Patterns of essential health services utilization and routine health information management during Covid-19 pandemic at primary health service delivery point Addis Ababa, Ethiopia.

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Abstract

Background: Health information system refers to any system that captures, stores, manages, and transmit information related to health of individuals. The essential health service includes Antenatal care, skilled birth attendant, emergency, outpatient, Inpatient, Pneumonia, and Immunization. The current pandemic of coronavirus disease (COVID-19) has proved devastating in low-income countries, which were already suffering from low access for basic health service utilization. The pandemic might generate disruptive collateral damage to ongoing healthcare services through diverting available healthcare resources to the fight against the pandemics in these countries. This study aimed to assess the pattern of essential health services utilization, data accuracy checking, and information use performance review practice at selected public health center in Addis Ababa Ethiopia.

Methods: We employed cross-sectional study and retrospectively reviewed health records to assess the pattern of selected essential health service utilization, data quality, and performance review practice before and during the COVID-19 pandemic. Out of twenty-seven health centers, nine health centers were randomly selected from three sub-cities to review key indicators using a guiding checklist. Data were extracted using record verification protocol. Data was entered, cleaned, and analyzed using STATA version 14. We used average change in proportions to describe the pattern of service utilization, data quality and performance review practice before and during COVID 19. The mean difference before and during COVID 19 was compared using paired T-test statistics.

Result: Essential health services utilization has been partially or completely disrupted in the selected health centers. Pneumonia (70%), Upper respiratory diseases (65%), PICT (54%), Out-patient (42%), and 39% for data quality and performance review practice (39%) showed significant reduction during COVID 19 cases reported in the country. ANC1, ANC4, Penta1, and Penta4 service show almost in a similar trend from month to month before and during COVID-19.

Conclusion: Service utilization like emergency, out-of-patient, and VCT cases significantly reduced during COVID-19 pandemic. During the COVID-19 pandemic, routine data accuracy checks, and RHIS performance reviews practice were also significantly reduced. [*Ethiop. J. Health Dev.* 2021; 35(SI-1):90-97]

Key words: Data quality, data use, health service utilization

Introduction

Global mortality from non-outbreak cases during a pandemic remains unacceptably high and is increasing (1). The World Health Organization declared COVID-19 a pandemic on March 11, 2020(1). Later, the viruses evolve into a life-threatening pandemic that spreads to every country. Within a year of the first case study, 81.2 million confirmed cases and over 1.8 million deaths had been registered worldwide (2). Of these, 2.7 million cases and 62,903 deaths have been reported from 57 Africa countries. Ethiopia reported its first case on March 13, 2020, and as of December 2020, 122864 confirmed COVID-19 cases and 1909 deaths (2).

Patients seeking antenatal care services, Myocardial Infarction (STEMI) activations, and stroke reduction were reported during the pandemic (3,4,5). This reduction is due in large part to fear of entering healthcare facilities and contracting COVID-19 (6). Study result from Taiwan revealed that the occupancy rate in-hospital hospice units were also dramatically decreased during the pandemic, dropping from 66.2 percent before the pandemic to 37.4 percent during the pandemic (7). The study stud also showed that during the pandemic, only 114 pregnant women (29.3%) had completely used antenatal care services in Taiwan (7).

Mass gatherings and public events were prohibited, as were schools, government buildings, and businesses, as well as all travel (8). The impact of the pandemic on an already compromised health system has been demonstrated and it has a devastating effect on other health programs in different countries. The pandemic is posing a huge problem in other health programs particularly chronic disease which required close follow and care. The health system more focusing on responding to the pandemic by advocating the mitigation mechanisms of the pandemic (9). Many patients were unable to obtain healthcare service as a result of these limitations.

Many outpatients and inpatient facilities were also halted as healthcare staff and other personnel was diverted to COVID-19. Furthermore, in China patients stopped seeking medical help due to fear of catching the virus in a medical environment (10, 11) resulting in delay necessary healthcare such as surgery, dialysis, and cancer treatment. (12,13).

