (SE)	Mar-Aug 2020 Mean (SE)	Mar-Aug 201 Mean (SE)	Mean difference I	Mean difference II	P-value
Public health center						
FP total new (yrs)	51.3 (8.8)	40.8 (5.6)	54.7 (7.2)	-10.5 (4.7)	+ 3.4 (5.5)	**0.014**
10-19	8.0 (2.5)	5.1 (1.5)	5.9 (1.5)	-2.9 (1.1)	- 2.1 (1.9)	0.123
20-29	37.4 (6.5)	30.3 (3.9)	40.8 (5.6)	-7.2 (4.2)	+ 3.4 (4.2)	**0.022**
30-49	7.9 (1.7)	6.5 (1.1)	8.2 (1.1)	-1.4 (1.1)	+ 0.3 (1.6)	0.343)
FP-total repeat (yrs)	127.9 (8.6)	115.5 (9.6)	142.5 (10.8)	-12.4 (7.3)	+ 14.6 (9.6)	**0.009**
10-19	98.4 (7.9)	99.2 (8.1)	102.2 (8.4)	+0.8 (3.2)	+ 3.8 (2.8)	0.365
20-29	89.0 (6.8)	80.5 (7.0)	88.5 (7.9)	- 8.5 (5.8)	- 0.5 (7.3)	0.379
30-49	30.0 (2.3)	29.8 (2.7)	37.3 (2.9)	- 0.2 (1.8)	+7.2 (2.4)	**0.001**
NGO_Clinics						
FP-total-new (yrs)	117.7 (34.3)	83.5 (29.1)	98.3 (36.5)	- 34.2 (17.3)	- 19.4 (16.7)	0.110
15-19	10.7 (1.8)	8.9 (1.9)	7.8 (1.1)	- 1.8 (1.7)	- 2.9 (1.4)	0.236
20-29	90.4 (27.4)	61.8 (23.3)	70.8 (27.6)	- 28.6 (15.2)	- 19.6 (14.6)	0.119
30-49	26.1 (8.3)	19.4 (7.5)	25.5 (11.2)	- 6.7 (3.9)	- 0.6 (5.9)	0.322)
FP total-repeat	116.6 (42.9)	97.8 (30.2)	103.2 (31.9)	- 18.8 (17.2)	- 13.3 (17.9)	0.406
10-19	10.4 (1.8)	10.2 (5.5)	9.0 (3.7)	- 0.2 (1.9)	- 1.4 (2.3)	0.762
20-29	92.0 (39.7)	66.9 (23.3)	65.8 (23.2)	- 25.1 (19.6)	- 26.2 (19.3)	0.218
30-49	29.6 (10.6)	26.1 (9.30	24.1 (8.9)	- 3.5 (3.6)	- 5.5 (3.6)	0.254

Effect of the pandemic on method mix of FP

Regarding methods used, the monthly mean number of FP clients was markedly reduced at the initial time of the pandemic, but later raised to a higher level a year later, for new clients who used pills in government health centers [F (1.8, 119.7) = 7.514; P = 0.001], and [F (1.7, 110.7); 7.546; P = 0.001], and for repeatedly using clients who use injectable [F (1.9, 129.6) = 4.654; P = 0.066] and [F (1.5, 101.2); 2.963; P = 0.070] contraceptives. However, in the non-governmental clinics, although a similar decrement in the average monthly number of clients was observed, it was still lower or worsened for both new and repeatedly user clients who were using pills and implants. However, this change in the average number of users during the pandemic was not statistically significant (Table 4/ Fig 2).

Regarding methods of FP used, the average number of FP clients was markedly reduced at the beginning of the pandemic, but a year later, it raised to a higher level for new clients who used both pills and implants in government HCs.
For non-governmental Clinics, although the mean number of pills and implant user clients was markedly reduced at the pandemic's beginning, it continued worsening a year later.

Table 4. Family planning methods provided to adolescents and reproductive age by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	**Mar-Aug 2019 Mean (SE)**	**Mar-Aug 2020 Mean (SE)**	**Mar-Aug 201 Mean (SE)**	**Mean difference I**	**Mean difference II**	**P-value**
Health center						
FP total-new	51.3 (8.8)	40.8 (5.6)	54.7 (7.2)	- 10.5 (4.7)	+3.4 (5.5)	**P=0.014**
Pills	30.0 (2.3)	29.8 (2.7)	37.2 (2.9)	- 0.2 (1.7)	+ 7.2 (2.3)	**P=0.001**
Injectable	14.0 (3.5)	11.8 (2.2)	14.2 (2.0)	- 2.2 (1.7)	+ 0.2 (3.2)	P=0.452
Implant	20.8 (2.7)	18.0 (2.1)	24.5 (3.0)	- 2.8 (1.5)	+ 3.7 (2.0)	**P=0.001**
FP total-repeat	127.9 (8.6)	115.5 (9.6)	142.5 (10.8)	- 12.4 (7.3)	+ 14.6 (9.6)	**P=0.009**
Pills	49.9 (20.6)	32.9 (17.2)	32.8 (14.8)	- 16.9 (10.9)	- 17.0 (8.7)	**P=0.048**
Injectable	34.8 (3.5)	33.6 (3.5)	41.6 (3.9)	- 1.2 (2.9)	+ 6.8 (2.9)	P=0.066
Implant	58.7 (5.9)	55.1 (5.7)	67.5 (5.9)	- 3.5 (3.5)	+ 8.9 (6.0)	P=0.070
NG_Clinics						
FP total-new	117.7 (34.3)	83.5 (29.1)	98.3 (36.5)	- 34.2 (17.3)	- 19.4 (16.7)	P=0.110
Pills	29.6 (10.6)	26.1 (9.3)	24.1 (8.8)	- 3.5 (3.6)	- 5.5 (3.6)	P=0.255
Injectable	27.7 (9.0)	23.8 (8.7)	33.4 (15.4)	- 3.9 (3.8)	+ 5.7 (9.8)	P=0.432
Implant	49.9 (20.7)	32.9 (17.2)	32.8 (14.8)	- 16.9 (10.9)	- 17.0 (8.7)	P=0.162)
FP total-repeat	116.6 (42.9)	97.8 (30.2)	103.2 (31.9)	- 18.8 (17.2)	- 13.3 (17.9)	P=0.406
Pills	14.6 (7.0)	14.1 (6.2)	12.1 (5.1)	- 0.4 (2.7)	- 2.5 (3.8)	P=0.649
Injectable	31.2 (8.7)	28.8 (8.7)	35.6 (13.1)	- 2.4 (3.2)	+ 4.3 (6.6)	P=0.420
Implant	42.2 (23.2)	32.3 (14.5)	39.1 (18.7)	- 9.9 (11.2)	- 3.1 (6.9)	P=0.417

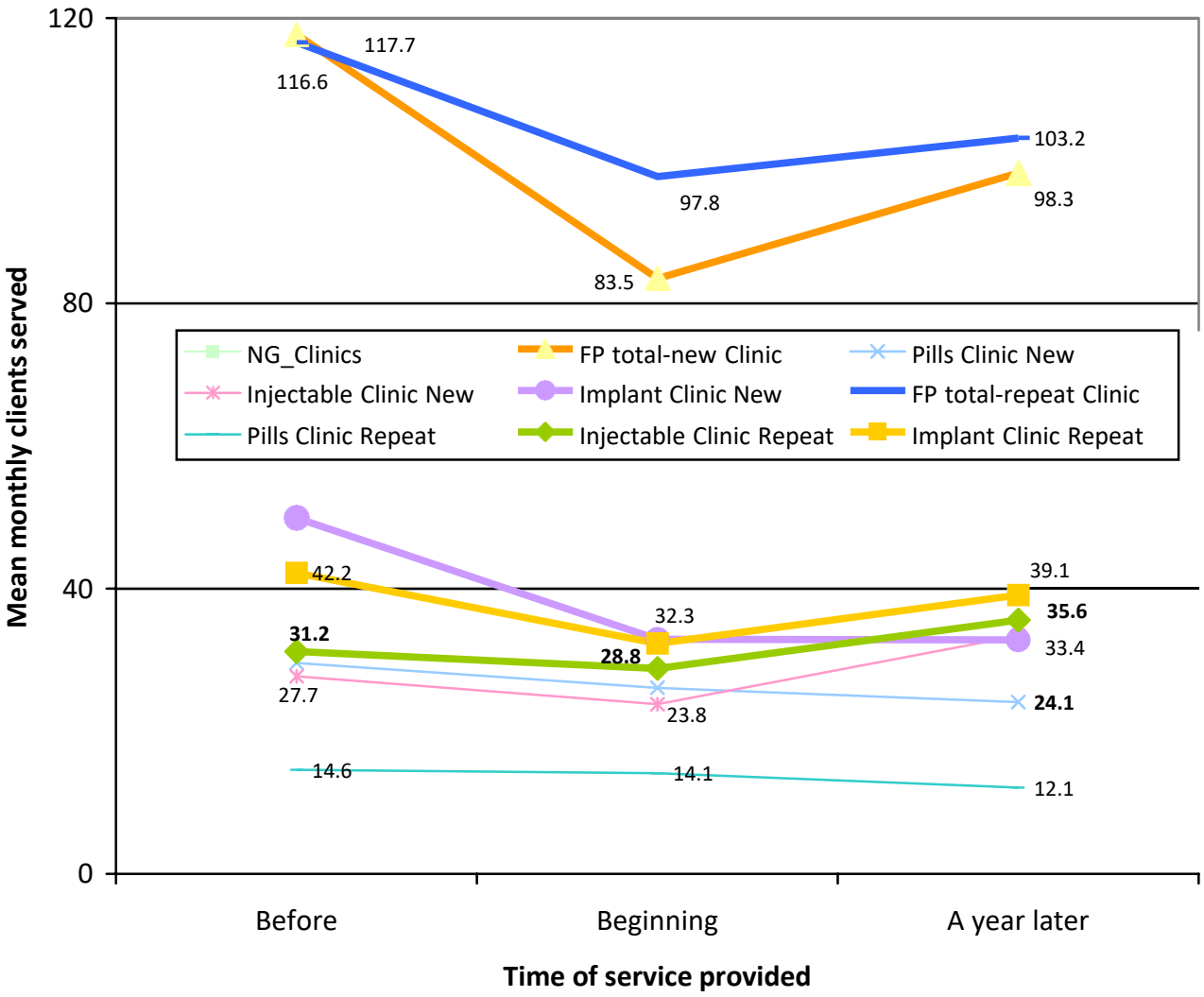

Fig 2. Family planning methods provided to adolescents and reproductive age in non-governmental clinics before, immediately, and a year later of COVID-19, in Addis Ababa, Dec 2021

Effect on the immediate postpartum family planning

In general, the average number of clients who use immediate post-partum family planning (IPPFP) service was higher in non-governmental clinics than in government-owned health centers. Regarding the IPPFP, although the average number of clients is very low, the average number of clients was lower during the initial months of the pandemic, but the number started to grow more after a year. The change was statistically significant for all clients [F (1.7, 95.2) = 4.924; P=0.013], and all age groups stratified, and clients who use pills [F (1.3, 74.7); 3.985; P=0.066] and injectable [F (1.6, 86.1) = 4.149; P=0.028] contraceptives, (Table 5/ Fig 3).

The study showed that the immediate post-partum family planning (IPPFP) service was higher in non-governmental clinics than government-owned health centers. Although the reduction in the number of IPPFP grew after a year of the pandemic in Gov. HCs, it showed worsening in number, immediately and later after a year, for non-Gov. Clinics.

