Maternal and Child Health Care Services Utilization during COVID-19 Pandemic in Ethiopia

Technical Report Prepared by Health system and Reproductive Health Research Directorate

Ethiopian Public Health Institute

In collaboration with Ministry of Health and Countdown to 2030

Maternal, Newborn and child survival

December 2021

Addis Ababa, Ethiopia

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This report presents findings of the utilization of Health services during COVID-19, which was implemented by the Ethiopian Public Health Institute, Ministry of Health and Countdown to 2030.

Additional information about the impact of COVID-19 on essential health services may be obtained from the Ethiopian Public Health Institute (EPHI), Gulelle Arbegnoch Street, Gulelle Sub City, Addis Ababa, Ethiopia. Telephone: +251.11.275.4647; Fax: +251.11.275.4744;

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Preface

The COVID-19 pandemic may affect the utilization of health services through disruptions in the provision of routine health services as well as changes in the demand for services. Multiple modeling studies in a range of health fields have raised major concerns about the impact of the pandemic and the associated service disruptions on health outcomes, particularly for women and children in sub-Saharan Africa where morbidity levels are highest. The Maternal and child health care services utilization during COVID-19 pandemic in Ethiopia report provides information on the impact of the pandemic on selected MCH indicators. It provides reliable information on ANC1, ANC4, Family planning, delivery, immunization, inpatient admission and outpatient visits, child and maternal health services, and ART.

This report is prepared by using DHIS2 data sources and quarter reports of selected health facilities. Hence it will contribute favorably to monitoring service utilization through the pandemic era. It is my hope that the conclusions of the assessment will encourage our stakeholders and partners to continue with their support. We therefore implore all to use the information in this document for improving the MCH service utilization. Since no situation is static, the figures shown here are expected to change with time. Therefore, we intend to conduct similar continuous analysis on an annual basis to determine the level of interruption of essential MCH indicators.

Finally, on behalf of the Ethiopian Public Health Institute (EPHI), I express our appreciation to the Health System and reproductive health research directorate of EPHI for providing guidance in the process of design, execution and analysis of the survey. I would like to pass our gratitude to MoH and partners specifically the Countdown to 2030 maternal, newborn and child survival for the financial and technical support and individuals who have participated in DHIS2 data extraction and curation as well as in the survey.

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Deputy Director General, EPHI

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Acronym and Abbreviations

ANC	Antenatal care
ART	Anti-retroviral Therapy
COVID-19	Corona Virus Diseases
EAs	Enumeration Areas
IPD	In patient department
ICCM	Integrated community case management
DHIS2	District Health Information System software
EPI	Expanded program of Immunization
RMNCH	Reproductive, Maternal, Newborn and child health services
MCH	Maternal and child health services
OPD	Outpatient Department
ORS	Oral Rehydration Salts
PPE	Personal protective equipment

Executive summary

Background: The novel coronavirus (COVID-19) is an infectious disease caused by a newly discovered SARS-CoV-2 virus. Despite strong efforts that have been taking place to control the pandemic globally, the numbers of cases and deaths have been increasing in many countries. Multiple modeling studies have raised major concerns about the impact of the pandemic and the associated service disruptions on health outcomes, particularly for women and children in sub-Saharan Africa where morbidity levels are highest. Hence, this study assessed the maternal and child health care services utilization during COVID-19 pandemic in Ethiopia.

Methods: The data used for this study was collected from two sources. The first one was from the District Health Information System software (DHIS2), initial data quality issues were identified and corrected at district level. The district files were compiled at the regional and national level and checked for completeness and quality. The final analysis relied on mixed effects ordinary least squared regression models to estimate the size of any change in service utilization for each COVID-19 month from March to December 2020 and for the whole COVID-19 period in 2020. The second data source was from health facility reports. The health facility report on Maternal and child health care services (the First and second quarters of 2019 and 2020 GC) were collected retrospectively from the Health facilities annual report using a checklist from 229 health facilities (203 health centers and 26 hospitals in 9 regions and 2 city administration). Rate of change (during COVID-19 era- April to June 2020 compared to the previous year non-COVID-19 era -April to June 2019) of the service utilization during Covid-19 were calculated at national and regional levels.

Findings:

- The analysis from the DHIS2 data source showed that the COVID-19 pandemic caused modest reductions in the utilization of maternal, newborn and child health services by 2-6%, and larger reductions has been observed in outpatient consultations and hospitalizations (7-17%) during March to December 2020, with months immediately following the start of the pandemic showing larger reductions.
- The analysis from the health facility reports showed that the child health service utilization such as initial consultation, diagnosed with Pneumonia, diarrhea, and Antibiotics for pneumonia and

ORS for diarrhea was decreased by 53 - 143%. The family planning and EPI services were decreased by 2 and 8 %, respectively.

- The drop of health service utilization observed in all regions and in all the health services during Covid-19 pandemic (April to June 2020), however, large variations in service utilization across regions, and the higher impact was observed in Hareri, Gambella regions, and in Dire Dawa city administration.
- The timing of the drop in service utilization varied between interventions but was greatest in 2nd and 3rd Quarters of the year 2020. The impact of COVID-19 on the continuation of health services varies between regions (and by interventions), but the patterns are somewhat similar. Strong government response, at the beginning of the pandemic, was associated with larger reduction in general service utilization but not on RMNCH services
- The Ethiopian DHIS2 data are a valuable source to detect time trends in key indicators of essential health services at national and regional levels. The systematic assessment showed that data quality is good with high reporting completeness by health facilities at regional level, few extreme outliers and missing values and good internal consistency in the majority of Regions. The analysis based on DHIS2 also showed that, almost all components of maternal and child health services suffered from a low case flow.

Conclusion and Recommendations: COVID-19 pandemic caused modest reductions in the utilization of maternal, newborn and child health services at national and regional level. The timing of the drop in service utilization varied between interventions. It is recommended to continue the analysis and include more indicators from DHIS2 to understand the continuation of the impact of COVID-19 on the essential health services utilizations. To increase the maternal, child, newborn health services utilization, it needs community sensitization for effective patient flow, implement strong infection control practices, and ensure the availability of adequate PPE, sustaining essential MNCH services by increasing client confidence and willingness to visit health facilities. The evidence provided baseline information for further research to generate new insights on the impacts of the pandemic on the utilization of essential health services at the health facilities.

1. Introduction

1.1 Background

In January 2020, a novel virus, the SARS-CoV-2, was identified as the causative agent for a cluster of pneumonia cases initially detected in Wuhan City, Hubei Province, China. SARS-CoV-2, which causes the disease now named COVID19, has subsequently spread throughout the globe. Health systems in the world are facing a rapidly increasing demand generated by the COVID-19 pandemic. The Ebola outbreak is a good example of how outbreaks may disrupt programs such as tuberculosis, HIV, and maternal and child health care, increasing mortality from preventable and treatable conditions.[1–5]

To mitigate the impact of COVID-19 on health systems, the WHO prepared a guideline on how to continue essential services during the COVID-19 pandemic. The guideline recommends continuation of essential services like vaccination, chronic disease follow-up and maternal and child health care, taking into consideration the local context and extent of the outbreak. In areas with a relatively limited number of COVID-19 cases, the health system may have the capacity to maintain routine service delivery in addition to managing COVID-19 cases.[6]

Ethiopia reported the first COVID-19 case on March 13, 2020. Like other countries, Ethiopia started to practice different prevention strategies after confirming the first case (Table 1). These include partial and selective total lockdown, stopping mass praying, avoiding mass gatherings, and closing schools. Different task forces were established at the national and local levels. The Federal Ministry of Health planned to continue essential services during COVID-19 prevention and management. The Ethiopian essential health service package includes reproductive, maternal, neonatal, child, and adolescent health services; major communicable diseases; non-communicable diseases; surgical care; and emergency and critical care.[7]

Table 1: COVID-19 Time line in Ethiopia and mitigation measures taken by the government of Ethiopia, 2021

Core activities	Progressive measures had taken to combat the COVID-19
DEC 31, 2019	China alerts WHO to several pneumonia cases of unknown cause
Jan 21, 2020	WHO confirms Human to human transmission of the virus
Jan 27, 2020	Public health emergency operation center activated for COVID-19 preparedness and Incident manager assigned
Jan 30, 2021	WHO declares the outbreak a public health emergency
Feb 07, 2020	Ethiopia starts laboratory test for COVID-19
Feb 11, 2020	WHO names the novel corona virus; COVID-19
March 13, 2020	Ethiopia reports the first COVID-19 case
March 15, 2020	8335 toll free hotline upgraded to digital call center
March 16, 2020	Government limited public gatherings including gatherings for religious practices, sporting events, and concerts, ordered school closures, ordered high-risk civil servants to work from home, Taxi and mass transport services were restricted. The regional states and city administrations imposed travel restrictions. The government preferred daily activities to continue but with containment measures.
March 20, 2020	Flights suspended Ethiopian airlines suspended flights to around 30 countries affected with the diseases and this extended to more than 80 countries on March 29 2020.
March 23, 2020.	Land borders closed Ethiopia closed all land borders and deployed security forces
March 23, 2020	14-days mandatory quarantine for all travelers arriving in Ethiopia started
March 25, 2020	PM of Ethiopia launched national COVID-19 resource mobilization committee
March 28, 2020	The first recovered patient reported in Ethiopia
April 01, 2020	COVID-19 Laboratory testing started in AHRI and NAHDIC
April 05, 2020	The first death reported in Ethiopia
April 5, 2020	The Prime Minister officially met and discussed with leaders of competing political parties to discuss and reach consensus on the effect and containment of COVID-19.
April 6, 2020	Ethiopian Religious Council, which draws membership from various religions in the country, declared a one-month prayer program from April 6 to May 5, 2020 and this was televised live. Religious leaders had announced ahead for worshipers to avoid going to church and mosques but pray from home.
April 08, 2020	Ethiopia declares state of emergency to fight COVID-19

Election postponed	Over COVID-19 fears, the Ethiopian government has officially postponed parliamentary and presidential elections which were supposed to be held on August 29, 2020.
Medias informed the public	Different national multimedia outlets and billboards massively disseminated facts and educational information to create awareness and deliver up-to-date information about COVID-19. Ethio-telecom uses cell-phone ring tones to remind people of the importance of hygiene measures.
International collaborations harnessed	The country took steps in international collaborations to fighting the pandemic. Prime Minister of Ethiopia and the Chinese businessperson Jack Ma and Ali Baba Foundation have initiated a PM Abiy-Jack Ma initiative to support African countries with COVID-19 diagnostics and infection prevention commodities on March 17, 2020.
Regular information dissemination	The Ethiopian Federal Ministry of Health and its technical arm, the Ethiopian Public Health Institute, established an active surveillance mechanism as per the WHO recommendation to regularly check the status of the disease in the population and disseminate the information. The number of tests performed, cases confirmed, and the Federal Ministry of Health, has reported cases recovered each day.
October 26, 2020	School reopening commenced in Addis Ababa
March 07, 2021	Ethiopia received the first 2.2 million doses of COVID-19 vaccine
July 13, 2021	Alpha and Beta SARS-COV-2 variants reported in Ethiopia
September 07, 2021	Delta SARS-COV-2 variant reported in Ethiopia

The COVID-19 pandemic may affect the utilization of health services through disruptions in the provision of routine health services as well as changes in the demand for services (Figure 1). Multiple modeling studies in a range of health fields have raised major concerns about the impact of the pandemic and the associated service disruptions on health outcomes, particularly for women and children.[8–10] The underlying data on service impact for these models are still limited, especially for sub-Saharan Africa. Several studies based on health facility data have begun to register adverse consequences on the use of specific services in multiple countries, but with considerable variability between services, countries and time periods of 2020.[10–13]

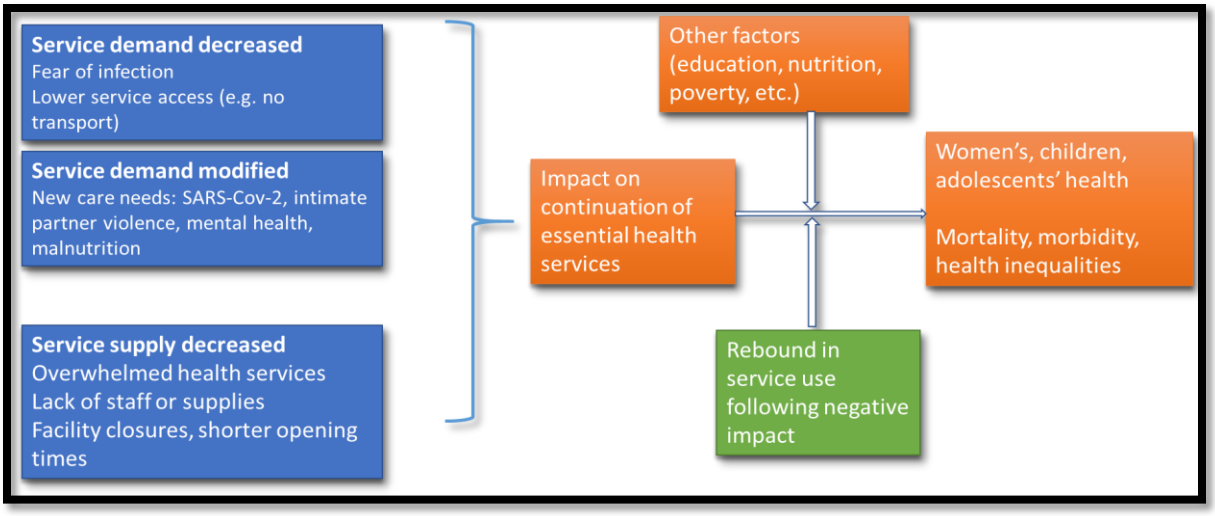


Figure 1: Continuation of essential health services: impact of potential demand and supply changes associated with pandemic.