In the United States, there have been 38% fewer hospital visits for heart attack symptoms, and 40% fewer in Spain (14). Different studies also showed that a declining trend in the utilization of maternal and child

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health (MCH) services such as delivery, antenatal care (ANC) attendance, PNC, and child immunization (15, 16). For example, during the COVID-19 pandemic, a recent report modeling the coverage of critical maternal and child health interventions in 118 low- and middle-income countries (LMICs) showed a rise in maternal deaths of 8.3–38.6% per month. (17)

It may be useful to look at how healthcare utilization trends for other medical conditions have changed to better understand the current situation surrounding healthcare utilization patterns for people with an opioid use disorder during COVID-19. (18)

Worldwide outbreaks impacted all sectors of the healthcare systems, decreasing healthcare capacity in all countries, including non-communicable disease diagnosis, management, and prevention programs. Any outbreak adversely impacted all HCWs involved in healthcare service delivery. (20) At the height of the COVID outbreak in China, numerous staff members contracted covid-19 viruses at the COVID treatment units, and many died; these included doctors, nurses, ambulance drivers, porters, and other ancillary staff who received, examined, treated, nursed, and/or moved patients with symptoms (21). Furthermore, many HCWs were infected in healthcare facilities that were not COVID treatment units but were national hospitals and peripheral health units that were unprepared for receiving patients with COVID-19. All the attention of national and international health care providers is focusing on limiting the further spread of COVID-19 and reducing mortality in infected patients (22)

The pandemic might generate disruptive collateral damage to ongoing healthcare services through diverting available healthcare resources to the fight against the pandemics in the country. On the one hand, the outbreak compromised the functioning of the health system, due to the deaths of many health care workers and the closure of health facilities, while at the same time communities had little trust in the capacity of providers to secure safe health care in Ethiopia. Evidence from different settings indicates that covid-19 may persist for a long time, particularly in developing countries. As the result, healthcare service may continue deteriorating in providing essential health services to the public. The health system should look for an alternative strategy to ensure resilience. For the key essential health service, such as maternal child, generating ongoing evidence on the impact of the pandemic on health care service is curial to guide health system planning to develop resilience. Hence, this study aimed to assess selected essential services utilization (ANC1, ANC4, SBA, Penta3, emergency, In-patient, out-patient, pneumonia, VCT, LQAS, and PMT) and Data quality and information use review before and during COVID_19 pandemics reported at selected public health facilities in Addis Ababa, Ethiopia.

Methodology
Study area and period: The data was collected from the selected health centers of three sub-cities in Addis Ababa. Addis Ababa city administration is one of the largest city administration and capital of the country.

The city has administrative structures: one city council, 11 sub-cities, and 116 woredas. An estimated, population of the city was 4.5 million people with a male to female ratio of 0.92. Under the city administration, there are 10 sub-cities Health offices, 6 Public hospitals, 1 Public health laboratory, and 86 public health centers. The study was conducted from May 30-July 15, 2020.

Study design
A retrospective health facility record review was carried out using structure checklist to assess the pattern of selected essential health services utilization, data quality and information use at primary care units.

Sample size and sampling procedure
Three sub-cities were purposely selected then the lists of all public health centers in the selected sub-cities were obtained for the study. Out of 27 health centers, nine of them were randomly selected from the three sub-cities. Eight months' (November 2019 to June 2020) service provision registers were reviewed on the selected essential health services: Maternal and child health, OPD, Emergency, diseases, and system indicator. The indicators selected for assessment were based on the criteria of being a key service and disease indicator, which are considered as quality indicator for service and diseases.

Data variables
The data variables for the study included are
Antenatal care: The first ANC (ANC1) visit: Number of pregnant women that received antenatal care at least once, the fourth ANC visit (ANC4): The number of pregnant women that received antenatal care at least four visits.