Table 5. Immediate post-partum family planning service by age and method contraceptives of for adolescents and reproductive age by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	Mar-Aug 2019 Mean (SE)	Mar-Aug 2020 Mean (SE)	Mar-Aug 201 Mean (SE)	Mean differ. I	Mean differ. II	P-value
Health center						
IPPFP total	2.7 (0.7)	2.4 (3.4)	4.8 (1.0)	- 0.3 (0.7)	+ 2.1 (1.0)	**P=0.013**
10-19	0.3 (0.1)	0.2 (0.1)	0.4 (0.1)	- 0.1 (0.1)	+ 0.1 (0.1)	**P=0.073**
20-29	2.0 (0.5)	1.8 (0.6)	3.5 (0.8)	- 0.2 (0.5)	+ 1.5 (0.7)	**P=0.023**
30-49	0.4 (0.1)	0.4 (0.1)	1.0 (0.2)	+ 0.01 (0.1)	+ 0.5 (0.2)	**P=0.005**
IPPFP Method						
Pills	0.02 (000)	0.06 (0.05)	0.25 (0.1)	+0.05 (0.05)	+ 0.2 (0.05)	P=0.066
Injectable	0.52 (0.2)	0.61 (0.2)	1.6 (0.5)	+0.1 (0.3)	+ 1.1 (0.5)	**P=0.028**
Implant	1.66 (0.6)	1.55 (0.6)	2.6 (0.7)	- 0.11 (0.4)	+ 1.0 (0.6)	P=0.136
IUD	0.5 (0.2)	0.2 (0.1)	0.5 (0.2)	- 0.3 (0.2)	- 0.0 (0.3)	P=0.241
NG_Clinics						
IPPFP total	50.5 (30.4)	33.3 (18.8)	15.4 (10.5)	- 17.2 (12.3)	- 35.1 (28.1)	P=0.240
10-19	5.9 (4.4)	1.5 (1.0)	1.1 (0.8)	- 4.4 (3.5)	- 4.8 (4.5)	P=0.299

20-29	51.2 (31.9)	26.8 (14.6)	10.8 (7.3)	- 24.3 (18.5)	- 40.4 (30.5)	P=0.216
30-49	12.0 (7.2)	10.0 (5.4)	6.4 (4.7)	- 2.0 (2.4)	- 5.6 (7.2)	P=0.454
IPPFP Method						
Pills	6.3 (6.2)	3.6 (3.3)	0.3 (0.3)	- 2.8 (2.8)	- 6.0 (6.2)	P=0.354
Injectable	31.9 (20.4)	19.6 (12.1)	8.0 (5.5)	- 12.3 (8.3)	- 23.9 (19.7)	P=0.257
Implant	19.6 (10.9)	13.5 (8.5)	9.6 (6.8)	- 6.2 (3.6)	- 10.0 (5.6)	P=0.106
IUD	0.15 (0.1)	0.21 (0.2)	0.44 (0.4)	+ 0.06 (0.1)	+ 0.29 (0.4)	P=0.492

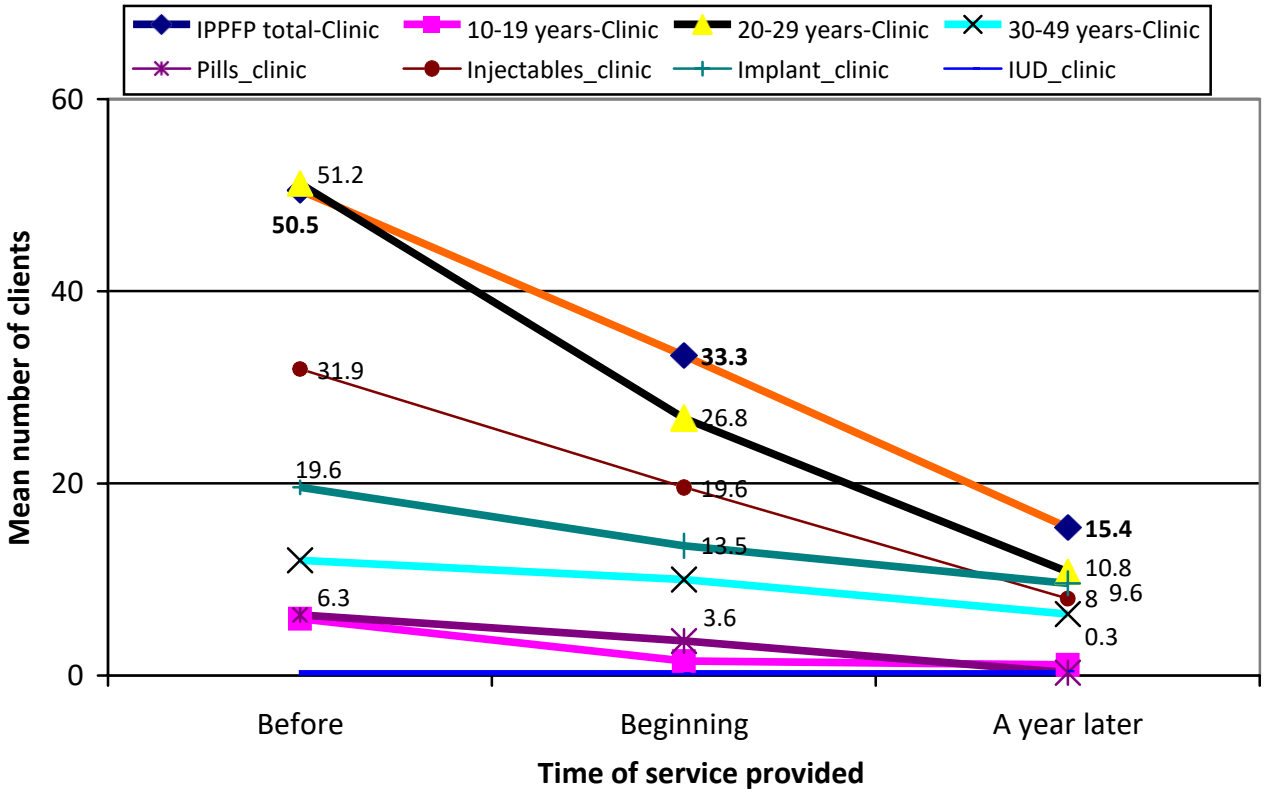

Fig 3. Immediate post-partum family planning service by age and method of contraceptives for adolescents and reproductive age in non-government-clinics before, immediately, and a year later of COVID-19 pandemic, in Addis Ababa, Dec 2021

Effect of the pandemic on the ANC service

The average monthly number of antenatal care (ANC) service users was higher in governmental health facilities than in clinics. The monthly mean number of clients visiting health facilities for the first time in health centers was markedly reduced during the first months of the pandemic, but it started to grow and was higher than the baseline time at the end of a year later. This change was statistically significant for all clients coming for the first time [F (1.8, 119.7); 19.692; P = 0.001], and clients that started use of the antenatal care after 16 weeks of gestational age [F (2.0, 127.4); 10.786; P = 0.001]. Similarly, the change was statistically significant for clients who completed four visits to the service [F (1.8, 119.3); 7.951; P = 0.001]. However, for clients who attend ANC for the first time within 16 weeks of gestational age in the health centers, the monthly mean number of clients continues to fall immediately and a year later after the pandemic [F (1.2, 72.7); 205.392; P = 0.001]. (Table 6).

The study showed that antenatal care (ANC) service users were higher in governmental health facilities than clinics. Although the reduction in the number of ANC service clients grew after a year of the pandemic in Gov. HCs, the study showed falling in number, immediately at the beginning of the pandemic and later after a year, for non-Gov. Clinics.

The monthly mean number of clients who visited the NGO-clinics for the first time dropped during the first months of the pandemic and remained low after 12 months, and this change was statistically significant for clients who started ANC before their 16th week [F (1.0, 13.4); 11.645; P = 0.004], after their 16th week [F (1.7, 21.8) = 4.140; P = 0.036] gestational age of the pregnancy, and for clients with an age of 20 years or more [F (1.0, 13.0); 5.933; P = 0.030] (Fig 4).

Table 6. Antenatal care service provided to pregnant women by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	Mar-Aug 2019 Mean (SE)	Mar-Aug 2020 Mean (SE)	Mar-Aug 2021 Mean (SE)	Mean differ. I	Mean differe. II	P-value
Health center						

ANC first visit total	107.8 (8.8)	106.0 (8.9)	125.3 (9.7)	- 1.62 (3.7)	+ 17.6 (2.9)	**P=0.001**
Less than 16 wks	44.1 (2.9)	6.3 (0.7)	7.4 (1.0)	- 37.8 (2.5)	- 36.7 (2.5)	**P=0.001**
16 wks or more	64.6 (6.7)	67.9 (7.3)	77.2 (8.2)	+ 3.3 (2.8)	+ 12.6 (2.6)	**P=0.001**
ANC_4th visit	72.7 (6.8)	72.0 (6.5)	80.1 (7.2)	- 0.66 (1.9)	+ 7.4 (2.4)	**P=0.001**
ANC first visit (age)	107.8 (8.8)	106.0 (8.9)	125.3 (9.7)	- 1.62 (3.7)	+ 17.6 (2.9)	**P=0.001**
First_visit_10_19yr	7.4 (0.7)	6.3 (0.7)	7.6 (1.0)	- .1 (0.6)	+ 0.2 (0.8)	P=0.203
20yr_or_more	100.9 (8.3)	99.6 (8.4)	99.6 (8.4)	- 1.3 (3.4)	- 1.3 (3.4)	P=0.686
NGO Clinics						
ANC first visit tot	77.7 (25.4)	60.5 (20.3)	75.5 (28.3)	- 17.2 (7.3)	- 2.2 (16.0)	P=0.376
Less than 16 wks	27.2 (8.8)	2.5 (1.4)	5.7 (3.6)	- 24.7 (7.5)	- 21.5 (5.6)	**P=0.004**
16 wks or more	51.4 (19.0)	36.9 (13.7)	38.8 (15.0)	- 14.5 (6.2)	- 12.6 (5.8)	**P=0.036**
ANC_4th visit	55.7 (19.7)	47.9 (17.9)	57.8 (23.2)	- 7.78 (8.7)	+ 2.1 (18.8)	P=0.637
ANC first visit (age)						
First_visit_10_19yr	5.9 (4.1)	2.5 (1.5)	5.7 (3.5)	- 3.5 (2.6)	- 0.3 (1.0)	P=0.203
20yr_or_more	71.9 (22.7)	59.9 (20.7)	59.9 (20.7)	- 11.9 (4.9)	- 11.9 (4.9)	**P=0.030**