According to an international government stringency index, which compares the government policies against COVID-19 (Figure 2), is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). If policies vary at the national level, the index shows the response level of the strictest nationally. The government response stringency index of COVID-19 shows the restriction measures imposed by the country. These latter indicators were downloaded from Our World in Data.(1) Data were extracted from https://github.com/owid/covid-data/tree/master/public/data.

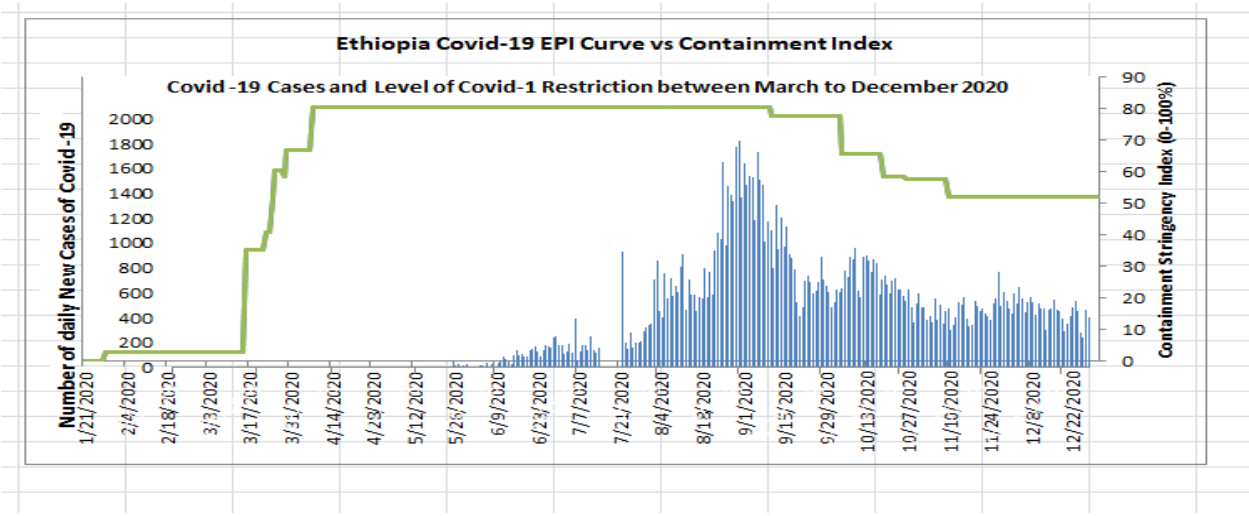


Figure 2: Daily new confirmed Covid19 cases per million people since March 2020 and Covid-19 stringency index, 2021

[1] www.ourworldindata.org

This study aims to identify the disruptions and rebounds in health services utilization during 2020 for a selected set of health care services, focusing on RMNCH. The period of interest is March – December 2020, when Ethiopia began to report COVID-19 cases and the initial measures to control the spread of COVID-19 were taken in the country. The study compares the observed monthly service utilization patterns, obtained from the health facility data and DHIS2 for all districts with an expected level of service use based on data.

1.2 Objective

- Assess continuity of essential health services during 2020 with DHIS2 with a focus on RMNCH and general services at national and subnational level.

2. Methods

2.1 Study setting and period

This study was conducted in 10 regions and two city administration of Ethiopia. In Ethiopia there were 21,843 functional Public Health facilities (367 functional hospitals (specialized, general and primary hospitals), 3,777 Health centers, and 17,699 Health posts).[15] Health care services are provided through both public and private health care facilities. Ethiopia had an estimated population of 100,829 000 in 2020.[16]

2.2 Data extraction and analysis from district health information system /DHIS2/

Study design and Eligibility criteria

All health care facilities that reported using DHIS-2 were included in the study. A pre-post study design was used to assess the effects of COVID-19 on essential health services utilization in Ethiopia. This helps to assess the effects of COVID-19 on essential health services utilization by comparing with similar period before the occurrence of COVID-19.

Sampling, Data sources and management

The study used all health facility reported to Ministry of Health using DHIS2. The source of the data was the District Health Information System-2 (DHIS-2) database. Monthly data for basic indicators from each of the essential health service categories of the period 2019 and 2020 extracted from DHIS2 to the Microsoft excel 2010 and exported to Stata 14.0 for analysis. The analysis period was included 2019 and 2020.

The main data source was the DHIS2. Data reported by health facilities to district offices on a monthly basis were extracted by using standardized reporting forms. The steps of the analyses were summarized in Figure 3. The analytical approach started with the assessment of data quality and preparation of curated data sets by adjusting for incomplete reporting by health facilities and correcting missing values and improbably extreme outlying values in the reported monthly data from each district. Data quality checks were performed with district, regional and national level. The districts with problematic reporting rates and inconsistencies were flagged for further examination and correction measures taken, as needed. The analysis summarized the percent of district-months with facility reporting rates below 90% and listed all district-months with facility reporting rates below 75%. In the latter case, the median value of the calendar year was imputed for the month.

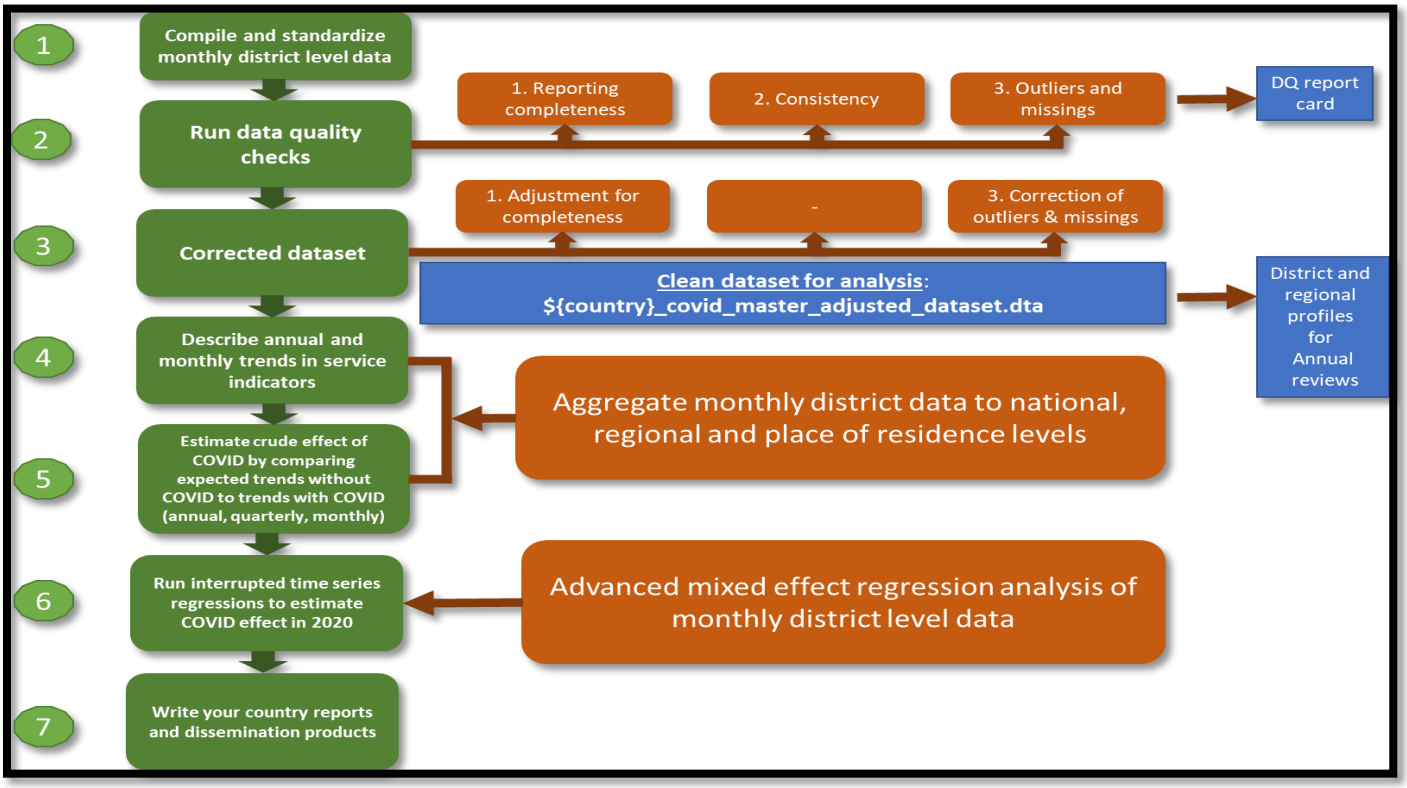


Figure 3: Stepwise analysis process

For all other districts, we adjusted for incomplete reporting (Formula 1) by considering the completeness of reporting by facilities and the level of service provision expected from non-reporting facilities. For the latter, we had used an adjustment factor ranging from 0 to 1, where 1 means similar level of services as reporting facilities and 0 assumes that non-reporting facilities provided no services.[17] Extreme outliers were identified using a modified Z-score which is a standardized score of observations measuring the deviation from the median, obtained by dividing the difference from the median by the median absolute deviation. Monthly data with a score greater than five standard deviations from the annual median were identified as extreme outliers.[18] These were corrected by imputing a value based on the median value of the calendar year (Formula 2).

Median-1.4826*3*MAD < Xi > Median+1.4826*3*MAD ……. Formula 1
Median-1.4826*3*MAD < Xi > Median+1.4826*3*MAD …… Formula 2

LB = Median - 1.4826 * 3 * MAD
UB = Median + 1.4826 * 3 * MAD
where X*i* is the value of the observation for a particular time period (year) and the MAD is defined as the median absolute deviation (MAD = median(|X*i* - X~|), where X~ is the median of the three preceding years).

The final analysis relied on mixed effects ordinary least squared regression models to estimate the size of any change in service utilization for each COVID-19 month from March to December 2020 and for the whole COVID-19 period in 2020. We fitted these regressions using the monthly number of service utilization at district level as the dependent variable (equation 1). This dependent variable (Yij) was regressed on a time variable (time) defined in months (from January 2019 to December 2020) to capture time trends, calendar month (month) to control of seasonality in service use, district population (pop), first administrative level (Region), and COVID-19 month from March 2020 to December 2020 (COVID-19 month). Equation (1) presents the model. The coefficient of each COVID-19 month dummy variable expresses the average change in service utilization in the particular month. To obtain the average change in service utilization over the entire COVID-19 period, we fitted another model with a dummy variable for this period. The mixed effects models included random intercept and slope for time trends, accounting for multiple measurements at the region levels. We computed the percent average change in services utilization during COVID-19 months along 95% confidence intervals at national and regional levels. We compared

these measures to those obtained by aggregating the predicted monthly size of service utilization across regions and found them to be generally similar.

$$Y_{ij} = \beta_{0j} + \beta_{1j} time_{\square} + \sum_{m=2}^{12} \beta_m Month_m + \beta_p Pop + \sum_{r=16}^{n} \beta_r Region + \sum_{t=1}^{9} \beta_{ct} Covidmonth + \varepsilon_{ij} \quad (1)$$

Creating a data set and fixing data quality issues

The analytical approach started with reported monthly data from each Region. The assessment and adjustments were made using common rules, as there often are too many districts to make individual decisions. The districts with problematic reporting rates and inconsistencies were flagged. The following criteria were used:

- *Reporting rates (RR)*: summarize the percent of Regions months with RR below 90% and list all district months with reporting rates below 75%. If the latter was the case the month would receive the median value of the year.
- *Adjustment for incomplete reporting*[17]: Inspection of the monthly RR for Regions, one value for each service based on program knowledge. The default adjustment factor was 0.25.
- *Correction of extreme outliers*: modified Z-score which is a standardized score of observations measuring the deviation from the median which was obtained by dividing the difference from the median by median absolute deviation. Monthly data with a score higher than 5 standard deviations from the annual median were identified as outliers[18,19]. Extreme outliers were corrected by imputing a value based on median of 6 months before and 6 months after outlying values.
- *Dealing with missing values*: impute the median of 6 months before and 6 months after outlying values, unless there is reason to believe that it was a true missing (less likely at the region level)

The national summary was created bottom-up from all Regions data (there are 10 Regions and two city administrations). A summary of data quality captures both the national values for each year during 2019 – 2020 and the percent of Regions with good data for each of the three dimensions of data quality (Table 2).