Other services: Skill birth attendant rate (SBA): The number of births attended by skilled health personnel, Penta 1: Number of children under one year of age who have received first dose of pentavalent vaccine, Penta3: Number of children under one year of age who have received third dose of pentavalent vaccine.

Number of patients diagnosed to: Pneumonia, upper respiratory diseases, client Provider initiative HIV/AIDS Counseling and Testing (PICT), Outpatient, emergency service and inpatient service utilization.

Data accuracy: Number of records on register vs number of reported on DHIS2, number of HIS performance review for selected indicator, Data on these variables were reported on a routine monthly basis over the study period.

Operational definition
Data Quality Assurance: A systematic monitoring and evaluation of data to uncover inconsistencies in the data and data management system and making necessary corrections to ensure quality of data.

Performance Monitoring Team is a team of multidisciplinary health workforce that is primarily responsibility to improve data quality and use information regularly to monitor progress and improve performance at all levels.

Essential Health service consists of a limited list of public health and clinical services which will be provided at primary and/or secondary care level which includes the services on basic curative care and treatment of major chronic conditions, family health and communicable disease.

Data collection tool and procedure
Data extraction form was prepared based on the objective of the study during review of similar literatures. Essential health service-related data were extracted using from outpatient, emergency, inpatient, HIV/AIDS and ANC, delivery, and EPI registry at each selected health center. Data accuracy checking and HIS performance review practice related data was obtained from the DHIS-2 routine dataset.

Data Management and analysis
Data were checked for completeness, consistency, and missing value and entered, cleaned, and analyzed using the STATA version 14.0 statistical software program. Proportions (percentages)and mean scores were used to describe the pattern of service utilization before and during COVID 19. The average score for health services utilization before and during COVID-19 was compared using paired t-test statistics.

Ethical consideration
Ethical clearance was obtained from the school of Public Health, College of Health Sciences, Addis Ababa University Institutional Review Board. Health facility directors were briefed on the objectives of the study and permission was obtained from each health center.

Results
Overall essential health service utilization at health centers: A summary of the comparison of different months' average service utilization before and during COVID 19 is presented in Table 1. The average reduction of ANC1, ANC4, and Penta 3 was 1.3%, 8.1%, and 1.2% respectively. While SBA (9.8%) and Penta1 (6.7%) increased on average during COVID 19. The proportion of reduction for pneumonia cases, upper respiratory diseases cases, VCT service utilization, outpatient service, and emergency service were 70.0%, 64.9, 54.5%, 42.3%, and 30.3% respectively as compared with average before COVID 19. Similarly, data accuracy checking, and HIS performance review also showed reduction during the COVID 19 cases reported with a proportion of 39.0% and 29.4% respectively.

Table 1: **Comparison of average monthly reported cases on essential health services before and during the COVID 19 at selected health centers in Addis Ababa city administration, 2020**

Indicator	*Total number of cases before COVID 19(n)	**Total number of cases During COVID 19(n)	†Difference n (%)
ANC1	792.3	782.0	-10.3(-1.3)
ANC4	505.3	464.3	-40.9(-8.1)
SBA	319.8	351.0	31.3(9.8)
Penta 1	650.3	693.7	43.4(6.7)
Penta 3	719.8	711.0	-8.8(-1.2)
Emergency	2040.8	1423.0	-617.8(-30.3)
In-Patient	58.8	44.0	-14.8(-25.1)
Out-patient	35557.0	20507.0	-15050.0(-42.3)
Pneumonia	304.5	91.3	-213.2(-70.0)
VCT	883.5	402.0	-481.5(-54.5)
Data accuracy check	8.5	6.0	-2.5(-29.4)
HIS performance review	8.8	5.3	-3.4(-39.0)

*Before COVID 19 = December 2019 -February 2020; during** COVID 19 = April –June 2020; †Differences calculated by subtracting the numbers in the preceding period from the numbers in the following period.*

