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Effects of Communicable Diseases on Maternity Services in Selected MNCH Priority Counties' Public Health facilities in Kenya: A Case of COVID-19

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ABSTRACT

Covid-19 is a rapidly evolving pandemic which has affected both developed and developing countries. Maternity services in low resource countries are adapting to provide antenatal and postnatal care midst a rapidly shifting health system environment due to the COVID-19 pandemic. Over the years there has been progress in reducing maternal and new-born mortality and stillbirths in Kenya and the globe. However, in the wake of covid-19 pandemic, perinatal women and their frontline health services providers especially nurses and midwives have been cited to bear the brunt of the pandemic. This has largely been linked to the limited access to Personal Protective Equipment (PPE) requirements and the fear of contracting the disease within health services delivery points. There have been adverse effects of maternal and new-born care outcomes due to coronavirus disease. The objective of this study was to determine the effect of coronavirus disease (COVID 19) to maternity services in selected levels III and IV public health facilities within five (5) Counties in Kenya. The five MNCH priority counties selected included Nairobi, Migori, Kilifi, Isiolo and Garissa. A two-stage sampling approach was used to select health facilities in the 5 MNCH priority counties with the sampling frame comprising all MNCH priority counties in Kenya. The study employed cross-sectional and observational retrospective approaches. Data was collected from the midwifery managers and maternity registers in a total of 28 levels III and IV facilities. Open Data Kit (ODK) formatted tools were used to collect data from maternity services facility managers and maternity registers in the selected facilities. Data collected from maternity registers covered the period of four months before covid-19 pandemic and four months during the covid-19 pandemic. A two-days training programme comprising of introduction to study objectives and instruments as well as review of the instruments, practice interviews and data collection was conducted. Data was analysed using STATA Version 15. Descriptive statistics and measures of central tendencies were used to analyse the demographic details of the respondents and health related variables of interests. Chi-square test and fishers exact test were used to find association between facilities that had diagnosed COVID-19 cases and their demographic characteristics. For all tests, a p-value < 0.05 was taken as statistically significant. A total of 31 midwifery managers were interviewed and a total of 801 maternity records (400 before COVID and 401 during COVID-19 pandemic) were obtained from levels 3 III (66%) and IV (34%) facilities across 5 MNCH priority counties in Kenya [Nairobi (27%), Garissa (10%), Isiolo (20%), Kilifi (23%) and Migori (20%)]. On Overall representation, Level III facilities were slightly over half (51.6%) and level IV facilities had 48.4% representation. Most of the maternity services managers interviewed (48.4%) had worked for less than 3 years in their respective stations and the majority (67.7%) had a diploma in either Nursing or midwifery as their highest level of professional education. Overall, the managers indicated that ANC visits had reduced (67.9%), referrals of mothers with complications got delayed (29%), mothers feared delivering in hospitals (64.5%) and possibly some mothers were delivering with the

assistance of TBAs (45.2%). The managers reported that New-born care services were the most affected by the pandemic (54.8%) followed by ANC services (45.2%). Immunization services were the least affected (35.5%). The managers (41.9%) reported reduced uptake of FP commodities and a reduction in exclusive breastfeeding (12.9%). Majority (51.6%) of the managers confirmed there was an increase of unplanned pregnancies (90.4) during the pandemic period with limited opportunity to educate ANC clients (74.2%). It was observed that 48% of the facilities surveyed had diagnosed a covid-19 case yet only 61.3% and 54.8% of the facilities had access to masks and hand sanitizers respectively. Facility records indicated a 19% higher ANC attendance before COVID than during COVID-19 pandemic period. Neonatal deaths increased significantly during Covid-19 period ((P=0.010) by 38%. Live births significantly increased by 15% during the pandemic (p<0.0001). Other significant increases were observed in mothers with labour complications (p=0.0003) and number of mothers that underwent caesarean sections(p<0.001) during the pandemic period. There was no sufficient statistical evidence on whether the uptake of FP commodities, post-partum complications, immunizations and maternal mortalities were affected by the covid-19 pandemic. The Covid-19 pandemic caught maternity service providers and the local health systems unaware. The fear of the pandemic had a cross-cutting effect on utilisation of maternity services. Continuous training of health services providers on emergency response to pandemics and health system preparedness is vital in order to have resilient service delivery points.