Table 2: Summary of DHIS2 data quality 2019-2020 using tracer indicators (ANC, delivery, vaccination and OPD).

		2019	2020
1	**Completeness of monthly facility reporting (>90%)**		
1a	% of expected monthly facility reports (mean, national)*	84	81
1b	% of Regions with completeness of facility reporting >= 90%*	94	94
1c	% of facilities with no missing monthly values in the year *	100	100
2	**Extreme outliers (> 95%)**		
2a	% of monthly values that are not extreme outliers (mean, national)*	94	94
2b	% of Regions with no extreme outliers in the year*	92	84
3	**Consistency of annual reporting (>85%)**		
	Ratio ANC1 – penta1 numbers (national)	1.129593	1.107646
3a	% of Regions with ANC1-penta1 ratio between 1.0 and 1.5	92	75.0
	Ratio Penta1 – penta3 numbers (national)	1.101681	1.085649
3b	% of Regions with penta1-penta3 ratio between 1.0 and 1.5	100	100
	Annual data quality score (mean indicator 1a to 3b)	95	92

*Mean for ANC, delivery, immunization and OPD services

2.3 Data collection from Health facilities

A survey was conducted in nine regions and two city administrations among randomly selected households in Ethiopia namely Afar, Amhara, Oromia, Beneshangul-gumuz, Somali, Southern Nations Nationalities and Peoples (SNNP), Sidama, Gambella, Hareri, Addis Ababa and Dire Dawa. The data was collected during community based data collection for studying national risk perception and behavioral response survey described elsewhere.[14] The facilities that served the respective EAs were assessed. One health facility (health center and above) from each EAs or if there was no facility with in EAs, we included nearby facilities. Then, a total of 229 facilities were assessed (Table 3). The health facility reports on Maternal and child health care services (the First and second quarter of 2019 and 2020 GC) were collected retrospectively from the Health facilities annual report using a checklist. Rate of change of the service utilization during COVID-19 were calculated at national and regional level.

Table 3: Number of Health facilities involved in the assessment from each region, 2021

	Health Facility type		
Region	Number of HC	Number of Hospital	Total Health facilities
Afar	5	2	7
Amhara	36	3	39
Oromia	37	3	40
Somalie	10	4	14
Bene Shangule	8	2	10
SNNP	35	7	42
Sidama	14	3	17
Gambella	6	2	8
Hareri	6	0	6
Dire Dawa	10	0	10
Addis Ababa	36	0	36
Total	203	26	229

Data collection and analysis process:

Data were collected before COVID-19 case reported in the county (January, February and March 2020) & (April, May June 2020) after the 1st case reported in the country. The records of these facilities were reviewed for their routine maternal and child health services. The quality of data was maintained through pre-testing the tools, and providing training for the data collectors. To assess the effect of the COVID-19, the regional sum of performance before COVID-19 was subtracted from a similar period of 2020. The percentage of reduction or increase was calculated by During COVID-19 minus pre COVID-19 divided by pre COVID-19 performance and finally multiplied by 100.

Ethical Considerations

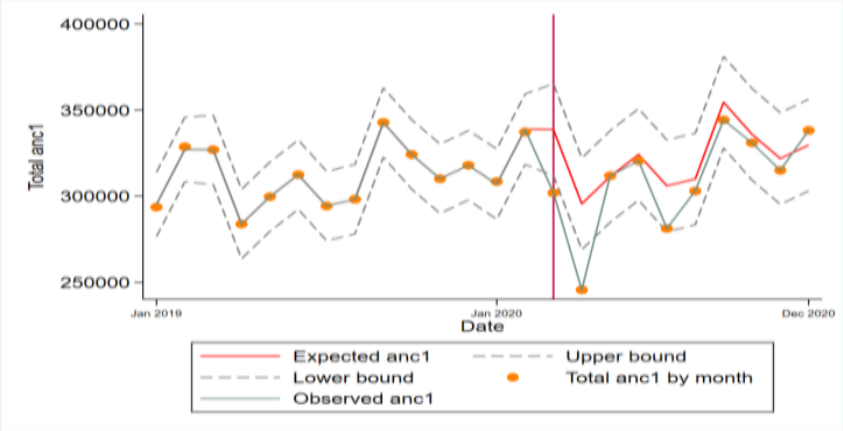
Ethical approval was obtained from the Ethiopian Public Health Institute, and research permits were obtained from the Regional Health Bureaus.

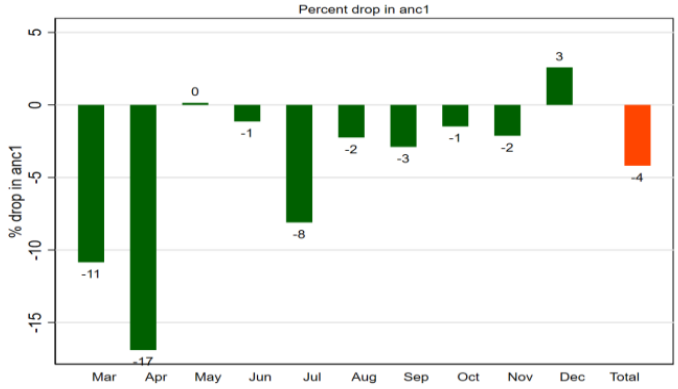
3. Results:

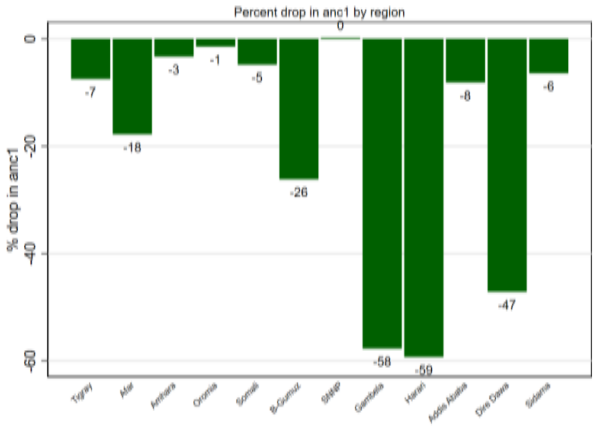
3.1 Analysis from DHIS2 data source

3.1.1 ANC-1 visits

Figure 4 presents the changes in ANC1 visits from March to December 2020 from DHIS2 data sources. The trends for ANC1 visits along time had shown decreased from the expected in March 2020 to December 2020. The total drop of ANC1 visit was 4%. The higher drop of ANC1 visits were on April 17%, followed by on March and July, 11% and 8 %, respectively. The distribution of the lower visits of ANC1 across the region showed that the highest percent drop in ANC1 visits were in Harari, Gambella and Dire Dawa by 59, 58 and 47%, respectively than expected based on the levels and trends of the previous years.







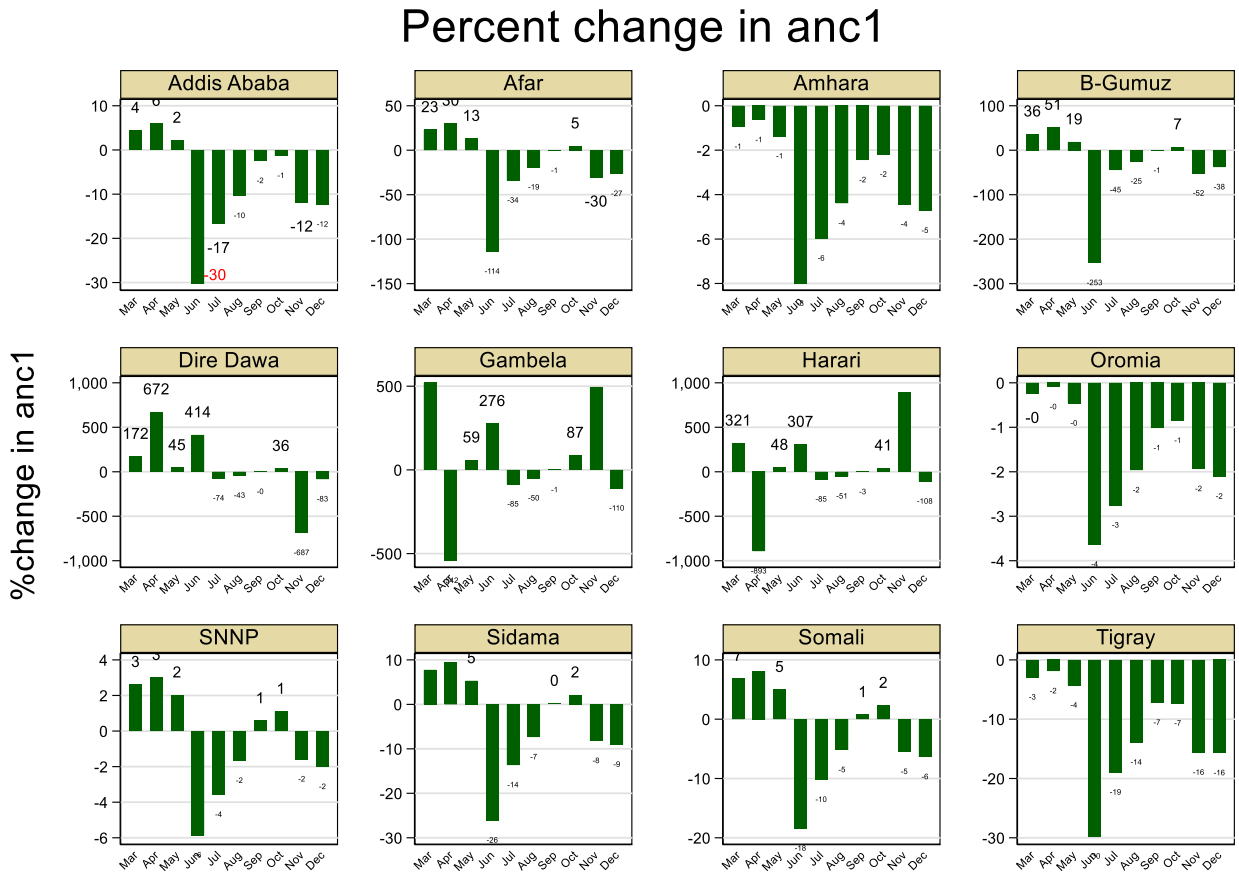
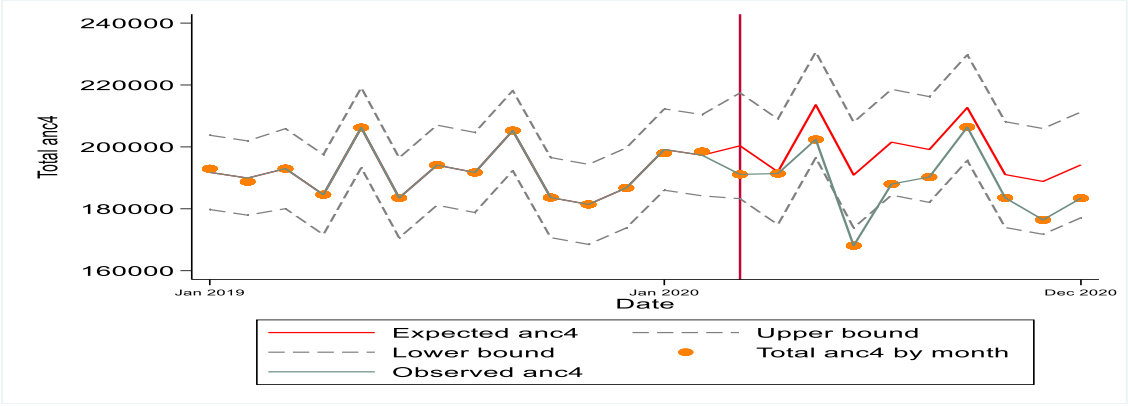
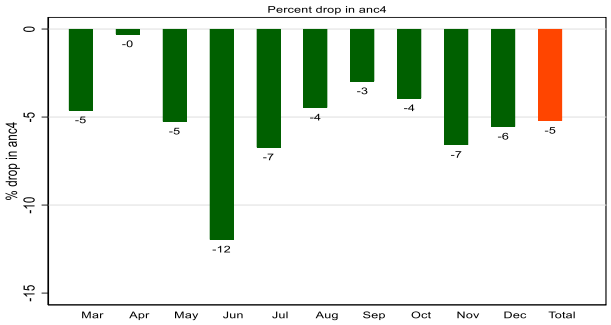