Overall health service utilization at selected health centers in Addis Ababa*: Of the maternal and Child health service utilization, the proportion of coverage decline by 14%, 17%, 2%, and 13% in April immediately during the first COVID-19 case is detected for ANC1, ANC4, SBA, and Penta3 respectively (Table 2). The proportion of coverage also declined for Emergency, In-patient, Out-patient, Pneumonia, VCT, LQAS, and PMT meeting by 26%, 48%, 27%, 16%, 11%, 11%, and 25% respectively in April immediately during the first COVID-19 case was detected. The service delivery for ANC1 and In-patient, consistently fluctuated up and down from month to month throughout the study time. The maximum decline in the

proportion of service coverage was observed in April for ANC1 (14%), ANC4 (17%), Penta3 (13%), In-patient (48%), and Out-patient (17%). Whereas the maximum increase in the proportion of service coverage was observed in May for Penta 3 (30%) and Emergency (35%). On average more than half (70%) of the health centers surveyed have partially or completely disrupted services for 70% fore pneumonia;65% for AURI; 54% for VCT; 42% Out-patient and 39% for PMT service. Similarly, health data accuracy checking, and data quality and information use performance review was disrupted in the last three months during COVID 19 reported in the country.

Table 2: **Service utilization for selected health service indicator at health centers in three sub-cities in Addis Ababa city administration, 2020**

Percentage Change	December, 2019	January, 2020	February, 2020	March 2020	April, 2020	May, 2020	June, 2020
ANC1	-1%	1%	-9%	14%	-14%	18%	-14%
ANC4	21%	5%	-16%	13%	-17%	16%	-17%
SBA	-13%	7%	20%	-4%	-2%	-1%	8%
Penta 1	-4%	-6%	-7%	2%	24%	-14%	8%
Penta 3	-9%	4%	2%	-8%	-13%	30%	5%
Emergency	-35%	-13%	4%	-3%	-26%	35%	-16%
In-patient	-13%	16%	-23%	64%	-48%	0%	7%
Out-patient	-5%	-15%	0%	2%	-27%	-18%	-9%
Pneumonia	-76%	226%	-43%	-23%	-16%	-39%	-49%
VCT	-2%	-41%	28%	-22%	-11%	-48%	27%
Data accuracy checking	0%	13%	0%	0%	-11%	-38%	0%
HIS performance review	-11%	13%	0%	-11%	-25%	0%	-33%

As indicated in figure 1, the general trend in different services from November up to the June data shows oscillation. The Skilled birth attendant service followed almost a similar trend from month to month, which also continued before and during COVID-19. ANC1 and ANC4 graph oscillated similarly from November up to June. Whereas Penta 3 showed a slight increment during April but, it was not a significant change.
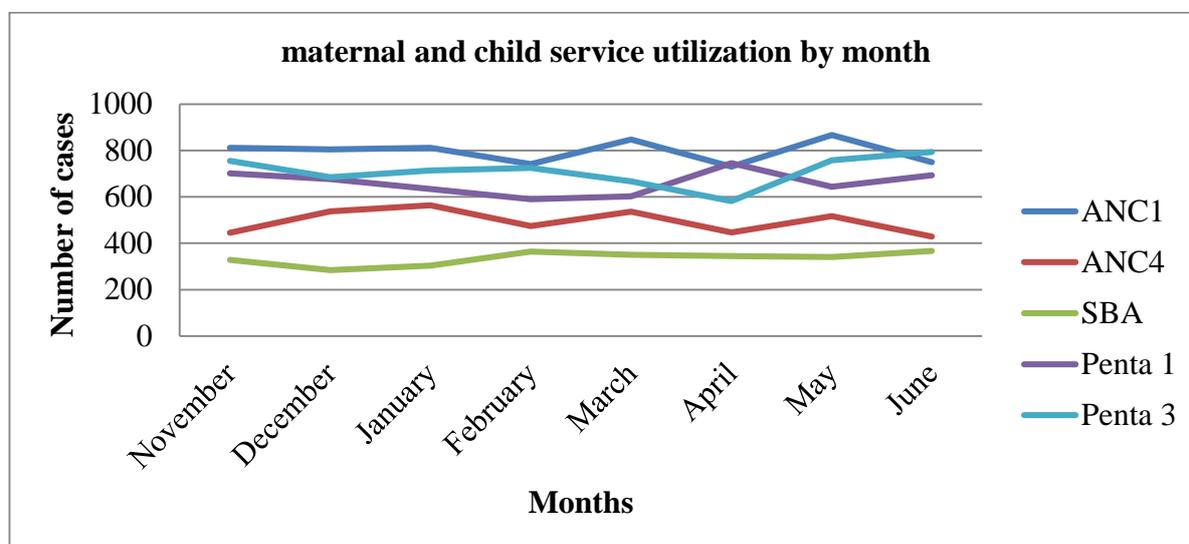