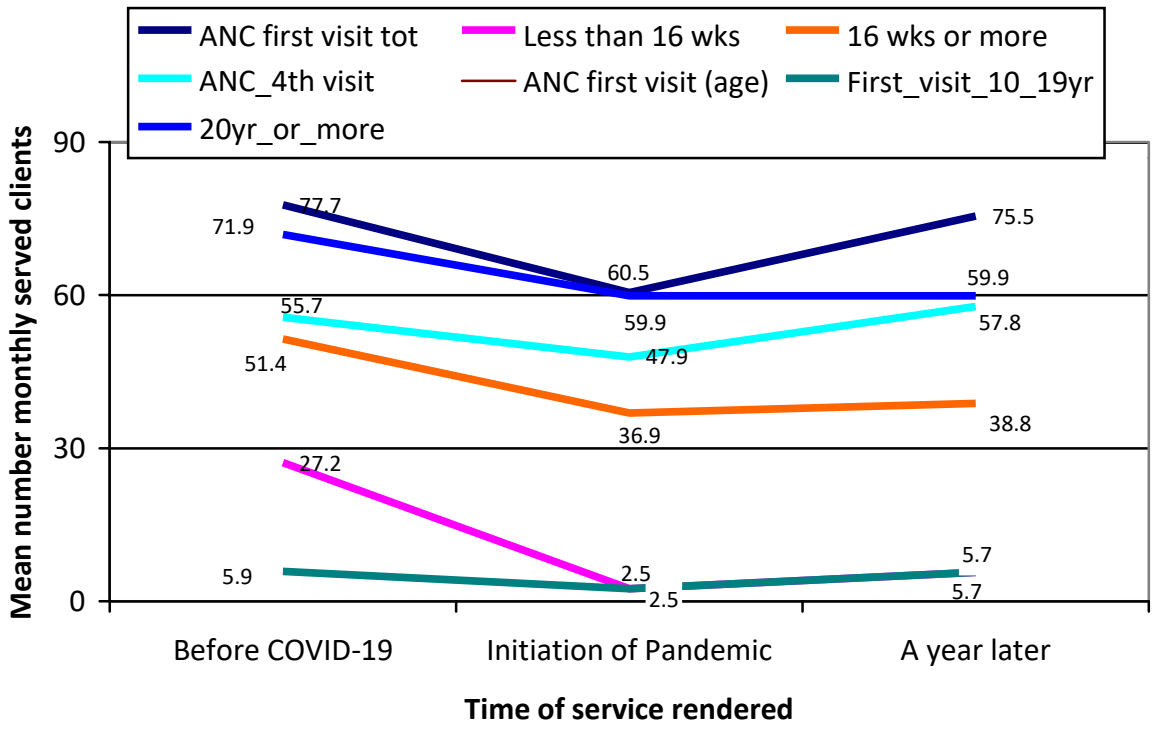

Fig 4. Antenatal care service provided to pregnant women in non-governmental clinics before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Effect of the pandemic on delivery and postnatal services

The study showed that the mean number of births attended in governmental health offices dropped during the beginning of the pandemic, but it started to rise 12 months later. Such a change in the mean number of services was statistically significant for attending a birth [F (1.8, 113.7); 6.551; P = 0.002], change in the number of live births and post-natal care [F (1.9, 127.1); 5.622; P = 0.005] and post-natal care that was undertaken within 24 hours of birth [F (1.9, 122.9; 14.340; P = 0.001]. On the contrary, the mean number of clients that dropped during the start of the pandemic dropped or worsened for safe abortion services [F (1.4, 93.3); 3.842; P = 0.039], and even after it was stratified by age.

The study showed that births attended, safe abortion, postnatal care services users were higher in the non-gov clinics than in the governmental health centers. As for other services, attending births, postnatal care, and safe abortion services, although failed in all health facilities, the failure was still worsening a year after the pandemic in the non-Gov clinics, for the gov. HCs, the waning in the services was only at the initiation of the pandemic, but it further raised a year later after the pandemic.

When it comes to non-governmental health facilities, the monthly average number of clients taking service continued to drop a year after the reduction in number after the pandemic began for most of the services given above, although it was not statistically significant. The change was statistically significant for services of birth attendance [F (1.4, 15.0); 5.286; P = 0.028], and safe abortion [F (1.2, 15.4); 5.963; P = 0.023], (table 7).

Table 7. Births attended, live births, and postnatal care service for adolescents and reproductive age by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	**Mar-Aug 2019 Mean (SE)**	**Mar-Aug 2020 Mean (SE)**	**Mar-Aug 2021 Mean (SE)**	**Mean differ. I**	**Mean differe. II**	**P-value**
Health center						
Births attended	48.0 (4.3)	45.4 (4.0)	53.0 (4.7)	- 2.6 (2.2)	+ 5.0 (1.7)	**P=0.002**
Live births	47.4 (4.2)	52.1 (4.4)	61.4 (5.4)	+ 4.7 (2.9)	+ 14.0 (2.8)	**P=0.001**
Post-natal care tot	57.5 (5.3)	52.1 (4.4)	61.4 (5.4)	- 5.4 (3.0)	+ 3.9 (2.7)	**P=0.005**
Post natal care (24hrs)	33.4 (3.2)	38.9 (3.3)	47.7 (4.2)	+ 5.5 (2.7)	+ 14.3 (3.0)	**P=0.001**
Safe abortion total	6.0 (0.9)	4.2 (0.5)	4.5 (0.4)	- 1.8 (0.7)	- 1.5 (0.9)	**P=0.039**
10-19	1.14 (0.2)	0.63 (0.1)	0.67 (0.1)	- 0.5 (0.2)	- 0.5 (0.2)	**P= 0.027**
20-24	2.7 (0.4)	1.8 (0.2)	2.0 (0.2)	- 0.9 (0.3)	- 0.7 (0.4)	P=0.054
Teenage Preg +ve	27.4 (5.1)	25.1 (5.0)	33.7 (5.8)	- 2.3 (2.4)	+ 6.3 (3.6)	**P= 0.023**
NGO Clinics						
Births attended	57.0 (24.4)	52.3 (22.9)	48.4 (21.4)	- 4.68 (2.5)	- 8.5 (3.4)	**P=0.028**
Live births	56.0 (24.0)	63.7 (27.8)	54.5 (24.1)	+7.7 (8.5)	- 1.5 (5.1)	P=0.299
Post-natal care total	61.5 (24.6)	63.7 (27.9)	54.5 (24.1)	+ 2.2 (5.8)	- 7.0 (2.5)	P=0.153
Postnatal care (24hrs)	30.5 (20.8)	42.9 (23.4)	37.5 (21.5)	+ 12.4 (12.2)	+ 7.0 (11.1)	P=0.385
Safe abortion total	102.9 (43.3)	73.9 (32.1)	93.0 (39.8)	- 29.0 (11.4)	- 9.9 (5.1)	**P =0.023**
10-19	14.9 (8.0)	8.6 (3.6)	8.8 (3.9)	- 6.3 (5.3)	- 6.0 (4.9)	P= 0.269
20-24	47.8 (22.4)	33.7 (14.5)	36.7 (15.4)	- 14.1 (9.0)	- 11.1 (9.7)	P=0.200
Teenage Preg +ve	34.5 (19.6)	35.7 (15.9)	21.0 (8.8)	-1.3 (9.8)	- 13.5 (12.5)	P=0.303

Effect on childhood immunization

The mean number of children getting immunization services was higher in government-owned health centers than in non-governmental clinics for BCG, pentavalent-3 vaccine, and measles. However, NGO-clinics have higher variability (dispersed) clients than health centers.

The study assessed the number of children vaccinated within six months before the COVID-pandemic time, the first six months during the COVID-pandemic, and six months after the initiation of the pandemic for vaccines BCG, pentavalent vaccine-3, and measles after stratifying by type of health facility to determine the effect of COVID-19 on childhood immunization. The BCG vaccine showed a slight decrement during the initiation of the pandemic, but it was again raised and boosted in the health centers, and such a change was statistically significant (F (1.8, 120.8) = 6.085; P= 0.004). However, in the non-governmental clinics, there was a decrement during the initiation and continued low for more than a year, although it was not statistically significant. There was a substantial increment in vaccinated children a year later for the measles vaccine, F (1.6, 105.6) = 7.426; P= 0.002, although there was not much change during the initiation of the pandemic in the health centers. But no marked difference was visible in the NGO-clinics. In both types of health facilities, no significant change in pentavalent-3 was observed (table 8).

The study showed that the average number of children using the immunization (EPI) service was higher in the gov HCs than in the non-governmental clinics. As for other services, the EPI services, although failed in all health facilities, the failure was still worsening a year after the pandemic in the non-Gov clinics (except for the measles vaccine). For the gov. HCs, the reduction in the EPI services was only at the initiation of the pandemic, but it further raised a year later after the pandemic.

Table 8. Immunization service provided to infants by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

Health service	Mar-Aug 2019 Mean (SE)	Mar-Aug 2020 Mean (SE)	Mar-Aug 2021 Mean (SE)	Mean differ. I	Mean differ. II	P-value
Health center						
BCG vaccine	87.5 (8.6)	84.1 (7.8)	95.9 (8.7)	- 3.4 (3.1)	+ 8.4 (3.3)	**P=0.004**
Penta 3	98.4 (7.9)	99.2 (8.1)	102.2 (8.4)	+ 0.8 (3.2)	+ 3.8 (2.8)	P=0.365
Measles	97.1 (64.2)	97.1 (62.6)	106.4 (66.2)	- 0.04 (3.1)	+ 9.3 (3.1)	**P=0.002**
NGO_Clinics						
BCG vaccine	65.9 (26.2)	54.5 (20.1)	56.3 (26.1)	- 11.4 (3.1)	- 9.6 (5.7)	P=0.319
Penta 3	33.0 (11.8)	38.0 (13.4)	26.7 (11.7)	+ 4.5 (2.32)	- 6.7 (5.4)	P=0.141
Measles	29.6 (10.8)	36.9 (13.6)	26.6 (12.8)	- 0.04 (3.1)	- 3.4 (4.1)	P=0.219

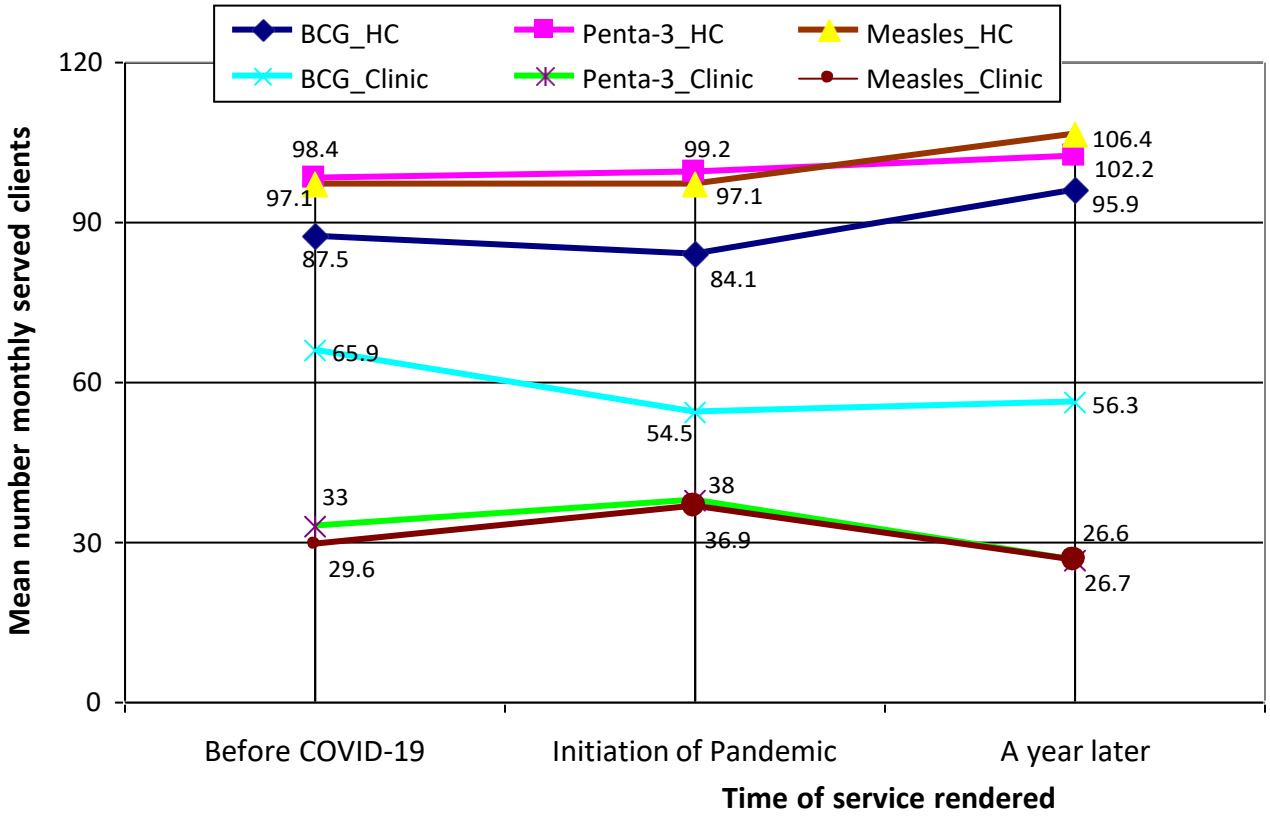

Fig 5. Immunization service provided to under infants by type of health facility before, immediately, and a year later of COVID-19 pandemic in Addis Ababa, Dec 2021

The Qualitative outcome

In this in-depth qualitative interview, a total of 14 key informants were selected purposefully and conveniently, and eight from non-government clinics and the remaining six from governmental health centers were included. Seven were health providers, two of which were at the managerial level in the health sector. Seven were female clients of family planning, one of whom was a client who got counselling services for teenage pregnancy. Five were males, and nine were females, ranging from 18 to 38 years.