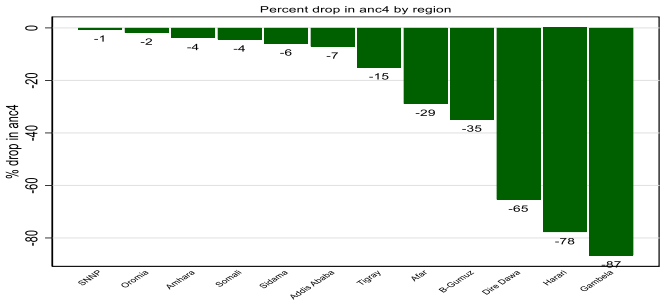
Figure 4: Percent change of ANC-1 visits during March – December 2020 from DHIS2 data source, 2021

3.1.2 ANC-4 visit

Figure 5 presents the changes in ANC4 visit from March to December 2020 from DHIS2 data sources. The trends of ANC4 visit had shown decreased in March 2020 to December 2020. The total drop of ANC4 visits were 5%. The higher drop of ANC4 visits were on June 12%, followed by on July and November, 7% for both months. The higher in drop of the ANC utilization observed in Gambella, Harari, and Dire Dawa, by 87, 78 and 65%, respectively.







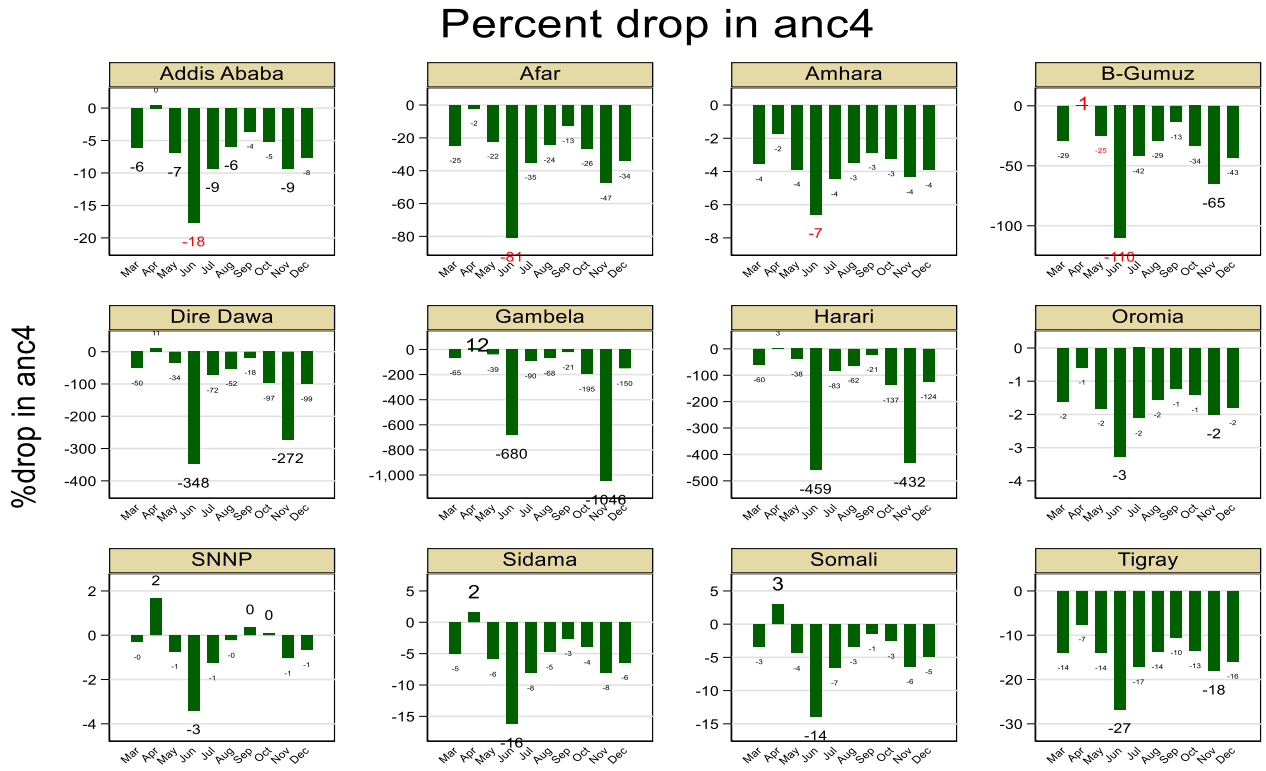
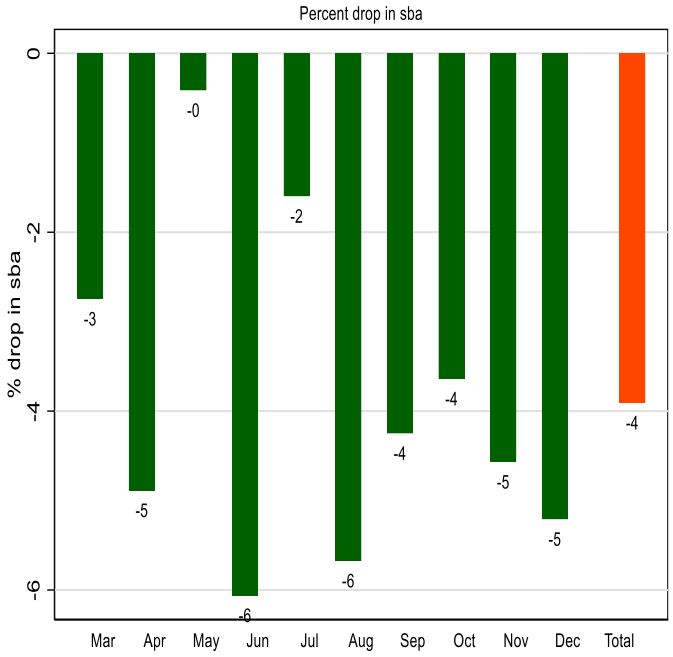
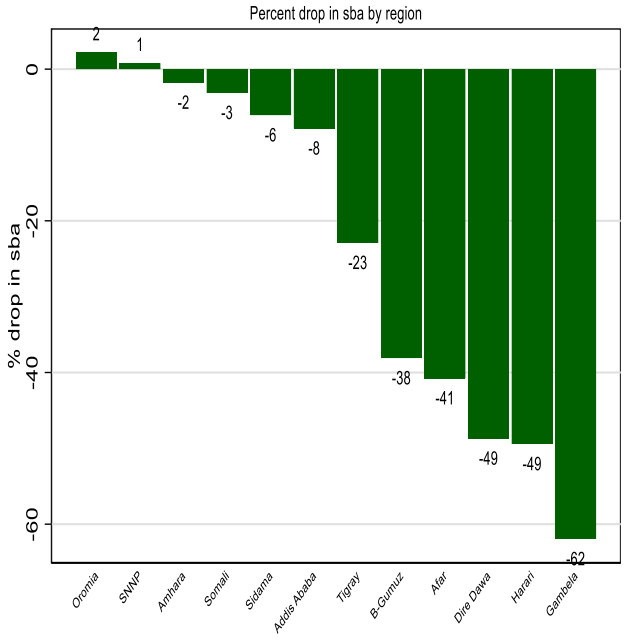


Figure 5: Percent change of ANC-4 visits during March – December 2020 from DHIS2 data source, 2021

3.1.3 Skill birth attendance /Institutional Delivery utilization

Figure 6 presents the changes in Skill birth attendance utilization from March to December 2020 from DHIS2 data sources. The trends for the utilization of Skill birth attendance along time had shown decreased from the expected in January 2020 to December 2020. The total drop of Skill birth attendance utilization was 4%. The higher drop of Skill birth attendance utilization were in June and August, approximately 6%, and lower drop were in May and July, followed by April and December, accounted for 5% each. The Skill birth attendance utilization showed decreased in all regions except Oromia and SNNP regions. The highest percent drop in Skill birth attendance utilization were in Gambela, Harari, Dire Dawa and Afar and Benishangul gumuz, by 61%, 49%, 48%, 40%, and 37%, respectively than expected based on the levels and trends of the previous years.





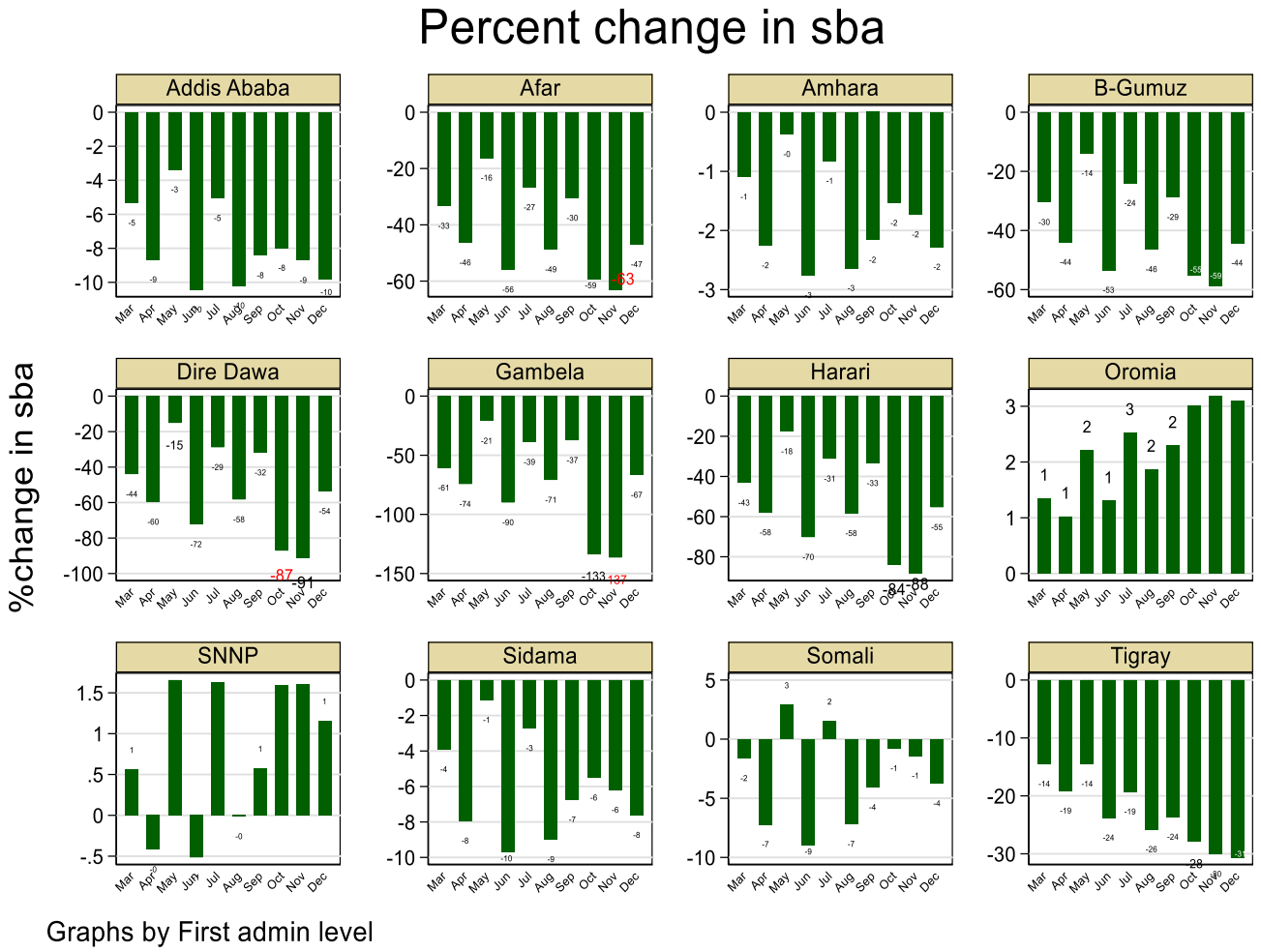
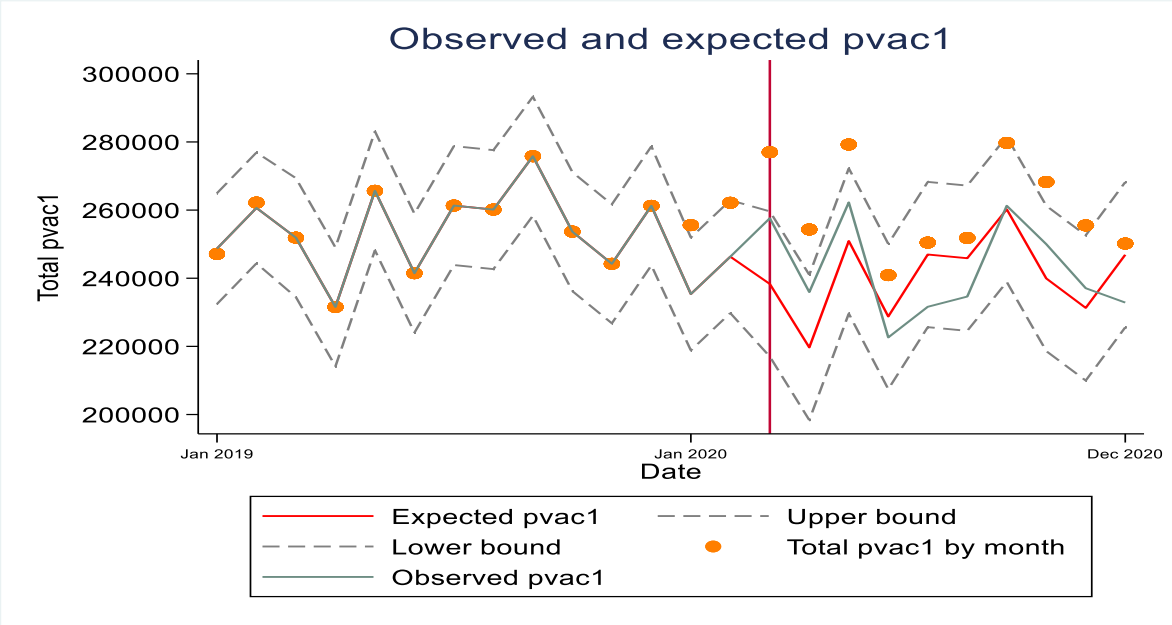