Figure 1: **Number of cases attending ANC 1, ANC 4, SBA, Penta 1and Penta 3 services at the selected health center in three sub-cities Addis Ababa city administration 2020.**

There was a significant decrease in Lot Quality assurance and sampling (LQAS) and Performance monitoring team (PMT) service during the COVID-19 pandemic (Figure 2). The reason was that most of the health workforce was partially or fully reassigned to support COVID-19 so that PMT meeting and LQAS were discontinued, and reporting was not done timely.
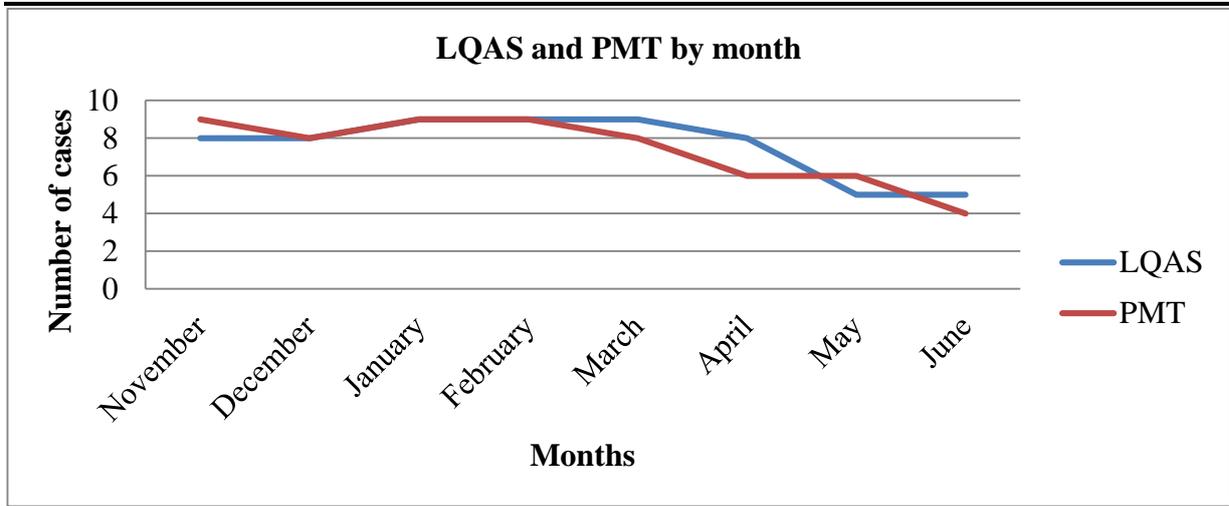
Figure 2; **data accuracy checking and HIS performance review practice at health centers before and during COVID 19 in three sub-cities Addis Ababa city administration 2020.**

Small numbers of In-patients and Pneumonia services were delivered in the given time frame and their changes from month to month were also small. In-patient service decreased from November up to June at selected health centers in Addis Ababa city administration (Figure 3).