Key informants from health facilities [health providers and managers] described the effect of COVID-19 on different dimensions of the health service or provider, the clients, and economic background.

Informants described the sudden failure (dropping out) of the various health services, especially those related to preventive health, of which maternal, adolescent, and child health services were counted. The sudden reduction of the services was due to fear of "mass fear" by both health providers and clients and health facilities. The absence of detailed knowledge about the COVID-19 pandemic and its immediate impact, showing a serious outcome as a killer of many people in higher-income countries like China, Europe, and the USA, has resulted in a fear to cut serving the public through banning tp provide the service. Moreover, the lockdown made by the government to control the pandemic has terrorized health professionals, the government, and the public, creating a mass fear that hinders many routine health services. Furthermore, people of advanced age and chronic collateral diseases have been forced to stay home due to such fears. The above possible reasons supplemented by the general public's obligation to remain at home may have contributed to the health service's lower performance at the initiation of the pandemic.

Reasons for reduction of women, child and adolescent reproductive health at the initiation of the pandemic

- Mass Fear due to lack of knowledge on the prognosis of COVID-19
- Lockdown strategy to mitigate the pandemic
- Banning from service of older and health providers with collateral diseases
- Shifting of some health providers in the mitigation of the pandemic
- Moving/ shifting of health resources into the alleviation of the pandemic
- Reduction on the direct supervision of the health service
- Reduction in the import of crucial medical equipment and drugs
- The different waves of the pandemic changing the courses of services.

The informants also illustrated their experiences in the first months of the pandemic on the availability of health providers. The availability of health professionals assigned to the services was minimal at the beginning of the pandemic, and they added that the reason might be related to some health providers' consistently leaving to come to health facilities due to the lockdown and some shifting to work on other priority health problems like emergency activities, including shifting to participate in the prevention and control of COVID-19 through health education. Participants also depicted the effect of the pandemic on the limited availability of medical equipment and drugs for the medication (e.g., pills, injectables, and implants), surgical manipulations, lab investigations, etc., necessary for the service. Such problems in the availability of medication, equipment, and drugs continued to worsen with time during the whole COVID-19 pandemic. They also described their experience of

unavailability, augmented by the war in northern Ethiopia. Practitioners also added that the financial

Reasons for reduction of women, child and adolescent reproductive health a year later after the initiation of the pandemic

- The underemployment and reduced interaction of markets may have changed decisions by individual clients on the choices of health services
- The high inflation rate in the country changing the imported medicines and the services
- The low imports of the different drugs and medical equipment at the national level lowering the quality of service
- The war in northern Ethiopia may be affecting the government to shift budget
- The war further may be affecting the individual decision on the health service etc.

problems due to the pandemic (and the war) continuing in the country made it difficult for the public to use the health service, starting during the pandemic that continued to date.

Two focal FP service providers and three FP clients participated in the family planning program activities. We found a nurse and two clients in a queue on arrival at the health facility's FP room. We conducted an in-depth interview with one of the clients and the nurse. The nurse described the absence of marked change in client load in general except at the initiation of the pandemic, but she believed that the reduction in the number of methods (options) to be chosen by clients was significant. She also mentioned her insistence that she insisted mothers choose available contraceptives. The other nurse in another health facility mentioned the relative decrement in the number of clients and depicted her experience of the reduction in the number of clients in a line, showing the length of the queue, and she associated the decline with the socio-economic problems in the country, making women stay at work

(they don’t want to waste their time sitting in the facility). The three clients who participated didn’t know the problem, but a diploma-holding woman in her 35th mentioned the economic burden due to inflation resulting from the pandemic, war, and even the overpopulation to worsen women’s health-seeking behavior. She added that if the number of clients is reduced, those reasons could be possible reasons.

Regarding the antenatal care, delivery, and postnatal services, a health provider from the governmental health facility described the services as increasing with time. However, he believed the services had dropped significantly at the beginning of the pandemic, which was reversed back to what they were and rose further. He continued to argue about the other services' existence and how they increased with time. He also tried to compare the benefits to be higher in hospitals since people prefer hospitals and the private sector for having quality service in case delivery complications come. In contrast, two health providers, one from an MCH clinic and the other from a governmental health center, observed a decrement in the number of clients coming for delivery, with postnatal care mentioned to reduce with time. They both associated it with the economic crisis in the country due to the pandemic augmented by civil war. The health provider from the MCH clinic also added the reduced advertisement to play a greater role in the reduction by using the available health facilities.

Finally, the youth-friendly services, including counselling services to youth, safe abortion, and post-abortion services, were assessed at one of the NG-clinics. We met a social worker who counsels youth after counseling a teenage girl who visited the clinic for a safe abortion. The counselor claimed the presence of adolescents who came for psychosocial counseling after sustaining a pregnancy and almost ended it through a safe abortion, of which only a few came for post-abortion counseling. Regarding the presence of change in the number of youth coming for counseling, it could be too difficult to judge it due to the COVID-19 pandemic. Another girl who claimed to have tested positive for pregnancy and wanted to get rid of it claimed she came after hearing about the service from friends. She took a counseling service but claimed to have ended the pregnancy because of the unplanned pregnancy, and she was not married.

Discussion

The study has tried to include a relatively representative number of government health centers and non-governmental clinics by including more than 90% of the health centers and all clinics of the eight sub-cities of Addis Ababa. Regarding the health facilities, health services like childhood immunization and antenatal care dominate in governmental health centers, while births attended, immediate postpartum family planning, safe abortion, and family planning (newly) visiting services were significantly high in the non-governmental clinics. Clients repeatedly utilizing the family planning were slightly higher in governmental facilities, while clients visiting for postnatal care and teenage pregnancy were marginally higher in non-governmental clinics.

Regarding the effect of the COVID-19 pandemic, most maternal, childhood, and adolescent health services have shown from a marginal to a substantially high reduction in most health facilities. However, there was a difference in the monthly mean number of clients a year later. In governmental health centers, most services like FP, antenatal care, postnatal care, births attended, and immunization have come to serve similar to pre-pandemic time or come to serve substantially higher clients a year later after the initiation of the pandemic. Whereas non-governmental clinics have experienced performing a considerably lower number of clients than before the pandemic for services like family planning, antenatal care, immediate postpartum family planning, attending births, safe abortion, teenage pregnancy, and childhood immunization a year later. NGO clinics have also shown slightly increased clients a year later after the initiation of the pandemic for injectable contraceptive utilizers, while health centers serve marginally lower pill contraceptive users.

The study appears the effect of the COVID-19 pandemic to show immediate dropping of maternal and child health services, and governmental health centers copping the problem and come back to routine number clients a year later, while non-governmental clinics are still affected by the pandemic a year later. The reduction in the mean number of clients during the beginning of the pandemic for maternal, adolescent, and child health services is supported by studies (47-49). The explanation for this drop-in health service could be related to direct fear of the pandemic as a severe killer and health facilities being thought the centre of the transmission, and the declared public lockdown for months in the

country in general and the city, in particular, may have brought to the substantial decrement in the services. It may also be due to home delivery supported by a TBA, especially multipara women who could lower attendance in health facilities. The change in the strategy of health facilities to tackle the pandemic may also have contributed to the reduction in MCH services.

Regarding the continuation of the effect on most MCH services, especially in non-government clinics, a year after the pandemic's beginning may relate to the economic burden of the pandemic augmented by the war that would affect the economy during the second time of the pandemic after a year. This economic consequence is supported by studies made by Carlsson-Szlezak et al. that declare the three primary transmission pathways (50, 51). According to Carlsson-Szlezak et al., the first is the direct effect, associated with the lower consumption of goods and services. Consumer confidence may be affected due to the pandemic's protracted duration and related social distancing measures, which keep people at home apprehensive of discretionary spending and gloomy about their long-term economic prospects. The indirect impact, which stems from a financial market, may shock, and its effects on the actual economy are considered the second reason for the impact resulting in household wealth decline, savings rising, and consumer expenditure will decline. Supply-side disruptions are the third type of disruption; if constraints halt or impede production, they will have a detrimental influence on supply chains, labor demand, and employment, resulting in lengthy layoffs and growing unemployment (50, 51).

Authors such as Baldwin (2020) define COVID-19's economic impact on the economy as a "wait-and-see" attitude marked by uncertainty since there is less confidence in markets and in engaging in financial transactions (52). He adds through three paths, and the first step starts with disease showing its impact by putting workers into their sickbeds, which is like temporary unemployment, but only temporarily. The second may be related to public-health-related containment measures, including lockdown measures, office closures, travel bans, quarantines, and the like, and the third is the expected shock. The COVID-19 crisis has consumers and firms worldwide crouched in a wait-and-see mode, and it is the long-term consequences of the following macroeconomic turmoil due to the continuity of the global crisis's attempt to surge and fall due to the different waves of epidemics (52). In our scenario, this economic crisis at the individual level may impact searching for health facilities that the

government health centers may cost them the least. The burden of health problems that non-governmental clinics share for their relatively costly, but a quality maternal and child health service may be affected by the economic crisis due to COVID-19 pandemic and possible civil war crisis.

Although it has many strengths, our study is not immune to limitations. The major limitation is related to the small sample size of the non-governmental clinic that created difficulty to show a significant difference in the presence of a large effect size, which may be related to high variability. To minimize such a problem, the research group has tried to include all clinics in the city. Variability in the type of maternal and child health service among health facilities has also diminished the size, losing power, and difficulty showing the statistical difference. The other limitation in the quantitative data included the absence of reporting youth-friendly counseling performed mainly in non-governmental clinics. In this study, the qualitative data has captured it but is limited to quantifying the effect of COVID-19.

Conclusion

Health services like childhood immunization and antenatal care services were not much affected in governmental health centers. At the same time, births attended, immediate postpartum family planning, safe abortion, and family planning (newly) visiting services were found to have a higher service in the non-governmental clinics, showing their share is enormous where the government should give due attention.