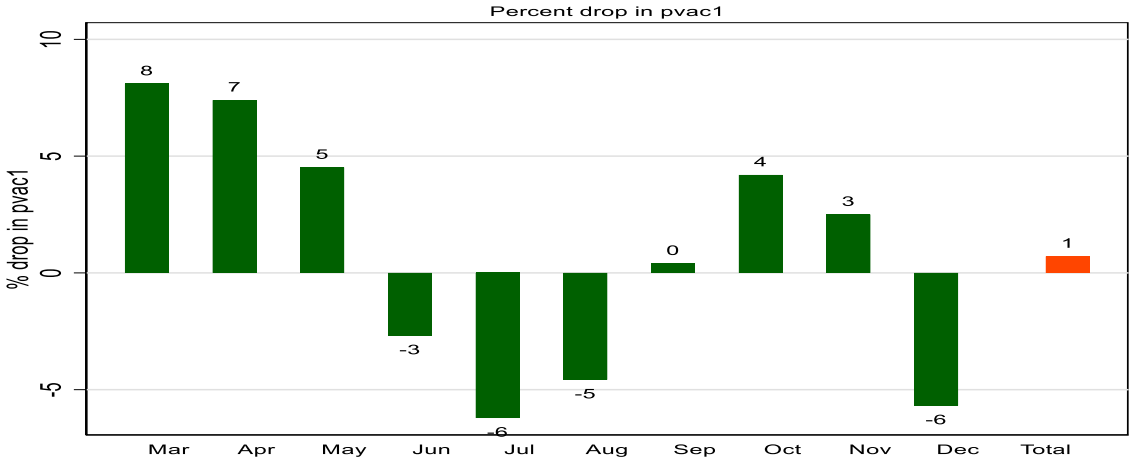
Figure 6: Percent change in utilization of Skill birth attendance during March – December 2020 from DHIS2 data source, 2021

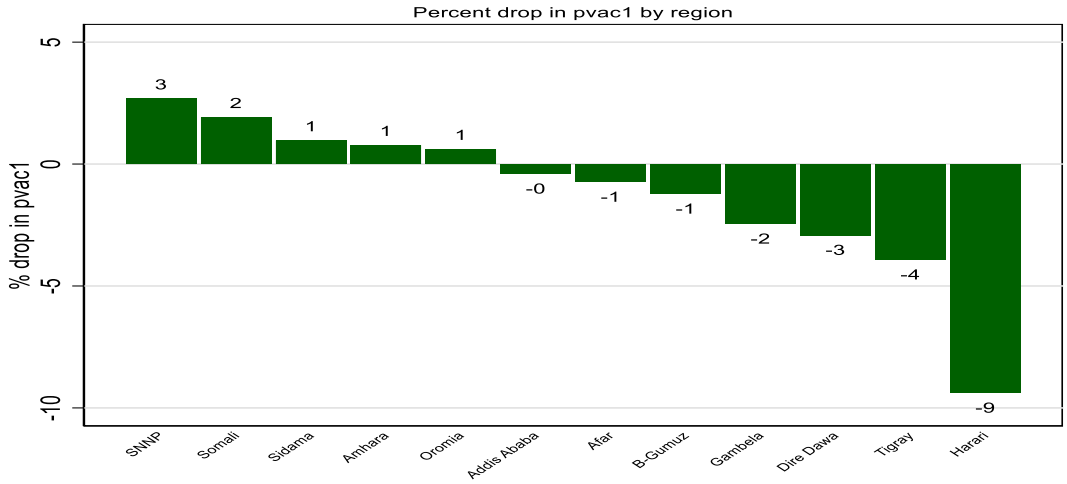
3.1.4 Vaccination service utilization

Pntavalent-1 vaccination (pvac1)

Figure 7 presents the changes in pvac1vaccination utilization from March to December 2020 from DHIS2 data sources. The percent drop in pvac1vaccination utilization had increased by 1% at national level than in 2020 year expected based on the levels and trends previous years. The drop of pntavalent-1 vaccination utilization 3%, 6%,5%, and 6% in June, July, August, and December; respectively. At regional level, the highest percent drops in pntavalent-1 vaccination utilization were in Harari, Tigray and Dire Dawa by 8%, 4%, and 2%; respectively.


Observed and expected pvac1
300000
280000
260000
240000
220000
200000
Total pvac1
Jan 2019
Jan 2020
Dec 2020
Date
Expected pvac1
Lower bound
Observed pvac1
Upper bound
Total pvac1 by month


Percent drop in pvac1
% drop in pvac1
10
5
0
-5
8
7
5
-3
-6
-5
0
4
3
-6
1
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Total


Percent drop in pvac1 by region
% drop in pvac1
5
0
-5
-10
3
2
1
1
1
-0
-1
-1
-2
-3
-4
-9
SNNP
Somali
Sidama
Amhara
Oromia
Addis Ababa
Afar
B-Gumuz
Gambela
Dire Dawa
Tigray
Harari

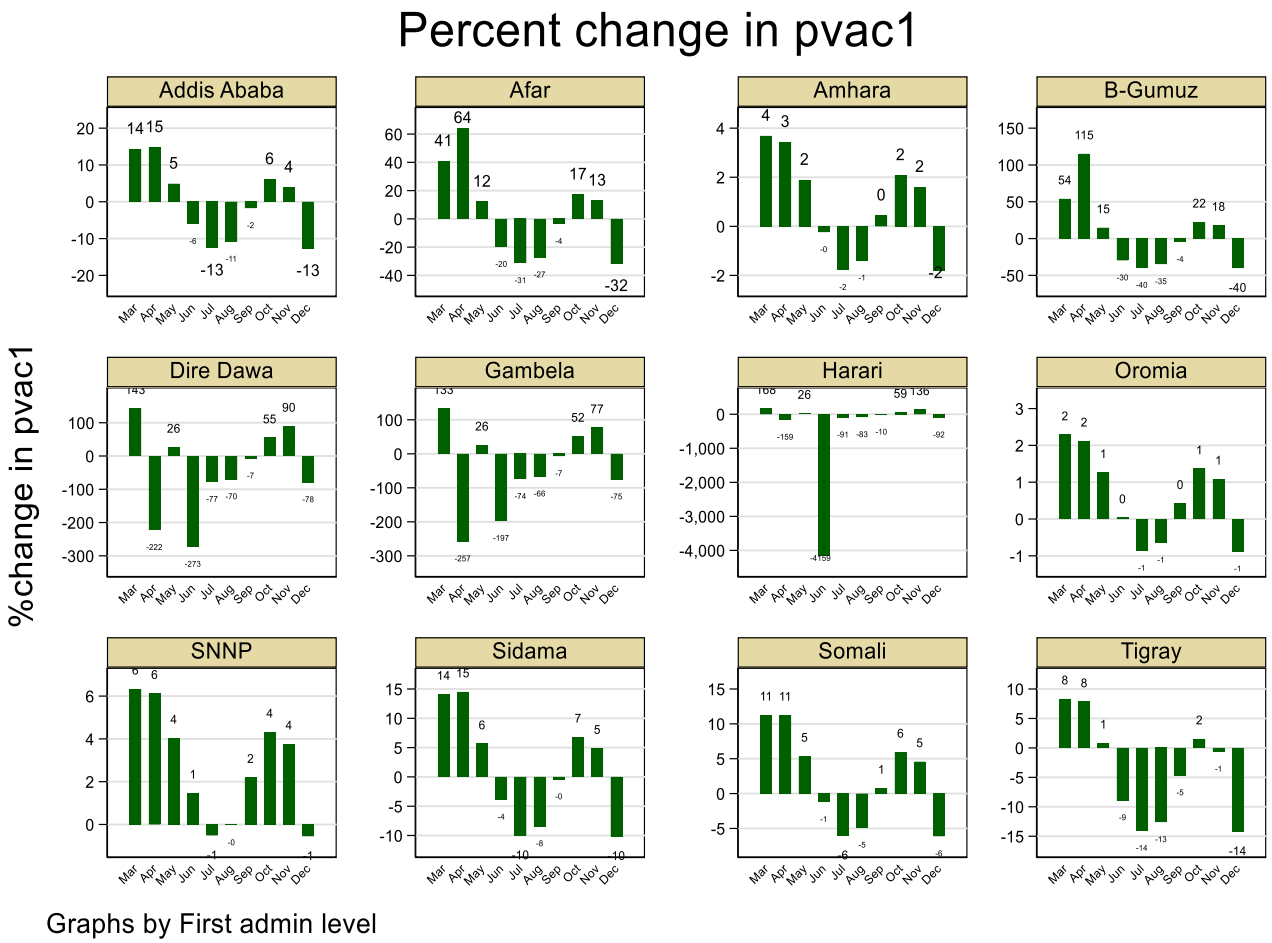


Figure 7: Percent change in utilization of Pntavalent-1 vaccination during March – December 2020 from DHIS2 data source, 2021

Pntavalent-3 vaccination (pvc3)

Figure 8 presents the changes in pntavalent-3 vaccination utilization from March to December 2020 from DHIS2 data sources. The percent drop in pentavalent-3 vaccination services utilization had increased by approximately by 1% at national level than in 2020 year expected based on the levels and trends previous years. The drop of pntavalent-3 vaccination utilization were 5%, 5%, and 6% in June, August, and December; respectively. At regional level, the drop of pntavalent-3 vaccination utilization was observed in June to August except Gambella, Harari and SNNPR. The highest percent drop in pvc3 vaccination services utilization were in Harari, Dire Dawa, and Gambella by 20%, 16%, and 15%; respectively.