emergency service moves in a similar pattern from December up to March but, its pattern after March is changed that might be because of the COVID-19 case and prolonged the non-COVID-19 disease which was not treated timely in fear of COVID-19.
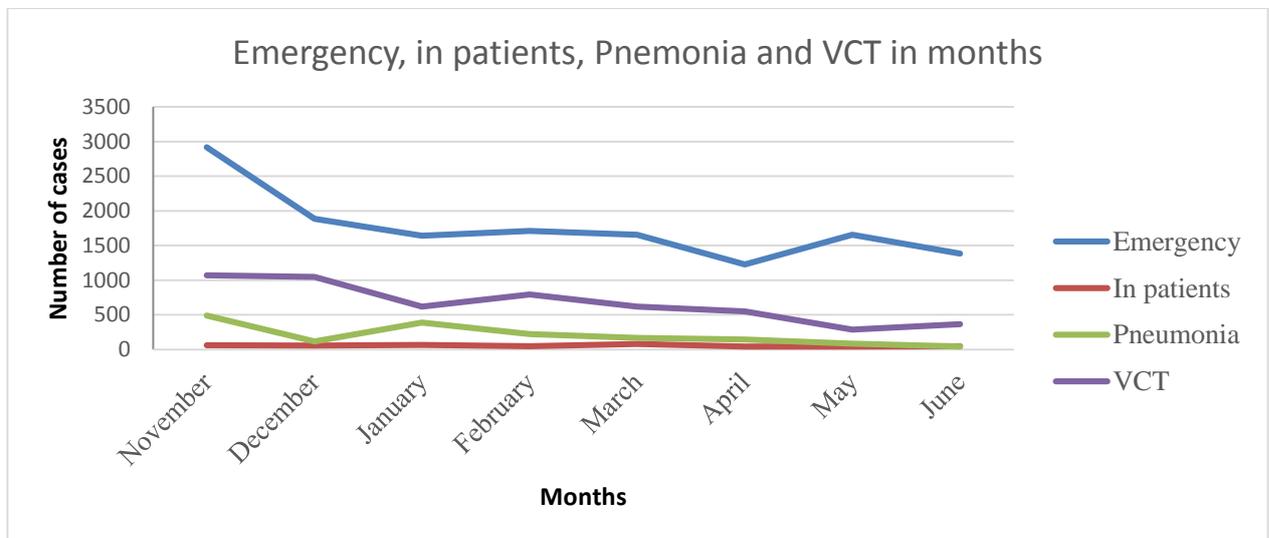

Figure 3: **Number of cases attending Emergency, Inpatient, Pneumonia, and VCT services at selected health center in three sub-cities Addis Ababa city administration between Nov 2019 and June 2020.**

Both, the outpatient, and upper respiratory infection service decreases in the given time frame (Figure 4). The most common reasons for discontinuing or reducing services were because the systems were