The study appeared to show that the effect of the COVID-19 pandemic caused the immediate dropping of maternal and child health services; however, governmental health centers copping the problem and came back to the routine number of clients a year later. In contrast, non-governmental clinics are still affected during the pandemic's beginning and are still affected a year later since the initiation.

This adverse effect immediately post-COVID-pandemic may be related to a direct coping impact to the fear of the virus as a killer at the beginning and due to the different attempts made to mitigate the pandemic. In contrast, the long-term impact worsening, especially in non-governmental clinics, may be related to the economic crisis. This impact may be due to the micro and macro-economic consequence of the pandemic augmented by the war-related financial situation at the national level

making the enormous public service shift either to use the free governmental health centers or to the partial use of the non-governmental clinics.

Recommendation

Based on the research finding that showed the long-run effect of COVID-19 on maternal, adolescent, and childhood health dominating in non-governmental clinics, and the burden is related to the economic crisis, the government should act in the macro and microeconomic scenario. Understanding the share of non-governmental clinics in the maternal, youth, and childhood health service is high in Addis Ababa, policymakers should give due attention to strengthening the economy of small and middle enterprises by settling some control mechanisms. Non-governmental clinics that keep user-fee services should maximize the subsidy to attract clients to take a higher share of the service than before the COVID-19 pandemic by further improving services' quality.

References

1. Roberton T, Carter ED, Chou VB, Stegmuller AR, Jackson BD, Tam Y, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. The Lancet Global Health. 2020;8(7):e901-e8.

2. Huang WH, Teng LC, Yeh TK, Chen YJ, Lo WJ, Wu MJ, et al. 2019 novel coronavirus disease (COVID-19) in Taiwan: Reports of two cases from Wuhan, China. J Microbiol Immunol Infect. 2020.

3. Okada P, Buathong R, Phuygun S, Thanadachakul T, Parnmen S, Wongboot W, et al. Early transmission patterns of coronavirus disease 2019 (COVID-19) in travellers from Wuhan to Thailand, January 2020. Euro Surveill. 2020;25(8).

4. Arashiro T, Furukawa K, Nakamura A. COVID-19 in 2 Persons with Mild Upper Respiratory Symptoms on a Cruise Ship, Japan. Emerging infectious diseases. 2020;26(6).

5. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. Lancet Public Health. 2020.

6. Kunz R, Minder M. COVID-19 pandemic: palliative care for elderly and frail patients at home and in residential and nursing homes. Swiss Med Wkly. 2020;150:w20235.

7. Liu K, Chen Y, Lin R, Han K. Clinical feature of COVID-19 in elderly patients: a comparison with young and middle-aged patients. J Infect. 2020.

8. Gupta M, Abdelmaksoud A, Jafferany M, Lotti T, Sadoughifar R, Goldust M. COVID-19 and Economy. Dermatol Ther. 2020:e13329.

9. Deressa W, Kayembe P, Neel AH, Mafuta E, Seme A, Alonge O. Lessons learned from the polio eradication initiative in the Democratic Republic of Congo and Ethiopia: analysis of implementation barriers and strategies. BMC public health. 2020;20(4):1-15.

10. Bashyam AM, Feldman SR. Should patients stop their biologic treatment during the COVID-19 pandemic. J Dermatolog Treat. 2020:1-2.

11. Wan S, Xiang Y, Fang W, Zheng Y, Li B, Hu Y, et al. Clinical Features and Treatment of COVID-19 Patients in Northeast Chongqing. J Med Virol. 2020.

12. Peng J, Ren N, Wang M, Zhang G. Practical experiences and suggestions on the eagle-eyed observer, a novel promising role for controlling nosocomial infection of the COVID-19 outbreak. J Hosp Infect. 2020.

13. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR, et al. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. Ann Intern Med. 2020.

14. Wang Y, You XY, Wang YJ, Peng LP, Du ZC, Gilmour S, et al. [Estimating the basic reproduction number of COVID-19 in Wuhan, China]. Zhonghua Liu Xing Bing Xue Za Zhi. 2020;41(4):476-9.

15. Tolu LB, Ezeh A, Feyissa GT. How Prepared Is Africa for the COVID-19 Pandemic Response? The Case of Ethiopia. Risk Management and Healthcare Policy. 2020;13.

16. Manyazewal T. Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. Arch Public Health. 2017;75:50.

17. Roberton T, Carter ED, Chou VB, Stegmuller AR, Jackson BD, Tam Y, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. Lancet Glob Health. 2020;8(7):e901-e8.

18. Rust G, Melbourne M, Truman BI, Daniels E, Fry-Johnson Y, Curtin T. Role of the primary care safety net in pandemic influenza. Am J Public Health. 2009;99 Suppl 2:S316-23.

19. Facility GF. Preserve Essential Health Services During The Covid-19 Pandemic: Nigeria, available on https://www.globalfinancingfacility.org/sites/gff_new/files/documents/Nigeria-Covid-Brief_GFF.pdf accessed on Sept 25, 2020 2020 [

20. Gizelisa T-I, Karim S, Østby G, Urdal H. Maternal Health Care in the Time of Ebola: A Mixed-Method Exploration of the Impact of the Epidemic on Delivery Services in Monrovia. World Development. 2017;98:169-78.

21. Cabinet Office. Coronavirus outbreak FAQs: what you can and can't do, https://www.gov.uk/government/publications/coronavirus-outbreak-faqs-what-you-can-and-cant-do/coronavirus-outbreak-faqs-what-you-can-and-cant-do accessed on Sept 25, 2020 2020 [

22. OECD, Interim Economic Assessment. Coronavirus: The world economy at risk, available on https://www.oecd.org/berlin/publikationen/Interim-Economic-Assessment-2-March-2020.pdf accessed on Sept 25, 2020 2020 [

23. Jing Daily. The Impact of Travel Restrictions on Global Economies, available https://jingdaily.com/the-impact-of-travel-restrictions-on-global-economies/ accessed on Sept 25, 2020. 2020.

24. Nuzzo JB, Meyer D, Snyder M, Ravi SJ, Lapascu A, Souleles J. What makes health systems resilient against infectious disease outbreaks and natural hazards? Results from a scoping review. BMC Public Health. 2019;19.

25. Kieny MP, Bekedam H, Dovlo D, Fitzgerald J, Habicht J, Harrison G, et al. Strengthening health systems for universal health coverage and sustainable development. Bulletin of the World Health Organization 2017;95:537-9.

26. UNICEF Ethiopia. Socio-economic impacts of COVID-19, Update - 14th May 2020, available on, https://www.unicef.org/ethiopia/reports/socio-economic-impacts-covid-19, accessed on Sept 25, 2020. 2020.

27. World Health Organization. COVID-19 significantly impacts health services for noncommunicable diseases, News release on June 20, 2020 available on: https://www.who.int/news-room/detail/01-06-2020-covid-19-significantly-impacts-health-services-for-noncommunicable-diseases, accessed on Sept 25, 2020. . 2020.

28. Bohmer RMJ, Pisano GP, Sadun R, Tsai TC. How Hospitals Can Manage Supply Shortages as Demand Surges, available on https://hbr.org/2020/04/how-hospitals-can-manage-supply-shortages-as-demand-surges, accessed on Sept 25, 2020. 2020 [

29. Gudina EK, Tesfaye M, Siraj D, Haileamilak A, Yilma D. COVID-19 in Ethiopia in the first 180 days: Lessons learned and the way forward. Ethiopian Journal of Health Development. 2020;34(4).

30. COVID I. pandemic cuts access to sexual and reproductive healthcare for women around the world, 2020.

31. International MS. Stories from the frontline: in the shadow of the COVID-19 pandemic. 2020.

32. Santoshini S. Family planning efforts upended by the coronavirus. Foreign Policy. 2020.

33. Note I. Impact of the COVID-19 Pandemic on Family Planning and Ending Gender-based Violence, Female Genital Mutilation and Child Marriage. April, 1–7. 2020.

34. Molloy EJ, Lavizzari A, Klingenberg C, Profit J, Zupancic JA, Davis AS, et al. Neonates in the COVID-19 pandemic. Nature Publishing Group; 2021.

35. Cheema R, Partridge E, Kair LR, Kuhn-Riordon KM, Silva AI, Bettinelli ME, et al. Protecting breastfeeding during the COVID-19 pandemic. American journal of perinatology. 2020.

36. Wernette GT, Countryman K, Khatibi K, Riley E, Stephenson R. Love My Body: Pilot Study to Understand Reproductive Health Vulnerabilities in Adolescent Girls. Journal of medical Internet research. 2020;22(3):e16336.

37. Nielsen A, Bågenholm A, De Costa A. Development of a mobile phone app to promote safe sex practice among youth in Stockholm, Sweden: qualitative study. JMIR formative research. 2020;4(1):e12917.

38. Achdut N, Refaeli T. Unemployment and psychological distress among young people during the COVID-19 pandemic: psychological resources and risk factors. International journal of environmental research and public health. 2020;17(19):7163.

39. Regional and Technical Cooperation Division, UN-HABITAT. Ethiopia: Addis Ababa Urban Profile. Kenya U, editor. Nairobi, Kenya2008.

40. World Population Review. Population of Addis Ababa, for the September 2020, available on https://worldpopulationreview.com/world-cities/addis-ababa-population, Accessed on Sept 28, 2020. 2020.

41. F-MOH. Health and Health Related Indicator, EFY 2007. health Fmo, editor. Addis Ababa, Ethiopia2015.

42. F-MOH. Health Sector Development Program IV 2010/11 – 2014/15. Ethiopia FMo, editor. Addis Ababa, Ethiopia2010.

43. Hertzog MA. Considerations in determining sample size for pilot studies. Research in nursing & health. 2008;31(2):180-91.

44. Chow S-C, Shao J, Wang H, Lokhnygina Y. Sample size calculations in clinical research: Chapman and Hall/CRC; 2017.

45. Deyessa N, Mekonnen A, Demilew T, Abagero A, Bisrat F, Abdi Y, et al. Preliminary Effect of COVID-19 pandemic on the six World Health Organization's Building Blocks of the Health System, in Addis Ababa, Ethiopia. Unpublished. 2021.

46. Peng C-YJ, Chen L-T. Beyond Cohen's d: Alternative effect size measures for between-subject designs. The Journal of Experimental Education. 2014;82(1):22-50.

47. das Neves Martins Pires PH, Macaringue C, Abdirazak A, Mucufo JR, Mupueleque MA, Zakus D, et al. Covid-19 pandemic impact on maternal and child health services access in Nampula, Mozambique: a mixed methods research. BMC health services research. 2021;21(1):1-8.

48. das Neves Pires P, Macaringue C, Abdirazak A, Mucufo J, Mupueleque M, Siemens R, et al. Covid-19 Pandemic Impact on Maternal and Child Health Services Access in Nampula, Mozambique: A Mixed Methods Research. 2020.

49. Adu P, Stallwood L, Adebola SO, Abah T, Okpani AI. The direct and indirect impact of COVID-19 pandemic on maternal and child health services in Africa: a scoping review. 2021.

50. Carlsson-Szlezak P, Reeves M, Swartz P. Understanding the economic shock of coronavirus. Harvard Business Review. 2020;27.

51. Carlsson-Szlezak P, Reeves M, Swartz P. What coronavirus could mean for the global economy. Harvard Business Review. 2020;3(10).