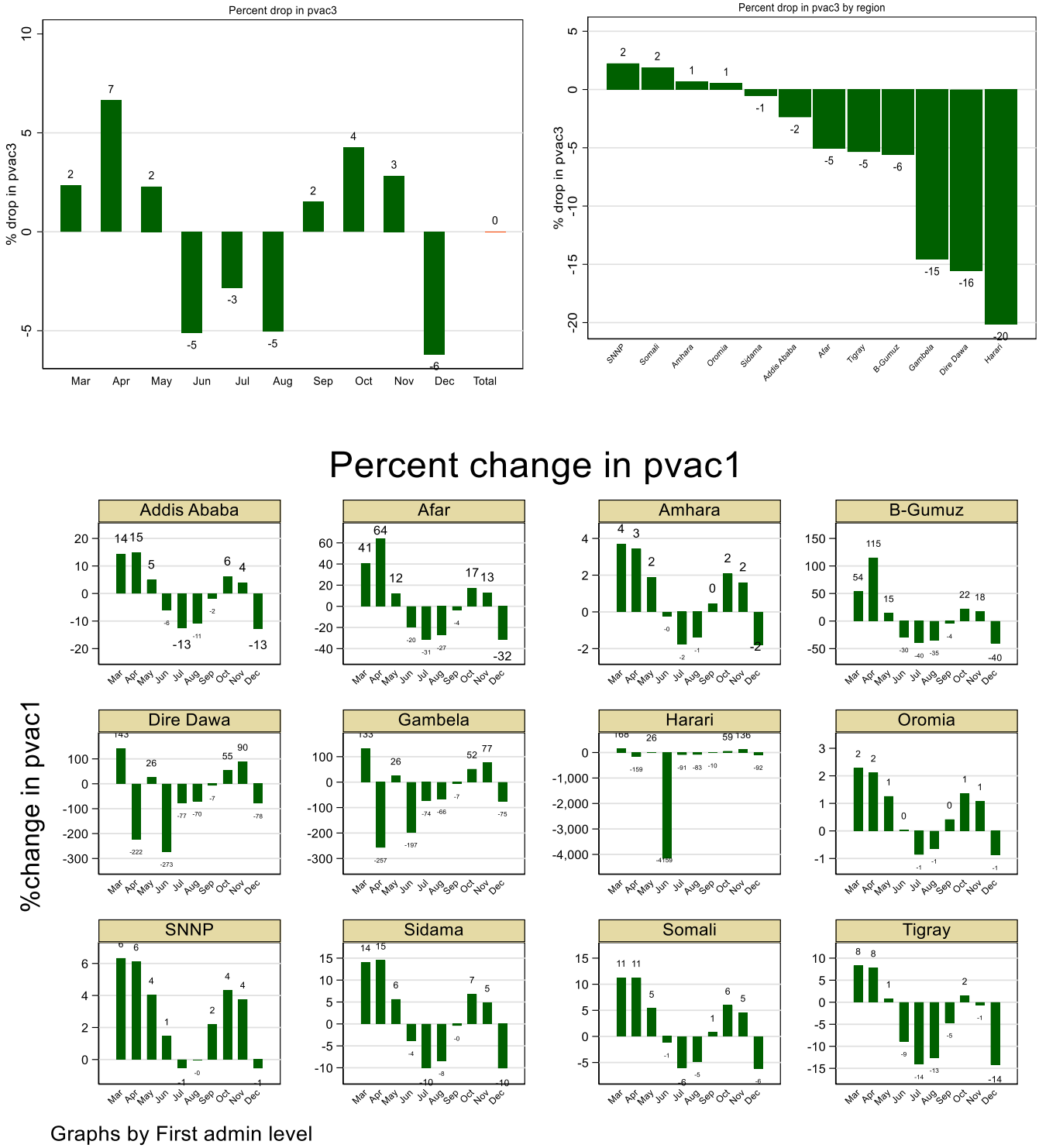
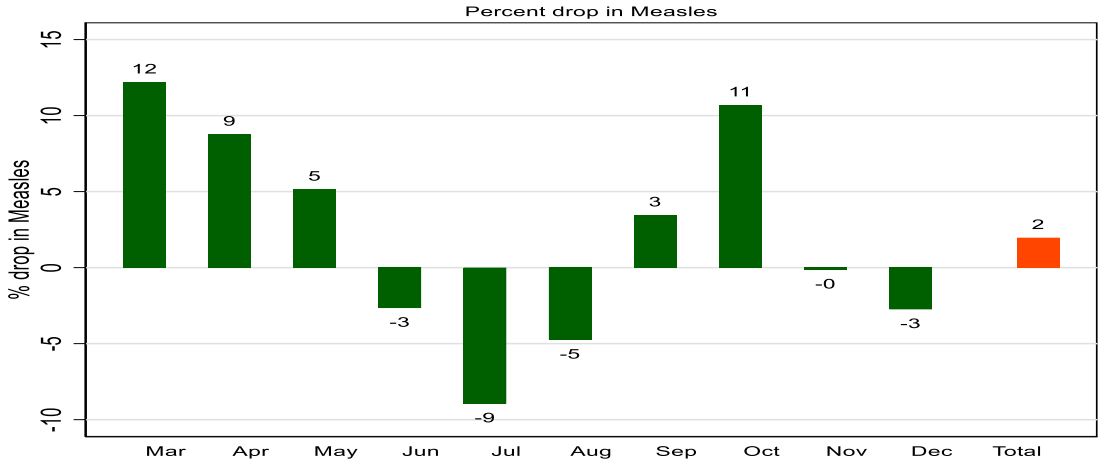
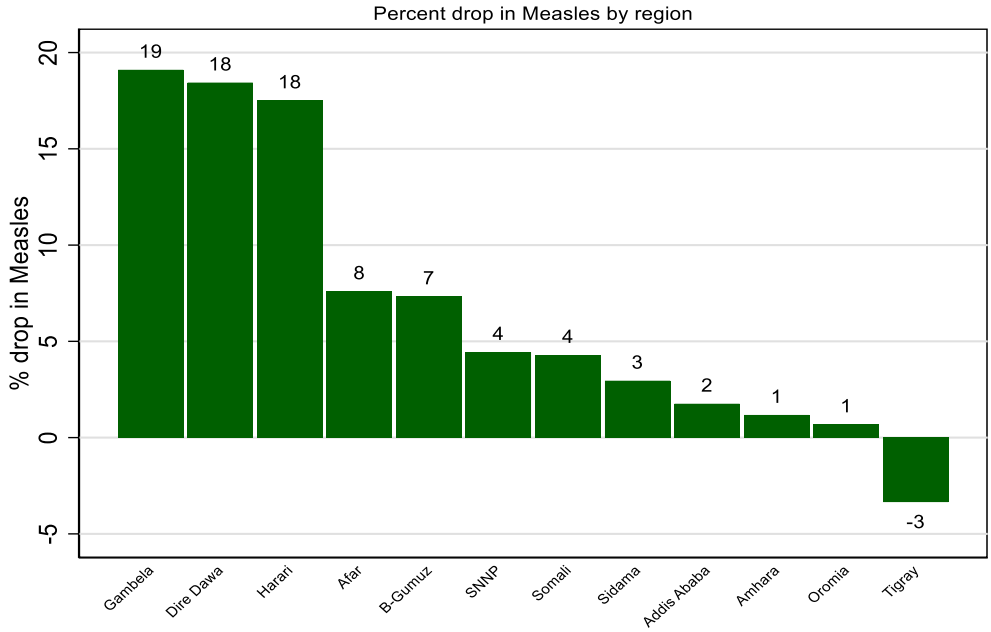


Figure 8: Percent change in utilization of pentavalent-3 vaccination during March – December 2020 from DHIS2 data source, 2021

Measles vaccination

Figure 9 presents the changes in measles vaccination utilization for the whole period March to December 2020 for Ethiopia. The percent drop in measles vaccination utilization was observed in June, July, August and December by 3%, 9%, 5% and 3%; respectively than in 2020 year expected based on the levels and trends previous years. Measles vaccination utilization did not show drop in regions except Tigray, it decreased by 3%. At regional level, the time trend analysis showed that the highest percent drop in measles vaccination utilization were in similar pattern at the national level, except SNNPR, Dire Dawa, Gambela, and Harari regions.





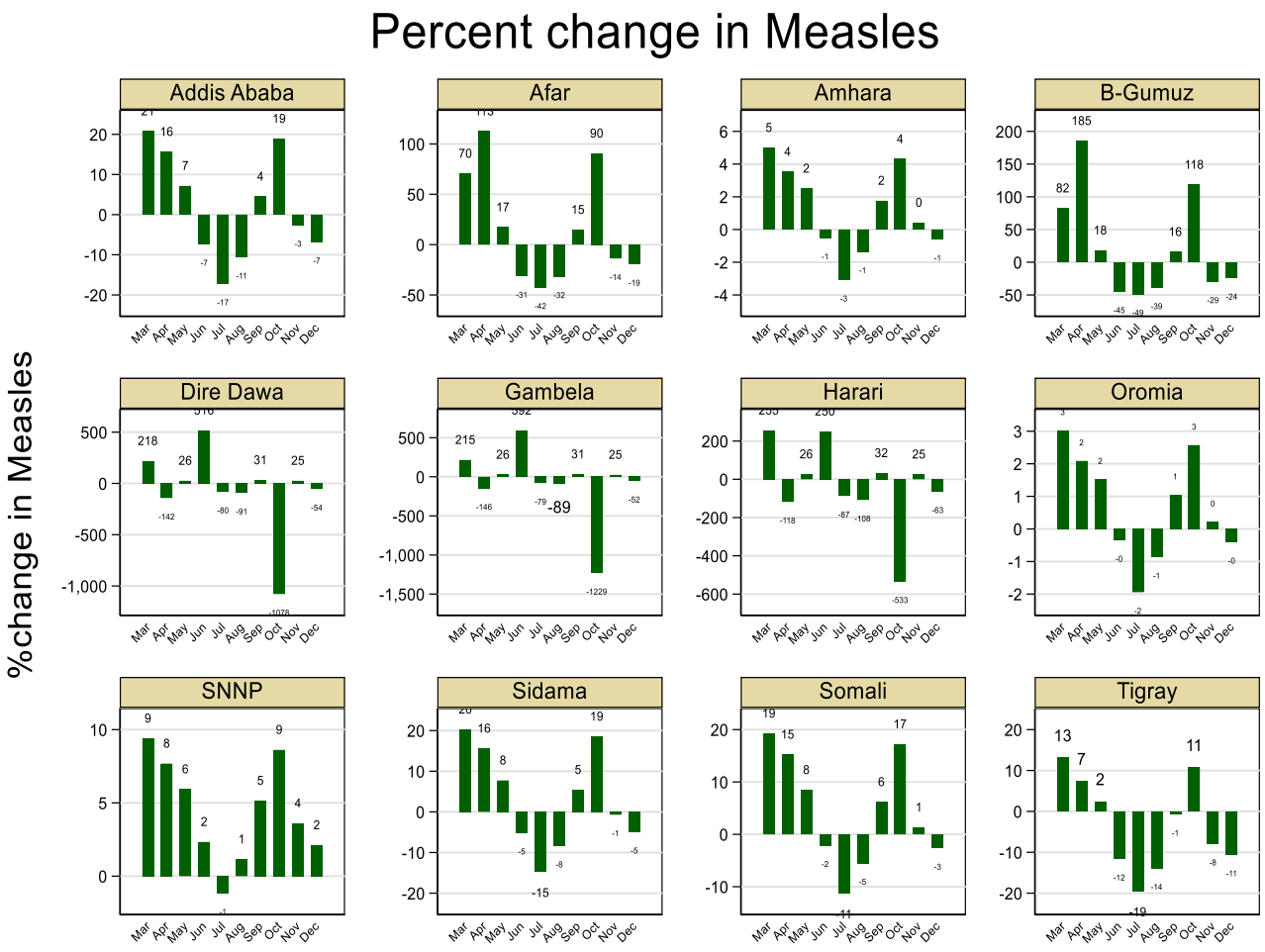


Figure 9: Percent change in utilization of measles vaccination during March – December 2020 from DHIS2 data source, 2021

3.1.5 Inpatient admission

Figure 10 presents the changes in inpatient admission for the whole period March to December 2020 for Ethiopia. The percent drop in inpatient admission had decreased by 9% at national level than in 2020 year expected based on the levels and trends previous years. The drop of inpatient admission was 25% in June, 16 in August and December, and 15% in May 2020. At regional level, the highest percent drop in inpatient admission were in Gambella, Afar, Benshangul gumuz, Dire Dawa, and Harari by 59, 49, 44, 42, and 35%; respectively.