focusing on responding to the pandemic through social/physical distancing with the motto of stay at home.
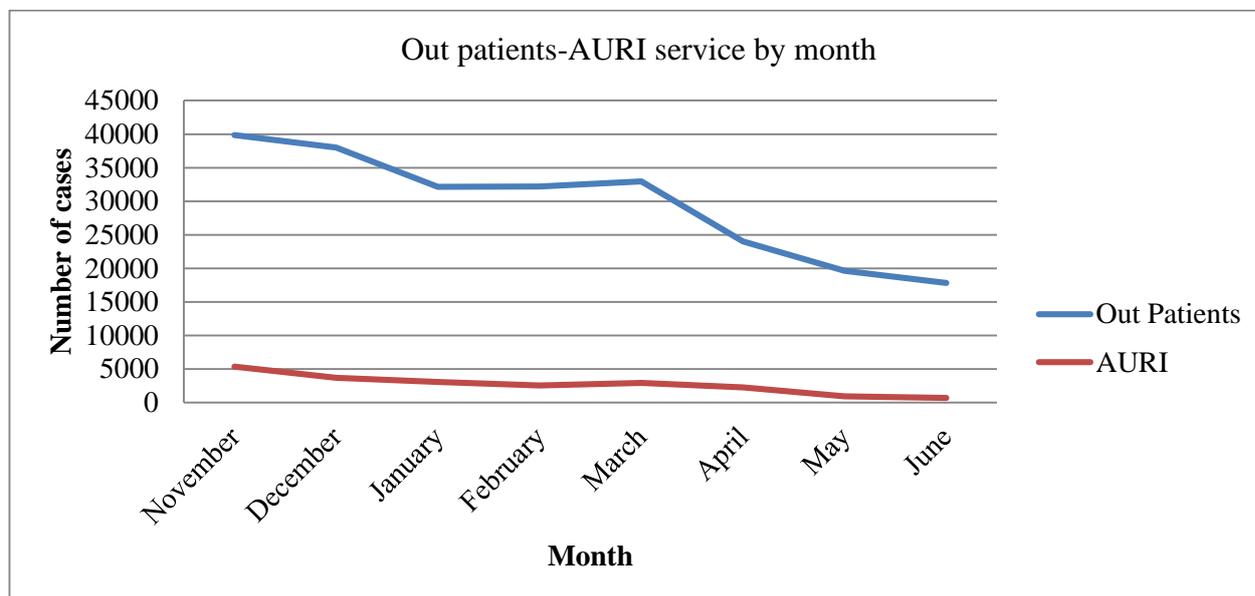
Figure 4: **Outpatients and AURI service utilization at the selected health center in three sub-cities Addis Ababa city administration 2020.**

Mean difference of service utilization and data accuracy checking and HIS performance review before and during COVID cases reported in Ethiopia.
The mean difference of service utilization before and after COVID 19 cases reported is depicted in table 3 below. The mean difference for emergency, outpatient, pneumonia, and upper respiratory diseases service utilization was -88.4 (95% CI, -162.1, -14.8), - 1672.1(95%CI, -2375.4, -968.9), -22.6(95% CI-43.9, -1.2), -271.0(95% CI, -400.1, -141.9) respectively. The mean difference in data accuracy checking, and HIS performance review practice showed significant reduction after COVID 19 cases reported. However, the mean difference for maternal child indicators such as ANC1, ANC4, SBA, Penta 1, and Penta 4 did not show significant mean difference before and during COVID 19 cases reported.

Table 3: **mean difference before and during COVID-19 for the selected indicator at health centers in three sub-cities in Addis Ababa city administration, 2020**

Indicator	Mean difference	95% Confidence Interval	P-value
ANC1	-1.1	(-7.2, 5.0)	0.6841
ANC4	-4.6	(-20.3, 11.2)	0.5233
SBA	4	(-1.5, 9.5)	0.1347
Penta 1	4.9	(-3.8, 13.6)	0.2320
Penta 3	-1	(-9.6, 7.6)	0.7498
Emergency	-88.4	(-162.1, -14.8)	0.0243
Outpatient	-1672.1	(-2375.4, -968.9)	0.0006
In patient	-1.6	(-4.1, 1.0)	0.1930
VCT	-68.6	(17.7-119.6)	0.0145
Pneumonia	-22.6	(-43.9, -1.2)	0.0407
AURI	-271.0	(-400.1, -141.9)	0.0013
PMT	-0.5	(-0.04, -1.0)	0.0353
LQSA	-0.5	(-0.15, -1.0)	0.0353

Discussion
In many countries, the health system is overwhelmed with COVID 19 pandemic due to the high demand for care of COVID 19 patients. Ensuring the resilience of essential health services is crucial to reduce direct and indirect the impact of the pandemic. This study assessed the impact of COVID 19 on health information systems and essential services utilization before and during the COVID-19 pandemic reported in Ethiopia.