52. Baldwin R. Keeping the lights on: Economic medicine for a medical shock. VoxEU.Org. Retrieved on Dec 2, 2021 from https://voxeu.org/article/how-should-we-think-about-containing-covid-19-economic-crisis 2020 [

Annex I. Consent form for qualitative data (English)

CONSENT/ASSENT FOR STUDY SUBJECTS PARTICIPATING IN

BASELINE or POST-INTERVENTION SURVEY

For self-administered questionnaire

Hello. My name is_____. I am a field officer from the School of Public Health, Addis Ababa University (AAU). You have been selected to participate in this research study conducted by the School of Public Health, Addis Ababa University (AAU). The purpose of the study is to learn more about the impact of COVID-19 on Maternal and Child Health, including Adolescent Reproductive and Sexual Health in Addis Ababa and further Ethiopia

You have been selected to participate in this study because you are a member of the health facility or user of service provided in the facility, and we assumed that you would represent the facility. Today, we would like to collect data using this Open Data Kit (ODK) (a mobile-based data collection instrument) to understand more about your health facility during this pandemic COVID-19 time. The information that we collect will help design policies and programs that aim to improve the Reproductive and Sexuality of the youth in Ethiopia.

Before deciding whether or not to participate in this survey, we would like to explain the purpose, the risks and benefits of the study to you and what is expected of you. I am here to discuss the information with you. I will answer any questions you may have. After the procedures have been fully explained to you, you can decide whether or not you want to participate. If you understand the process and agree to participate, you will be asked to answer questions that sweets you to respond.

Please note that:

- Participation is voluntary. You have the right not to answer any question and to stop answering questions at any time. We expect that the questionnaire will take about 30-45 Minutes.

- You may decide not to participate or withdraw from the questionnaire at any time without losing any benefits that you, your family, or your community might be entitled to in the future.

- The questionnaire contains multiple sections. First, you will be asked to answer some questions about your background and education. Next, you will be asked questions about your knowledge related to the health facility. Finally, you will be asked questions relating to your practice.

- The information you tell us will be confidential. We will not share it with anyone else. Your name or identifier will not be written anywhere in the questionnaire.

CONFIDENTIALITY: (Who May See Your Records)

- Anything you tell us during this interview or when we take measurements will be kept confidential. It will not be shared with other co-workers or with anyone else.
- We will never use your name on any document, only a coded number. No one will know that the coded number identifies you.

POTENTIAL BENEFITS:

- You may get no direct benefit from participating in this questionnaire, but you may benefit indirectly after a more extended period.
- The long-run benefit may include policy change related to COVID-19 on Maternal and Child Health, including Adolescent Reproductive and Sexual Health.

POTENTIAL RISK

- Since we are not using paperwork (ODK), there is no direct risk of transmission. But we will follow the interview in the presence of a face mask, distancing, and not having hand-shaking to avoid transmission of COVID-19.

ALTERNATIVES:

- You may choose not to participate in this survey. Being in this study is up to you, and no one will be upset if you don't want to participate or even if you first say yes and then you change your mind and want to stop.

CONTACT PERSON:

- If you have any questions or problems related to the research work, you can contact Dr. Negussie Deyessa Telephone Number +251-91140005; email negdaysun@gmail.com. In case if you don't receive enough information with the above address, you can request information from a higher body that controls the ethical issue of studies using +251-114-166083/41.

May I now ask whether you would like to participate in this survey and have measurements taken?

Do you agree to participate in the questionnaire?

[ ] Yes [ ] No

_____

Enumerator's name and signature of confirmation

Consent form

1. I confirm that I have heard and understand the information sheet and have had the opportunity to ask questions.

2. I understand that my participation is voluntary, and I am free to withdraw at any time without giving a reason.

3. I understood that If I have any questions, I can ask the head of the researcher group as well as the heads of the ethical research committee

4. I agree to be interviewed without my name recorded, in a private

5. I agree (my enterprise) to take part in the mentioned study.

Mark of participant_____ Date _____

Data collector (witness) Sign._____Date: _____

Annex II. Amharic Consent form

የቃል ፈቃደኝነት መጠየቂያ ቅፅ

በመረጃ ሰጪ የሚሞላ

ፕሮጀክት፡ ባገራችን የኮቪድ-19 ህመም በመንሰራፋቱ ምክንያት እና በጤና ተቋም ላይ ሊያመጣ የሚችለውን አሉታዊ ተፅእኖ ለማወቅ እና ግንዛቤ ለመውሰድ የቃል ፈቃደኝነት መጠየቂያ ቅፅ

ጤና ይስጥልኝ ስሜ ---------- ይባላል። በህብረተሰብ ጤና ት/ ክፍል በ አዲስ አበባ ዩንቨርስቲ የምሰራ የመስክ ሰራተኛ ነኝ። እርስዎ በዚህ ጥናት እንዲሳተፉ ተመርጠዋል። የጥናቱ ዋና አላማ ባገራችን የኮቪድ-19 ህመም በመንሰራፋቱ ምክንያት በእናቶችና ህፃናት አንዲሁም የወጣቶች በስነ-ተዋልዶ ጤና ላይ ሊያመጣ የሚችለውን አሉታዊ ተፅእኖ ለማወቅ እና ግንዛቤ ለመውሰድ ነው።

በዚህ ጥናት እንዲሳተፉ የተመረጡበት ዋና ምክንያት እርስዎ በዚህ ጤና ተቋም ሰራተኛ በመሆንዎ ወይም የአገልግሎቱ ተጠቃሚ በመሆንዎ ነው። ዛሬ የሞባይል መመዝገቢያ በመጠቀም ቃለ መጠይቅ በማድረግ ይርስዎን ግንዛቤ ለማወቅ እንፈልጋለን። ኮቪድ-19 ህመምን በተመለከተ በእናቶችና ህፃናት አንዲሁም የወጣቶች በስነ-ተዋልዶ ጤና ላይ ሊያመጣ የሚችለውን አሉታዊ ተፅእኖ ለማወቅ እና ግንዛቤ አገሪቱ ለምታደርገው በእናቶችና ህፃናት አንዲሁም የወጣቶች በስነ-ተዋልዶ ጤና ላይ ፖሊሲ ለማውጣት የሚያስችሉ ስልቶችን ለመቅረፅ ግብአት እንዲሆን ነው።

በጥናቱ ለመሳተፍ ከመወሰንዎ በፊት ከእርስዎ ምን እንደሚጠበቅ፤ የሚያገኙት ጥቅምና ጉዳት፣ አላማ ለመግለጽ እንወዳለን። እኔ እንደ መስክ ሰራተኛ እዚህ የምገኘው ከእርሶ ጋር ስለመረጃው ለመወያየት ነው። የሚኖሮዎትን ጥያቄዎች ለማብራራት እሞክራለሁ። ከዚህ በኋላ ለመሳተፍ ወይም ላለመሳተፍ የሚወስኑት የሚከተሉትን ማብራሪያ አንቢቤሎት የሚስማማዎት ከሆነ ብቻ ነው። ለመሳተፍ ከተስማሙ እና ጥናቱን ከተረዱት ቃለ መጠይቁን አቀርብልዋታለሁ። ካልተስማዎትም ምስጋናዬ ከልብ ነው።

እባክዎትን የሚከተለውን ያድምጡኝ፡

- የሚሳተፉት በሙሉ ፍቃደኝነት ላይ የተመሰረተ ሲሆን፤ መጠይቁ ከ30 እስከ 45 ደቂቃ ይፈጃል። እርስዎና እኔ የምንነጋገረው ለብቻችን ሆነን ነው።
- የርሶ በጥናቱ ላይ ተሳታፊ መሆን፤ ለሚገኘው ውጤት ትልቅ አስተዋፅኦ አለው።
- ባጠቃላይ በጥናቱ ላይ አለመሳተፍ፤ በማንኛውም ጊዜ ጥያቄውን ማቋረጥ ወይንም አንዳንድ ጥያቄዎችን መመለስ ባይፈልጉ ሊተዋቸው ይችላሉ።

የውይይቱ ሀሳብ ሚስጢራዊነት

- በቃለ መጠይቁ ጊዜ የሚሰጡት መረጃ በሚስጥር የተጠበቀ መሆኑ አሳውቆታለሁ።

- የሚሰጡት መረጃ ለማንም ሰው፤ ለቤተሰብ ወይም ሌላ ሰው አይነገርም። ስምዎትም በወረቀት ላይ አይመዘገብም።

የሚያገኙት ጥቅም

- ከጥናቱ በቀጥታ ተጠቃሚ ላይሆኑ ይችላሉ፤ ሆኖም በተዘዋዋሪ ለህብረተሰቡ በሚቀረፁ ኮቪድ-19 ከእናቶችና ህፃናት አንዲሁም የወጣቶች በስነ-ተዋልዶ ጋር በሚወጣ ፖሊሲ ተጠቃሚ ሊሆኑ ይችላሉ::
- መጠይቁ በማንበብ እና በመጠየቅ የግልዎ እውቀት ማሳደግ ይቻላል።

የሚገኙ ያለተፈለጉ ጉዳቶች

- በጥናቱ ሊመጡ የሚችሉ ጉዳቶች ውስጥ በቀጥታ ኮቪድ-19 ለመከላከል ማስክ በማድረግ እና ርቀት በመጠበቅ እንዲሁም የእጅ ለእጅ ንክኪ እንዳይደረግ በማድረግ ችግሩን እናስወግዳለን።

አማራጮች

- የርስዎ በጥነቱ ላይ መሳተፍ ለጥናቱ በጣም ጠቃሚ ነው። ሆኖም አለመሳተፍ ይችላሉ። ይህ የእርስዎ ውሳኔ ነው።
- አሁን በጥናቱ ለመሳተፍ እንደወሰኑ እና እንዳልወሰኑ ልጠይቆት ነው። ሆኖም ጠናቱነ በተመለከተ ያልዎትን ጥያቄ በሚከተለው የስልክ ቁጥር [ዶ/ር ንጉሴ ደቤሳ ስልክ ቁ +251911400059] ወይም በኢ- መየል negdaysun@gmail.com ማነጋገር ይችላሉ። ከላይ የተጠቀሰው አድራሻ ጥሩ መልስ ካልሰጠዎት፤ ይህን ጥናት በበላይነት የሚቆጣጠረው አካልን (የህብረተሰብ ጤና አጠባበቅ ማህበር፤ በስልክ ቀጥር +251-114-166083/41ማነጋገር ይችላሉ።

- በቃለ መጠየቁ ለመሳተፍ ተስማምተዋል?
  1 አዎን 2 የለም

- የመረጃ ሰብሳቢ (ማረጋገጫ ፊርማ) ፊርማ_____

የስምምነት ቅፅ

ለመጠየቅ ተጠያቂ

1. በጥናቱ የተካተቱት ሁኔታዎች አንብቤ የገባኝ መሆኔን አረጋግጣለሁ በወቅቱም ያልገቡኝን ጥያቄዎች ለመጠየቅ እድሉ ነበረኝ
2. በጥናቱ ላይ በፈቃደኝነት እንደምሳተፍና በማንኛውም ጊዜ ያለምንም ምክንያት ማቋረጥ እንደምችል ገብቶኛል።
3. የሆነ ጥያቄ ካለኝ፤ የጥናቱ ባለቤትም ሆነ ጥናቱን የፈቀደ አካል እንዳነጋግር አድራሻ ተሰጥቶኛል።
4. ስሜ ሳይመዘገብ፤ ሌላ ሰው በሌለበት ብቻየን መጠይቁን ለሞምላት በሙሉ ፈቃደኝነት ተስማምቻለሁ።
5. ባጠቃላይም በጥናቱ ላይ የበኩሌን ለማበርከት ተስማምቻለሁ።