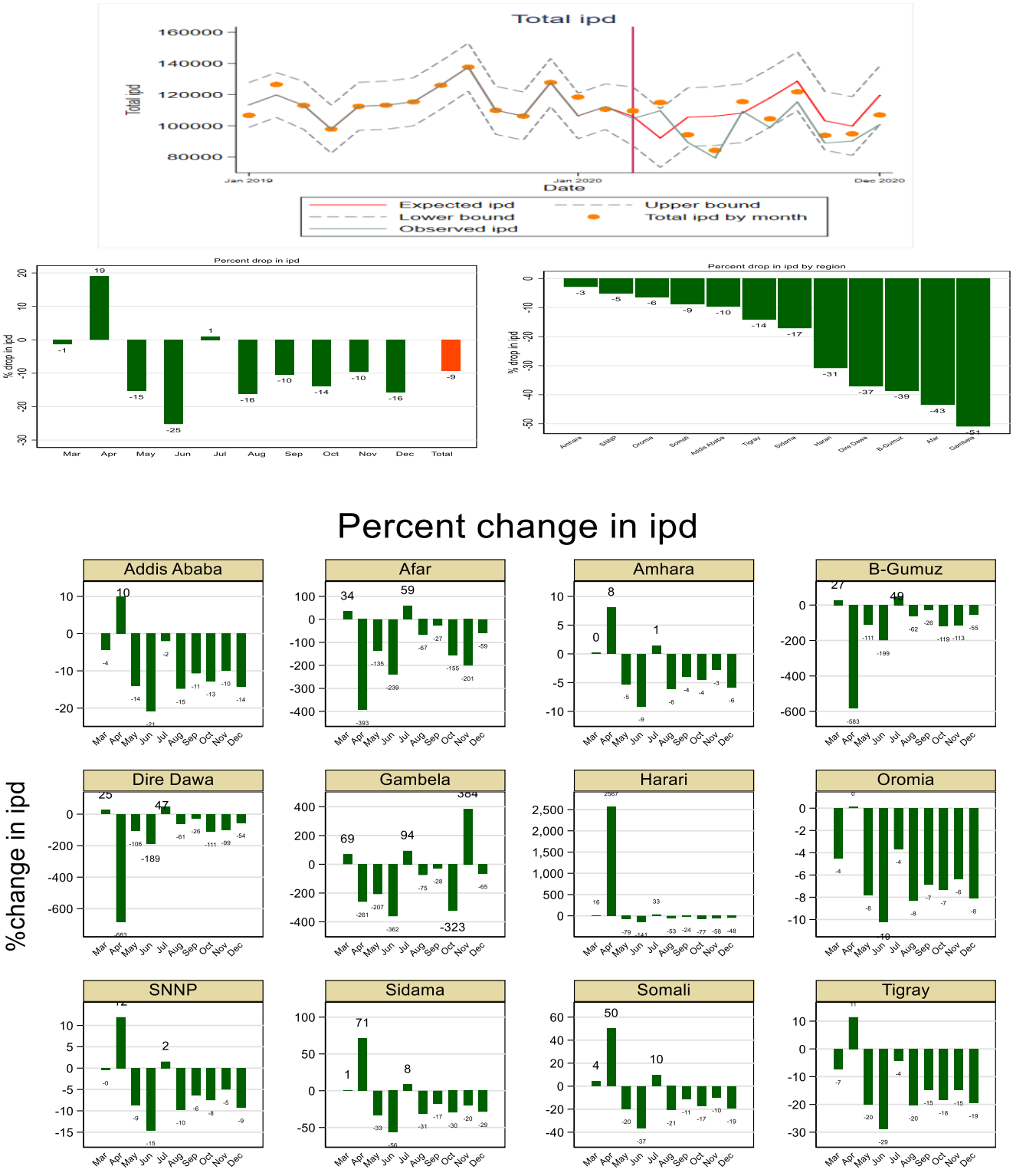
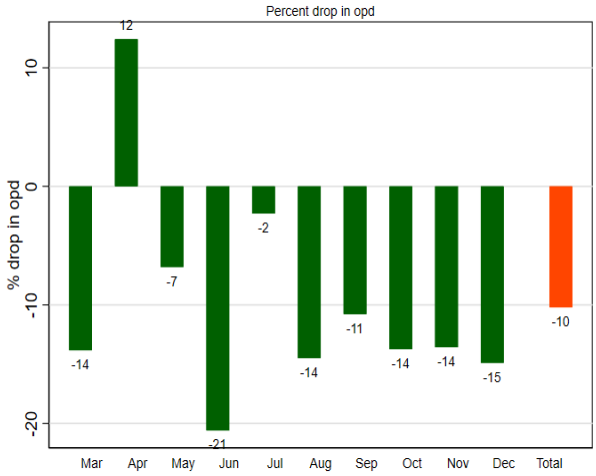
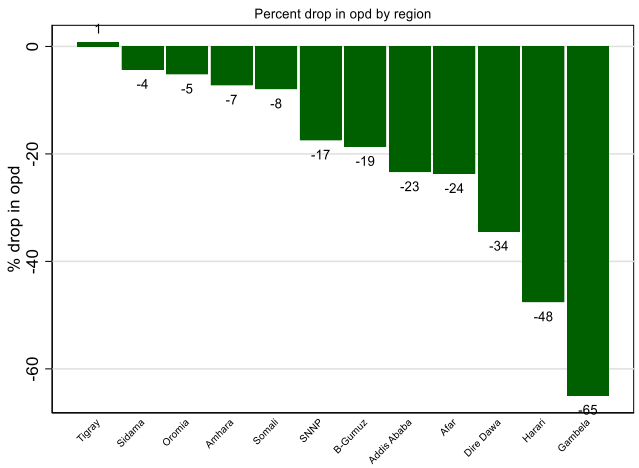


Figure 10: Percent change in inpatient admission during March – December 2020 from DHIS2 data source, 2021

3.1.6 Outpatient visit /OPD/

Figure 11 presents the changes in outpatient visit for the whole period March to December 2020 for Ethiopia. The percent drop in Outpatient visits had lowered by 10% at national level than in 2020 year expected based on the levels and trends of previous years. The highest drops of outpatient visits were continued declining from June to December 2020, 21% in June and 15% in December. At regional level, the highest percent drop in outpatient admission were in Gambela, Harari, and Dire Dawa, by 70, 54, and 38%; respectively.





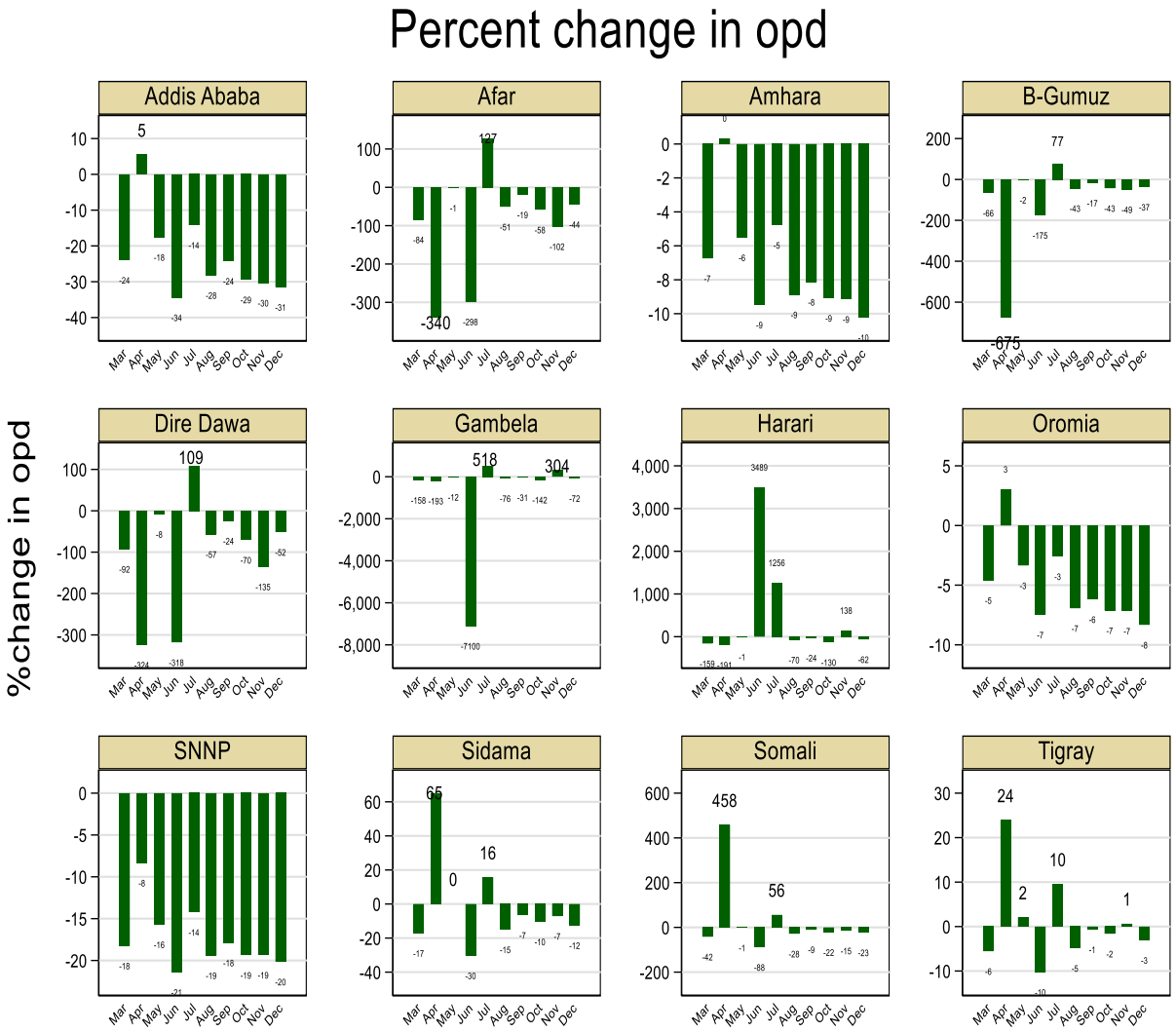


Figure 11: Percent change in Outpatient visits during March – December 2020 from DHIS2 data source, 2021

3.2 Analysis from Health facility reports

3.2.1 National Level: Change in Health care utilization during COVID-19

Table 4 shows the change in the number of health care service utilization during COVID -19 pandemic. The numbers of clients for all the ANC services were decreased during the Covid-19 pandemic. The data from ANC registers showed that there was a difference in magnitude like in the case of the number

of women receiving ANC1 and ANC4 were decreased by 9% and 4%, respectively during April to June 2020 compared to April to June 2019. The total delivery in the health facilities were decreased by 1%, while mother's PNC1 care was increased and second and third PNC services were decreased.

The Neonatal health care utilization such as PNC1 visit was increased while the second and third PNC visits were decreased from January to June 2020. The births at the facility and newborn treated with asphyxia also decreased, while the KMC and sick newborns seen were increased from April to June 2020. The child health care services utilization such as getting initial consultation, visiting for pneumonia, diarrhea, antibiotics and ORS were decreased by 53%, 105%, 84%, 103%, and 143%, respectively.

Family Planning and EPI users at national level showed dropped from April to June 2020 decreased by 2 and 8 %, respectively. The number of children who received penta-3 was decreased by 19% while the measles were increased by 6% during COVID-19 era.

Other services users such as ART service utilization, the newly diagnosed and started ART services at ANC follow up was dropped by 8%. The total numbers of OPD visits in the health facilities were decreased on average by 1%.