We found that there was a variation in the pattern of healthcare service utilization at different health facilities during and before the COVID 19 pandemic. The finding of the assessment showed that health services have been partially or completely disrupted in the selected health centers during COVD 19. This assessment showed that emergency, Out-patient, VCT, Pneumonia, and AURI services utilization saw a significant reduction during the period of COVID-19. Fear of acquiring infection at the health facilities, misinformation, restriction of movement might contribute to low outpatient and emergency service utilization. This indicated COVID 19 has a direct and indirect a contribution to high morbidity and mortality from a preventable and treatable disease.
Results of studies from different settings also reported that health service utilization was affected during COVID 19 (10-13). If the health system does not

proactively respond to ensure the resilience of non-COVID 19 service utilization, it might worsen with continued increases in pandemics in the fragile health system.

This assessment revealed that health care providers'-initiated HIV/AIDS consulting and testing significantly decreasing during COVID 19 cases official reported in the country. The fact that HIV testing is usually required to take the sample from a figure pick, may have induced fear for patients not exposed to COVID 19 virus Studies from West Africa reported that HIV/AIDS services are more affected during the Ebola epidemic (23). Evidence from Guinea showed that there is possibility to maintain essential health service provision even in the pandemic situation if there are contingency planning and support for health services (24). Primary care units need to identify an alternative approach to provide HIV/AIDS testing and other essential health service, considering all necessary conscious measures to minimize exposure to COVID 19 through avoiding direct contact with client.

The reduction of pneumonia and upper respiratory diseases service utilization might indicate fear of stigmatization, given COVID 19 a respiratory disease. A previous study from Taiwan showed there was a significant reduction in pneumonia and upper respiratory disease service utilization. (25)

On the contrary, maternal (ANC1, ANC 4, and SBA) and immunization (Penta 1 and Penta 3) service utilization, although minimal, do not show a significant change before and during COVID-19. The continued campaign carried out by stakeholders in collaboration with the Ministry of Health to maintain maternal and child health service at all levels during the pandemic might have contributed to keeping this service utilization in track during the pandemic. Even so, it is very early to evaluate the uptake of maternal and child health services in the cluster epidemic situation in the country, where most of the health centers in the country are designated for non-COVID 19 services
Evidence from West Africa's Ebola epidemics showed that overall health service utilization, including maternal and child health services, significantly declined during the epidemics (23-25).

The current trend of maternal and child health service utilization may be changed if the current trend of COVID 19 transmission continued. If the health system does not trigger a revised existing approach of basic health service delivery at primary health care particularly for low uptake services, preexisting low essential service utilization will be exacerbated.

Our study showed that most health facilities not carried out data accuracy checking and HIS performance review as per the standard during the COVID-19 pandemic. Most of the health workforce was partially or fully reassigned to support COVID-19 and thus PMT meeting and LQAS were discontinued, and reporting was not done timely. The significant reduction of LQAS and PMT is an indication that the COVID-19 pandemic has also an impact on data quality and information use. Significant reduction of the performance review meeting and LQSA has also an implication that the pandemic has an impact on the health information system utilization, which leads to a substantial effect on the overall health system for evidence-based decisions. Health system leadership should design a contextual approach to balance risk –benefits effect of the pandemic in the health system to ensure data quality and information use.

The health system needs to actively respond in collaboration with all stakeholders, by engaging the community to reduce the direct and indirect impact of the pandemic on essential health service utilization at all levels.

Conclusion
The findings of this study show that there is a variation in the trend of essential health service utilization before and during the COVID 19 pandemic. Services utilization like Emergency, Out-patient, VCT, Pneumonia, and AURI significantly reduced during COVID-19 at Health centers. Routine data accuracy checking, and HIS performance review practice also significantly reduced during the COVID-19 pandemic. The health system needs to be proactive to reduce the direct and indirect impact of the pandemic on non-COVID 19 health service utilization at all levels. Sustained commitment of the Ministry of Health and meaningful collaboration between organizations is critical to support health system re-building and to begin to reverse the poor essential health service utilization.

Further specific program level study recommended investigating root cause of reduction on health service utilization from both service provider and user perspective.

Limitation
The nature of the study by itself does not assess the cause-and-effect relationship of basic factors that impede the utilization of essential health services. There was shortage of local and national reference materials to make a comparison.

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