የስምምነት ማረጋገጫ ምልክት_____ ቀን _____

የመረጃ ሰብሳቢ (ፊርማ)_____ ቀን _____

Data collection instruments

Annex: An instrument for review of records

Health facility Name:_____Type of Facility_____Owner of facility _____

የጤና ተቋም ስም የተቋሙ ኤይነት የተቋሙ ባለቤት

Sub-city_____ Position of person _____

ክፍለ-ከተማ ታላፊነት

Date of report _____

i. Health service delivery

List number of people who received health care services [curative and preventive services]

	2019							2020							2021					
	Mar	Apr	May	Jun	Jul	Aug		Mar	Apr	May	Jun	July	Aug		Mar	Apr	May	Jun	July	Aug
2. Immunization																				
BCG/ OPV0																				
OPV1/ DPT/ PENTA3																				
Measles																				
FP-total new																				
FP_age-10-14 new																				
FP_age-15-19 new																				
FP_age-20-24 new																				
FP_age- 30-49 new																				
FP-total repeat																				
FP_age-10-14 repeat																				
FP_age-15-19 repeat																				
FP_age-20-24 repeat																				
FP_age- 30-49 repeat																				
FP-methods new																				
FP_Oral_pill new																				
FP_Injectable new																				
FP_Implant new																				
FP_IUD new																				
FP_Other new																				
FP-method repeat																				
FP_Oral_pill repeat																				
FP_Injectable repeat																				

FP_Implant repeat																				
FP_IUD repeat																				
FP_Other repeat																				
Immediate Post Partum FP_age																				
IPPF_age-10-14 new																				
IPPF _age-15-19 new																				
IPPF _age-20-24 new																				
IPPF _age- 30-49 new																				
IPPF-method																				
FP_Oral_pill																				
FP_Injectable																				
FP_Implant																				
FP_IUD																				
FP_Other																				
Antenatal care First visit																				
ANC-< 16 weeks																				
ANC >/= 16 weeks																				
ANC-First_age																				
ANC 1st 10-14																				
ANC 1st 15-19																				
ANC 1st 20 or more																				
ANC-Fourth by age																				
ANC 4th 10-14																				
ANC 4th 15-19																				
ANC 4th 20 or more																				
Births attended																				
Post natal care																				

Safe abortion																				
Safe abo 10-14																				
Safe abo 15-19																				
Safe abo 20-24																				
Safe abo 25-49																				
Post abo care																				
Post abo C. 10-14																				
Post abo C.15-19																				
Post abo C.20-24																				
Post abo C.25-49																				
Teenage Girls +ve preg																				
TG+ve 10-14																				
TG+ve 15-19																				
TG+ve Others																				
Pregnants knew their (HIV results)																				
Adolescent friendly service																				
RH/ FP counselling																				
HIV-testing counselling																				
Life skill counselling																				
Career counselling																				
Other counselling																				

Interview guideline

Date of report _____

A. Representing _____

1) FP provider 2) ANC- provider 3) Delivery service provider

4) Counselling service 5) MCH-coordinator 7) Beneficiary (women)

7) Beneficiary (adolescent) 8) Other (specify) _____

B. Age |__|__|

C. Sex [1. Male 2. Female]

D. Marital status _____

E. Profession (only health provider)

i. Profession_____ii. Department _____

iii. Position _____

Questions in each scenario?

1) How was the quality, access, safety, and coverage before and after the COVID-19 epidemic for the following theme of health care service?
ለሚከተሉት የጤና አገልግሎት ትራቱ፤ ተደራሽነቱ፤ ደህንነት፣ እና የአገልግሎት ሽፋን ከኮቪድ-19 ወረርሽኝ በፊት እና በኋላ ለሚከተለው የጤና አጠባበቅ አገልግሎት ጭብጥ ምን አለ?
2) How is the availability and quality of health professionals assigned in the service?
በሚሰጠው አገልግሎቱ ውስጥ የጤና ባለሙያዎች በሥራ ላይ መገኘት እና ጥራት እንዴት እንደሚሰሩ ግለፅልኝ?

3) Availability of medical equipment and drugs (financial, medication (eg pills), surgical manipulations, lab investigations, etc.) necessary for the service?

ለአገልግሎቱ አስፈላጊ የሆኑ የህክምና መሳሪያዎች እና መድሃኒቶች (የገንዘብ፣መድሀኒት (ለምሳሌ እንክብሎች)፣የቀዶ ጥገና ዘዴዎች፣የላብራቶሪ ምርመራዎች፣ወዘተ) መገኘት?

4) Governance of the service, how do health workers interact with their heads, colleagues, and clients? Presence of a plan to attain service, so the presence of monitoring and evaluation in place? የአገልግሎቱ አስተዳደር፣ የጤና ባለሙያዎች ከኃላፊዎቻቸው፣ ከሥራ ባልደረቦቻቸው እና ከደንበኞቻቸው ጋር እንዴት ይገናኛሉ? አገልግሎት ለመስጠት የታቀደ አላማ መኖሩ፣ ስራው በትክክል ለመፈፀም የክትትል እና ግምገማ በቦታው አለ ወይ?

   a. FP [by age, method, first time/ repeated, counselling, youth involvement]

      [በእድሜ ፣ በምጣኔ ዘዴ ፣ የመጀመሪያ / በድጋሚ ፣ ድህረ-ወሊድ ምጣኔ ሀብት፤ የወጣቶች ተሳትፎ፣ የምክር አገልግሎት]

   b. ANC [by age, first time, gestational age at first visit/ four times visit]
      [በእድሜ, ለመጀመሪያ ጊዜ, በእርግዝና የመጀመሪያ 16 ሳምንት ጉብኝት / 4ኛ ሳምንት ጊዜ ጉብኝት]

   c. Delivery service [የማዋለድ ግልጋሎት]

   d. Post-natal care [ድህረ-ወሊድ ግልጋሎት]

   e. Abortion [by age, follow up (post abortion]

      ውርጃ, [በዕድሜ, ክትትል (ከፅንስ ማስወረድ በኋላ]

የኢትዮጵያ ጤና አጠባበቅ ማህበር
(ኢጤአማ)

Ethiopian Public Health Association
(EPHA)

ቁጥር Ref No. EPHA/06/525/21
ቀን Date Nov. 15/2021

Dr.Negussie Deyessa
Principal Investigator
Yordanos Tefera
Co-Principal Investigator
Addis Ababa University
Addis Ababa

Subject: - Ethical Approval

It is to be recalled that you have submitted an application to the Ethiopian Public Health Association Institutional Review Board for ethical review and clearance of the protocol entitled **"The Effect of Covid-19 on Sexual and Reproductive health service, in Addis Ababa"**

Based on this, the institutional review board reviewers have made an expedite review to your application and decided to give you the ethical approval.

Therefore, the above-mentioned protocol has been approved by the board for a period of one year (November 08, 2021 –November 07, 2022). Any change in the approved protocol must be reviewed and approved by the EPHA-IRB through the amendments process prior to its implementation

Please also note that the progress report submission should be made every three months.

With regards,

Tesfa Demelew

A/Deputy Executive Director

CC:/

Research and Publication Director

IRB Administrator
EPHA

ስልክ Tel: +251 114 16 60 41
+251 114 16 60 85
+251 114 16 60 88

ፖ.ሣ.ቁ P.O.Box 7117

ፋክስ Fax: +251 114 16 60 86

ኢ-ሜይል E-mail: info@epha.org

ድህረ ገጽ Website: www.epha.org

አዲስ አበባ ኢትዮጵያ
Addis Ababa, Ethiopia

Curriculum Vitaes

BIORAPHICAL SKETCH

NAME	POSITION TITLE
Negussie Deyessa Kabeta	Associate Professor, School of Public Health, Addis Ababa University

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Umea University	***Ph.D.***	***09/10***	***Psychiatric epidemiology***
Addis Ababa University	MPH	07/96	Public Health
Gondar College of Medical Science	B.A.	7/89	Medicine

Personal profile

Dr Negussie Deyessa is a senior researcher and lecturer with an Associate Professor rank in Epidemiology and works in the Department of Preventive Medicine, School of Public Health, Addis Ababa University. He is a qualified medical doctor with a Master's of Public Health and a PhD in Psychiatric Epidemiology. His clinical practice and experience go back to the early 1990^{th,} and he has worked as a general practitioner in Moyale Health Center, Adigrat, and Mekele hospitals, with a Medical Director post at Adigrat hospital. He has also worked as head of the health service in Tigray Regional Health Bureau in northern Ethiopia.

As a professor in his department, he has conducted basic training for medical undergraduates, masters, and PhD students. He instructs students from masters of public health, health informatics, health economics, medical residents, field epidemiologists, medical undergraduates, including PhD students. Epidemiology, biostatistics, research methods, implementation science, critical appraisal, monitoring, and evaluation are covered topics. He has also provided in-service training to students at his university in statistical software, particularly SPSS, Epi-info, and Stata. In addition, he has taught the software as a capacity building for faculties in other universities, including Hawassa, Dilla, Wollaita, Selalle, and Ambo Universities. As a senior faculty member, he has advised undergraduate medical students

in research through active involvement in rural health attachment at the grassroots level within the public. He has advised more than 165 master's students and seven PhD students. Currently, he is supervising more than seven PhD students and five master's students.

Dr Negussie Deyessa has won more than thirteen national and international research grants that have been applied in the country. He has authored more than 78 articles from his research on a diverse health issue necessary for the public, health providers, and policymakers. He has published in areas related to communicable and non-communicable diseases. He also studied conditions related to mental health disorders, reproductive health, child health, etc., that have contributed to the national guidelines of the Ethiopian Ministry of Health

II. Professional Background

a) Addis Ababa University

1) He has applied for a **full Professor** in Dec 2018, and it is in process.
2) **Associate Professor** in epidemiology unit, Department of Preventive Medicine, School of Public Health, Addis Ababa University, since 2013.
3) **Assistant Professor** in epidemiology unit, School of Public Health, **Addis Ababa University**, with duties as in the above (May 2002-2013):

Duties and responsibilities as (Associate/ Assistant Professor)

- ✓ **PhD program coordinator** of the School of Public Health, Addis Ababa University (From Jan2016 to Dec 2019)
- ✓ **Head, epidemiology unit** within the Department of Preventive Medicine, in the School of Public Health, Since 2012.
- ✓ **Head, Academic Promotion Committee** of the Department of Preventive Medicine, in Public

Health, Since 2013.

- ✓ **Monitoring and evaluation, lead** for the Health Professional Education and Partnership Initiative **(**HEPI), since 2018

b) The Ethiopian Ministry of Health [Sept. 1989-June 1998]

4. **Head, Department of Health Service and Training**, Tigray Regional Health Bureau, Mekele City, with a responsibility to participate in the human resource and training of health providers in the regional state [Sept 1996- July 1998]

5. **Medical Director**, Adigrat General Hospital, a referral hospital serving about one million population, Adigrat Town, Tigray [with a responsibility to lead and manage the hospital activity during the routine service and epidemic of measles and pertussis] Sept 91- Aug 1994]

6. **Medical Practitioner** in Moyale Health centre, Serving more than 200,000 people, in Moyale District, South Ethiopia, Near-border to Kenya [Sept 1989- Aug 1991].