Table 4: Percent of drop of Maternal, neonatal, child health care and general health services during COVID-19 pandemic at national level, from Health facility reports, 2021

	Before COVIDD-19		During COVID-19		COVID-19 Impact (% drop)	
	Jan - Mar 2019	*Apr-Jun 2019*	*Jan - Mar 2020*	*Apr-Jun 2020*	*Jan - Mar 2020*	*Apr-Jun 2020*
Maternal Health						
ANC1 visit received	65,443	63,441	62,385	58,264	-5	-9
ANC4 visits received	37,128	37,816	45,045	36,217	21	-4
Total deliveries	47,438	46,901	46,253	46,549	-2	-1
PNC1 visit received	38668	41679	42783	44773	11	7
PNC2 visit received	6135	6605	6048	6197	-1	-7
PNC3 visit received	4070	3899	3531	3458	-13	-13
Newborn health						
Newborns receiving 1 PNC visit	32133	43398	44682	45961	39	6
Newborns receiving 2 PNC visit	4307	4503	4142	4340	-4	-4
Newborns receiving 2 PNC visit	3720	3568	3211	3228	-14	-11
Newborns treated for asphyxia, - initial	891	733	800	668	-10	-10

	Before COVIDD-19		During COVID-19		COVID-19 Impact (% drop)	
	Jan - Mar 2019	*Apr-Jun 2019*	*Jan - Mar 2020*	*Apr-Jun 2020*	*Jan - Mar 2020*	*Apr-Jun 2020*
stimulation, or resuscitation						
Pre-term and/or low birth weight neonates treated– (KMC)	1033	597	904	693	-12	14
Sick newborns from 0-2 months seen	5651	6100	6190	6463	10	6
Children						
Initial consultations with children	77289	106131	85561	69408	11	-53
Children classified as having pneumonia	27528	30964	25132	15127	-9	-105
Children classified as having diarrhea	64240	74014	51623	40246	-20	-84
Children classified as having malaria	6273	6366	10997	8979	75	29
Children who received antibiotic for pneumonia	21764	29733	25053	14645	15	-103
Children who received ORS for diarrhea	53529	53750	31775	22107	-41	-143
Immunization						
Clients Who Received Penta-3	51566	62500	53158	52312	3	-19
Clients Who Received Measles	52712	61334	54898	65124	4	6
Malaria services						
Children who received RDT for malaria	22347	24749	34522	28114	54	12
Children who received ACT for malaria	3806	3531	6142	5548	61	36
Clients who received Family planning	143629	138855	145130	136663	1	-2
Clients who received EPI	91691	87085	80902	80597	-12	-8
Newly diagnosed and started on ART at						
ANC	6366	5957	6422	5528	1	-8
Labor and delivery	2211	2076	2749	2862	24	27
PNC	199	75	530	85	166	12
Known HIV +						
On ART at entry	30260	35227	38917	31568	29	-12
Not on ART	20371	20105	124	141	-99	-14,159
Total number of patients assessed on OPD	918532	921461	935224	908194	2	-1

3.2.2 Regional level: Change in Health care utilization during COVID-19

Table 5 shows the change in the number of MNCH service utilization across regions. In all regions, the number of clients who utilized MNCH care dropped during April to of June 2020. The ANC1 service users were decreased in SNNP, Benshanguel gumuz, Amhara, Afar, Addis Ababa, and Sidama 39%, 20%, 12%, 6%, 6%, and 4%, respectively, while in other regions did not shown reduction. The number

of ANC-4 users dropped in Afar (59%), followed by Harari (28%), Benishangul gumuz (22%), Sidama (14%), SNNP (8%), Dire Dawa (11%) and Addis Ababa (6%). Among regions, clients gave births at the facility showed dropped in Oromia, Dire Dawa, Addis Ababa, Harari, and Amhara region.

For Family planning users by regions, higher dropped were recorded in Afar, Somali and Harari regions, 31%, 27%, and 22%, respectively. The EPI service utilization dropped highly in Amhara (75%), Gambella (48%), Oromia (30%), Harari (20%), and Afar (12%) regions. Immunization services such as Penta-3 vaccination utilization was decreased in all regions except Oromia and Afar, 0.2% and 2.4%, respectively while measles vaccination utilization was decreased in SNNP (7.0%), Harari (2%), Somalie (1%)and Amhara (0.3%) regions.

Child health care utilization also dropped during COVID-19 pandemic in regions. The children visits health facilities due to pneumonia and diarrhea was highly affected than other health care services in most regions. Visits due to Pneumonia dropped ranged from 12% to 235%. The highest reduction recorded in SNPP and ADDIS Ababa. Children visits health facility due to Diarrhea also reduced during the COVID-19 period, it ranged from18.7% in Amhara to 165% in Addis Ababa. ICCM New born (0-2 month) at regional level during COVID -19 pandemic was dropped during the COVID-19 period. At health facility, ICCM service utilization was highly dropped in Addis Ababa than other regions. Other health care services such as ART and OPD services dropped across regions. The ART uptake was decreased in Gambella, SNNP, Oromia and Benishangul gumuz when compared with other regions. OPD visits were decreased in Afar, Amhara, Harari, and Dire Dawa.

Table 5: Percent of drop of Maternal, neonatal, child health care and general health services during COVID-19 pandemic, regional level, from health facility reports, 2021

	ANC 1	ANC 4	Birth at health facility	Family planning	EPI	ART service	Penta-3	Measles	Number of sick newborns from 0-2 months visits	Number of newborns treated for asphyxia,	Kangaroo-Mother-Care (KMC)	ICCM 2-59 months	pneumonia	diarrhea	OPD
Afar	-6.4	-59.1	33.2	-31.4	-11.6	7.2	15.0	23.7	2.9	6.4	7.4	12.9	-12.1	-40.9	-34.2
Amhara	-12.3	-1.7	-2.8	-7.4	-74.6	0.7	-13.5	-3.1	-22.5	-70.6	93.5	11.5	-90.7	-18.7	-30.6
Oromia	4.2	4.2	-10.8	-8.7	-30.2	-4.0	1.7	5.8	40.4	-75.3	-160.0	40.0	-19.0	-28.3	11.7
Somalie	17.5	20.0	10.7	-21.7	6.9	5.9	-35.2	-4.4	15.4	-169.2	-103.7	-2.3	-72.3	-24.2	3.3
Beneshangule gumuz	-20.2	-22.4	16.5	-7.5	34.4	-0.3	-6.7	85.6	-5.3	-30.4	54.3	12.6	-37.6	-33.4	15.4
SNNP	-39.1	-7.9	8.8	13.0	5.6	-41.8	-84.8	-86.5	-12.0	14.0	-12.3	-	-235.3	-149.2	-2.6
Sidama	-3.8	-13.7	6.8	0.0	13.7	-0.1	-1.9	4.8	-5.4	-26.4	-62.9	-	-51.5	-96.2	26.3
Gambella	3.7	27.6	26.9	-5.4	-47.7	-282.2	-15.2	45.4	15.0	70.5	71.4	-6.3	15.4	-59.6	6.1
Hareri	7.8	-28.2	-3.7	-27.0	-20.3	13.9	-16.8	-15.5	-	-	-		70.6	82.4	-17.4
Addis Ababa	-5.5	-5.9	-5.5	-1.6	-6.0	9.4	-0.3	6.8	-31.8	31.0	-22.0	-117.2	-192.2	-168.4	-2.1
Dire Dawa	9.6	-10.9	-4.9	-5.5	12.4	23.1	-7.6	9.3	50.0	85.7	100.0	-	-37.2	-20.3	-12.8
National	-8.9	-4.4	-0.8	-1.6	-8.0	-11.6	-19.5	5.8	5.6	-9.7	13.9	-15.3	-104.7	-83.9	-1.5

3.2.3 Limitation of the analysis

- Ethiopia's DHIS2 data was captured from August 2018, hence the six month of 2018 were used as a washing period and the analysis only consider DHIS2 data from 2019 and 2020.
- The Percent change of the service utilization during March -December 2020 compared to expected utilization based on the preceding one year of the same months.
- The study only covers retrospective data collection from registers only the First and second quarter of 2019 and 2020 GC, only covers public health facilities, and only Maternal and child health care services.

4 Conclusions and Recommendations

- Based on this analysis from the two data sources, it can be concluded that there is a modest but important adverse effect of the COVID-19 pandemic on service utilization, especially admissions, ANC visits, and institutional delivery which may have implications for Ethiopia's effort to reach its health targets. The Health facility report showed that the maternal and child health service utilization decreased at national and regional level. This may increase the risk of unplanned pregnancies and related complications, death and comorbidity. Both neonatal and other childhood emergency visits have also decreased. The subnational analysis also showed the maternal, neonatal and child essential health services are interrupted due Covid-19. Either of the essentials health services is interrupted in all regions, while most of the essential health services are interrupted in Addis Ababa, Dire Dawa, Harari, Oromia, Somali, Gambella, and Amhara regions.

- The Ethiopian DHIS2 data are a valuable source to detect time trends in key indicators of essential health services at national and regional levels. The systematic assessment showed that data quality is good with high reporting completeness by health facilities at regional level, few extreme outliers and missing values and good internal consistency in the majority of Regions. The analysis based on DHIS2 also showed that, almost all components of maternal and child health services suffered from a low case flow. In comparison to expected levels of service utilization from the previous year, OPD, IPD, antenatal visits and institutional delivery decreased during March – December 2020.

- The timing of the drop in service utilization varied between interventions but was greatest in 2nd quarter and third Quarter of the year 2020. The impact of COVID-19 on the continuation of health services varies between regions (and by interventions), but the patterns are somewhat similar. The higher impact was observed in Hareri, Diredawa, and Gambella regions.

- It is recommended that this evidence provides baseline information for researchers interested to further generate new insights on the impacts of the pandemic on the utilization of essential health services at the health facilities. To increase the maternal, child, newborn health services utilization, it needs effective patient flow to optimize the service utilization, implementing strong infection control practices, and ensure the availability of adequate PPE, community sensitization and outreach services, sustaining essential RMNCH services, and strong preventive measures at facilities to increase client confidence and willingness to visit health facilities.

5 Reference

1. Elston JWT, Cartwright C, Ndumbi P, Wright J. The health impact of the 2014-15 Ebola outbreak. *Public Health*. 2017;143:60-70. doi:10.1016/j.puhe.2016.10.020

2. Konwloh PK, Cambell CL, Ade S, Bhat P, Harries AD, Wilkinson E. Influence of Ebola on tuberculosis case finding and treatment outcomes in Liberia. *Public Heal Action*. 2017;7(1):S62–S69.

3. Samba T, Bhat P, Owiti P,. Samuels L, Kanneh PJ, Paul R, Kargbo B. Non-communicable diseases in the Western Area District, Sierra Leone, before and during the Ebola outbreak. *Public Heal Action*. 2017;7(S1):(1):S16–S21.

4. Nagel E, Blackowicz MJ, Sahr F, Jarrett OD. Impact of the Ebola epidemic on clinical outcomes of HIV-infected soldiers and their dependents in Sierra Leone. *Int J STD AIDS*. 2019;30(2):106-112. doi:10.1177/0956462418797843

5. Leuenberger D, Hebelamou J, Strahm S, De Rekeneire N, Balestre E, Wandeler G, François Dabis and for the I International epidemiological databases to evaluate AWA study group. Impact of the Ebola Epidemic on General and HIV Care in Macenta, Forest Guinea, 2014. *AIDS*. 2015;29(14):1883–1887. doi:10.1097/QAD.0000000000000784.Impact

6. World Health Organization (WHO). Maintaining essential health services: operational guidance for the COVID-19 context. *World Heal Organozation*. 2020;1(June):1-55.

7. MOH. Essential Health Services Package for Ethiopia. 2005;(August):i-41.

8. Hogan AB, Jewell BL, Sherrard-Smith E, et al. Potential impact of the COVID-19 pandemic on HIV, tuberculosis, and malaria in low-income and middle-income countries: a modelling study. *Lancet Glob Heal*. 2020;8(9):e1132-e1141. doi:10.1016/S2214-109X(20)30288-6

9. Abbas K, Procter SR, van Zandvoort K, et al. Routine childhood immunisation during the COVID-19 pandemic in Africa: a benefit–risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. *Lancet Glob Heal*. 2020;8(10):e1264-e1272. doi:10.1016/S2214-109X(20)30308-9

10. Shapira G, Ahmed T, Drouard SHP, et al. Disruptions in maternal and child health service utilization during COVID-19: analysis from eight sub-Saharan African countries. *Health Policy Plan*. 2021;36(7):1140-1151. doi:10.1093/heapol/czab064

11. Wanyana D, Wong R, Hakizimana D. Rapid assessment on the utilization of maternal and child health services during COVID-19 in Rwanda. *Public Heal action*. 2021;11(1):12-21. doi:10.5588/pha.20.0057

12. Leight J, Hensly C, Chissano M, Ali L. Short-term effects of the COVID-19 state of emergency on contraceptive access and utilization in Mozambique. *PLoS One*. 2021;16(3 March):1-16. doi:10.1371/journal.pone.0249195

13. Ellen C. Caniglia, Lerato E. Magosi, Rebecca Zash, Modiegi Diseko GM, Judith Mabuta, Kathleen Powis, Scott Dryden-Peterson MM, Rebecca Luckett, Joseph Makhema, Mompati Mmalane, Shahin Lockman RS. Modest reduction in adverse birth outcomes following the

COVID-19 lockdown. *Am J Obs Gynecol*. 2021;224(615):e1-12.

14. Ethiopian Public Health Institute. Community risk perception and behavioural response towards COVID-19 in Ethiopia: A community based cross- sectional Mixed methods survey. *Report*. Published online 2021.
15. FMOH. Annual Performance Report 2021/22. Published online 2021:145-146.
16. *Central Statistical Agency Population Projections for Ethiopia 2007-2037*.; 2013.
17. Maina I, Wanjala P, Soti D, Kipruto H, Droti B, Boerma T. Using health-facility data to assess subnational coverage of maternal and child health indicators, Kenya. *Bull World Health Organ*. 2017;95(10):683-694. doi:10.2471/BLT.17.194399
18. WHO. *Data Quality Review*. Vol NLM classi.; 2017. http://www.who.int
19. Hoaglin DC. How to Detect and Handle Outliers,Volume 16; 2013.

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