Publications in the last five years

Asrat, Y., Huluka, D. K., Getachew, N., Abule, H. A., Araya, H., Tadesse, B., Deyessa. N. & Sherman, C. B. (2021). Awake prone positioning for COVID-19 patients at Eka Kotebe General Hospital, Addis Ababa, Ethiopia: A prospective cohort study. *Journal of the Pan African Thoracic Society*, 1-7..

Leight, J., Deyessa, N., & Sharma, V. (2021). Cost-effectiveness analysis of an intimate partner violence prevention intervention targeting men, women, and couples in rural Ethiopia: evidence from the randomized control of the Unite for a Better Life. *BMJ Open*, *11*(3), e042365.

Gebremedhin G, Enqueselassie F, Yifter H, and Deyessa N. 2021. Hyperglycemic Crisis Characteristics and Outcome of Care in Adult Patients without and with a History of Diabetes in Tigrai, Ethiopia: Comparative Study. *Diabetes Metab Syndr Obes*;14:547-556 https://doi.org/10.2147/DMSO.S275552

Yifter, H., Omer, A., Gugsa, S., Fekadu, A., Kebede, A., Gebremariam, T., Melkie, A. and Deyessa, N., 2021. Protocol: Early detection and management of major non-communicable diseases in urban primary healthcare facilities in Ethiopia: a study protocol for a type-3 hybrid implementation-effectiveness design. *BMJ Open*, *11*(1), p.e040564.

Asemu, M. M., Yalew, A. W., Kabeta, N. Deyessa., & Mekonnen, D. (2021). Prevalence and risk factors of hypertension among adults: A community based study in Addis Ababa, Ethiopia. *PloS one*, *16*(4), e0248934.

Desalegn, Z., Deyessa, N., Teka, B., Shiferaw, W., Hailemariam, D., Addissie, A., Abagero, A., Kaba, M., Abebe, W., Nega, B. and Ayele, W., 2021. COVID-19 and the public response: Knowledge, attitude and practice of the public in mitigating the pandemic in Addis Ababa, Ethiopia. *PloS one*, *16*(1), p.e0244780.

Desalegn, Z., Deyessa, N., Teka, B., Shiferaw, W., Yohannes, M., Hailemariam, D., ... & Abebe, T. (2021). Evaluation of COVID-19 related knowledge and preparedness in health professionals at selected health facilities in a resource-limited setting in Addis Ababa, Ethiopia. *PloS one*, *16*(2), e0244050.

Leight, J., Deyessa, N., Verani, F., Tewolde, S. and Sharma, V., 2021. Community-level spillover effects of an intervention to prevent intimate partner violence and HIV transmission in rural Ethiopia. *BMJ global health*, *6*(1), p.e004075.

Megerso, A., Deyessa, N., Jarso, G., Tezera, R., & Worku, A. (2021). Exploring Community Tuberculosis Program in the Pastoralist Setting of Ethiopia: a Qualitative Study of Community Health Workers' Perspectives in Borena Zone, Oromia Region.

Nega, B., Addissie, A., Mamo, G., Deyessa, N., Abebe, T., Abagero, A., Ayele, W., Abebe, W., Haile, T., Argaw, R. and Amogne, W., 2020. Sero-prevalence of anti-SARS-CoV-2 Antibodies in Addis Ababa, Ethiopia. *bioRxiv*.

Regassa, B., Deyessa, N., Addissie, A., Abagaro, A., Shumi, G., and Gudina, G., 2020. Outbreak investigation of Visceral Leishmaniasis in Borena Zone, Oromia Region, Ethiopia, November 2019: Case-Control study. *medRxiv*.

Deyessa, N., Senbete, B., Abdo, A., & Mundia, B. M. (2020). Population estimation and harm reduction among people who inject drugs in Addis Ababa, Ethiopia. *Harm Reduct J, 17*(1), 61. doi:10.1186/s12954-020-00407-x

Huluka DK, Mekonnen D, Abebe S, Meshesha A, Mekonnen D, Deyessa N, Klinger JR, Ventetuolo CE, Schluger NW, Sherman CB, Amogne W. Prevalence and risk factors of pulmonary hypertension among adult patients with HIV infection in Ethiopia. Pulmonary Circulation. 2020 Oct;10(4).

Sahlu, D., Deyessa, N., Firdu, N. and Asfaw, S., 2020. Food insecurity and other possible factors contributing to low birth weight: A case-control study in Addis Ababa, Ethiopia. *Asian Pacific Journal of Reproduction*, *9*(4), p.174.

Megerso, A., Deyessa, N., Jarso, G., & Worku, A. (2020). Lived experiences of tuberculosis patients and their implications for early tuberculosis case identification and management in the pastoralist community setting: a qualitative study in Borena zone, Oromia region of Ethiopia. *BMC Health Services Research, 20*(933). doi:https://doi.org/10.1186/s12913-020-05787-1

Deyessa, N., Webb, S., Duku, E., Garland, A., Fish, I., Janus, M., & Desta, M. (2020). Epidemiological study of a developmentally and culturally sensitive preschool intervention to improve school readiness of children in Addis Ababa, Ethiopia. *J Epidemiol Community Health, 74*(6), 489-594. doi:10.1136/jech-2019-213019

Gebremedhin, G., Enqueselassie, F., Deyessa, N., & Yifter, H. (2020). Urban-Rural Differences in the Trends of Type 1 and Type 2 Diabetes Among Adults Who Received Medical Treatment from Public Hospitals in Resource-Poor Community Tigray, Ethiopia. *Diabetes Metab Syndr Obes, 13*, 859-868. doi:10.2147/DMSO.S238275

Tadesse, A.W., Deyessa, N., Wondimagegnehu, A., Biset, G., and Mihret, S., 2020. Intimate partner violence during pregnancy and preterm birth among mothers who gave birth in public hospitals, Amhara Region, Ethiopia: A case-control study. *The Ethiopian Journal of Health Development (EJHD), 34*(1).

Gebremariam, T.H., Shewamare, A., Deyessa, N., Haile, L., Blumberg, H.M., Auld, S. and Degu, W.A., 2020. Effect of Isoniazid Preventive Therapy on Prevention of Tuberculosis and Reduction of All-Cause Mortality Among HIV Patients on Antiretroviral Therapy. In *A108. HIV RELATED PNEUMONIA, T.B., AND MYCOBACTERIAL INFECTIONS* (pp. A2692-A2692). American Thoracic Society.

Keynejad, R. C., Bitew, T., Sorsdahl, K., Myers, B., Honikman, S., Medhin, G., Deyessa, N . . . Hanlon, C. (2020). Problem-solving therapy (PST) tailored for intimate partner violence (IPV) versus standard PST and enhanced usual care for pregnant women experiencing IPV in rural Ethiopia: protocol for a randomized controlled feasibility trial. *Trials, 21*(1), 454. doi:10.1186/s13063-020-04331-0

Bacha, T., Getachew, T., Kejela, S., Deyessa, N., & Svenson, J. (2020). The pattern of pediatric trauma in AABET hospital: A cross-sectional study using a trauma registry. *Ethiop Med J,, 58*(Supp. 2), 115-123.

Leight, J., Deyessa, N., Verani, F., Tewolde, S., & Sharma, V. (2020). An intimate partner violence prevention intervention for men, women, and couples in Ethiopia: Additional findings on substance use and depressive symptoms from a cluster-randomized controlled trial. *PLoS Med, 17*(8), e1003131. doi:10.1371/journal.pmed.1003131

Sharma, V., Amobi, A., Tewolde, S., Deyessa, N., & Scott, J. (2020). Displacement-related factors influencing marital practices and associated intimate partner violence risk among Somali refugees in Dollo Ado, Ethiopia: a qualitative study. *Confl Health, 14*, 17. doi:10.1186/s13031-020-00267-z

Sharma, V., Leight, J., Verani, F., Tewolde, S., & Deyessa, N. (2020). Effectiveness of a culturally appropriate intervention to prevent intimate partner violence and HIV transmission among men, women, and couples in rural Ethiopia: Findings from a cluster-randomized controlled trial. *PLoS Med, 17*(8), e1003274. doi:10.1371/journal.pmed.1003274

Sharma, V., Papaefstathiou, S., Tewolde, S., Amobi, A., Deyessa, N., Relyea, B., & Scott, J. (2020). Khat use and intimate partner violence in a refugee population: a qualitative study in Dollo Ado, Ethiopia. *BMC Public Health, 20*(1), 670. doi:10.1186/s12889-020-08837-9

Debebe, T., Shekur, Z., Solomon, D. Z., Tersit, A., Deyessa, N., Assefa, G., . . . Laeke, T. (2019). Computerized Tomographic Findings and Injury Pattern in Patients with Traumatic Brain Injury at Tikur Anbessa Specialized Hospital, Addis Abeba. *Ethiop Med J, 57*(4), 337-341.

Tamrat G, Osman M, Deyessa N, Taye M, Lett R, Bekele A. Delay of emergency surgical interventions in Ethiopia: Patient and health system factors. EAST and CENTRAL AFRICAN Journal of Surgery. 2018;23(2):59–65.

Deyessa N, Argaw A. Intimate partner violence and unmet need for contraceptive use among Ethiopian women living in marital union. Ethiop J Health Dev. 2018;32(3):000-.

Shimelis D, Abebe B, Deyessa N. Incidence of Acute Kidney Injury and Determinant Factors in Children Admitted to a Tertiary Hospital. Journal of Dental and Medical Sciences. 2018;17(3):48-53.

Garland AF, Deyessa N, Desta M, Alem A, Zerihun T, Hall KG, et al. Use of the WHO's Perceived Well-Being Index (WHO-5) as an efficient and potentially valid screen for depression in a low-income country. Fam Syst Health. 2018;36(2):148-58.

Deyessa N. Intimate Partner Violence and Human Immunodeficiency Virus Infection among Married Women in Addis Ababa. Ethiop Med J 2018;56(1):51-9.

Dendir E, Deyessa N. Intimate Maternal Partner Violence and Low Birth Weight in Addis Ababa Public Hospitals. Ethiop Med J. 2018;56(2):103-11.

Gemechu T, Labisso WL, Deyessa N. The Relative Frequency and Patterns of Solid Malignant Tumors in Tikur Anbessa Specialized Teaching Hospital: A 10 Year Histopathology Review Sch J App Med Sci 2018;6(1D):278-88.

Alemayehu M, Deyessa N, Medihin G, Fekadu A. A descriptive analysis of depression and pain complaints among patients with cancer in a low-income country. PLoS ONE. 2018;13(3):e0193713.

Shiferaw D, Deyessa N, Fufa G, Kinati T, Desalegn M. Prevalence and associated factors of female genital mutilation among high school students in Dale Wabera Woreda, Oromia Regional State, Ethiopia. Journal of Medicine. 2017;9(6):72-8.

Isaksson J, Deyessa N, Berhane Y, Hogberg U. Early adversity and psychiatric symptoms - a prospective study on Ethiopian mothers and their children. BMC psychiatry. 2017 October 11;17(1):344. PubMed PMID: 29020947. Pubmed Central PMCID: 5637326.

Dendir, E., & Deyessa, N. (2017). Substance use and birth weight among mothers attending public hospitals: A case-control study. *Ethiop. J. Health Dev., 31*(1), 27-35.

Desta, M., Deyessa, N., Fish, I., Maxwell, B., Zerihun3, T., Levine, S., Garland, A. F. (2017). Empowering Preschool Teachers to Identify Mental Health Problems: A Task-Sharing Intervention in Ethiopia.*Mind, Brain, and Education, 11*(1), 32–42.