Key Words: *Covid-19, maternity services, frontline health workers, Pandemic*

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1.0 Introduction

Access to reproductive and maternal healthcare leads to healthier lives for women and girls and increases the likelihood of staying in school and contributing to their communities. Globally, Africa has the highest maternal death rates, linked to poorly functioning healthcare systems (Senkyire, *et al.,* 2022). Midwives are currently among the frontline health workers who are suffering the impact of the Covid-19 pandemic (Chersich et al., 2020). Midwives are the pillar of Maternity and Reproductive health programmes and the face of health services delivery among frontline health workers. Despite efforts toward attaining universal health coverage (UHC), the health systems of countries in Sub-Saharan Africa are overwhelmed by numerous challenges that have been further aggravated by the COVID-19 pandemic (Amu, *et al.,* 2022).

In Kenya, there have been reports of decreased antenatal attendance, immunisations, and hospital deliveries, along with an increase in stillbirths during COVID-19. The decline may be as a result of restricted access to health facilities arising from city lockdowns and curfews imposed by the government, where pregnant women and their companions feared harassment and arrest by the police. Additionally, fear of contracting COVID-19 may keep many women from attending reproductive health services. Similar issues were raised during the recent Ebola pandemic(Kimani et al., 2020). According to the Kenya Ministry of Health (MOH), level III facilities provide primary care services but with additional support. They include health

centres, maternity and nursing homes. Many are currently able to offer in-patient services, mostly maternity. These facilities usually receive referrals from level I and II facilities. On the other hand, level IV facilities are the first-level hospitals whose services complement the primary care level. Together with level V facilities, these form the county referral hospitals. Majority of the referrals to this level are from levels II & III. Facilities at this level offer in- and out-patient services and have large laboratories that offer diagnostic services that otherwise would not be available at the primary care facilities. In emergency cases, referrals to this level may also come from Level I(GOK/MOH, 2016). A review of the existing literature demonstrates there is information gap on the effect of coronavirus disease (COVID 19) to midwifery services in five Counties in Kenya.

2.0 Methods

The study was conducted between June and July 2022 in selected **levels** III and IV facilities located within the UNFPA and MOH, MNCH priority counties. Kilifi County is found on the coastal part pf the country, Migori on the Western, Garissa on the Northern part, Isiolo on the Eastern while Nairobi is the capital city of Kenya. A total of 28 health facilities in 17 sub-Counties were reached across the five counties. The study employed both cross-sectional and observational retrospective study design. Data was collected from maternity units managers and previous registers. Data collection focused on how Covid-19 had affected access to and utilization of maternity services by pregnant women four months before covid-19 and four months during the covid-19 period. Before extracting the information or talking to the midwifery managers, investigators explained the objectives of the research and assured the participants of their confidentiality. A total of 31 managers were interviewed and 801 maternity records were reviewed from all the selected level III and IV facilities. The facilities were randomly chosen from MoH master health facility list at the county level.

The questionnaire included information on the County, level of facility, duration of service and education level of the health workers. It also included the potentially affected health services and source of information on COVID 19. It also included ANC visits, access to skilled birth attendance information and services, post-natal care attendance and follow-up. A two-days training programme comprising of introduction to study objectives and instruments as well as review of the instruments, practice interviews and data collection was conducted. To improve on data accuracy and reduce data entry errors, the selected enumerators were trained on data collection using mobile phones (ODK). Research Assistants (RAs), were recruited and trained from each of the 5 counties based on a set criterion; included ability to use computers and mobile phone applications, training in health or social sciences, and familiarity with the respective region or county. The tools were piloted in a facility external to the counties of interest and feedback shared for any corrections before actual data collection commenced. Quantitative data checklist with variables of interest, were used in interviewing respondents. The quantitative instruments were piloted during the training of research assistants. Due to COVID 19, all the enumerators were given masks and sanitizers for the entire period that they were in the field. The quantitative data was analysed using STATA Version 15. Descriptive statistics, such as frequency counts, percentages, mean, and standard deviation were used to analyse the demographic details of the respondents and health related variables of interests. Cross tabulation, chi-square test and fishers exact test were used to find association between selected maternity care indicators and selected time intervals of the pandemic. For all tests, a p-value < 0.05 was taken as statistically significant. Incidence Rate Ratio (IRR) was also calculated to establish mothers' comparative risk exposure before and during the pandemic.

3.0 Results

3.1 Social-Demographic results

A total of 31 midwifery managers were interviewed and a total of 801 maternity records reviewed from the selected public health facilities in 5 MNCH priority counties in Kenya. Level III facilities accounted for slightly over half (51.6%) of the facility manager respondents. The records reviewed were proportionate to the number of levels III and IV facilities in each of the selected five counties **(Fig 1).** It emerged that 71.7% of the files reviewed belonged to unemployed (housewife) mothers of whom 92.1% were married. For the interviewed facility maternity managers, 48.4% of them had worked for 1-3 years in their current station and the highest level of professional education for most of them (67.7%) was a diploma in either nursing or midwifery (Table 1).

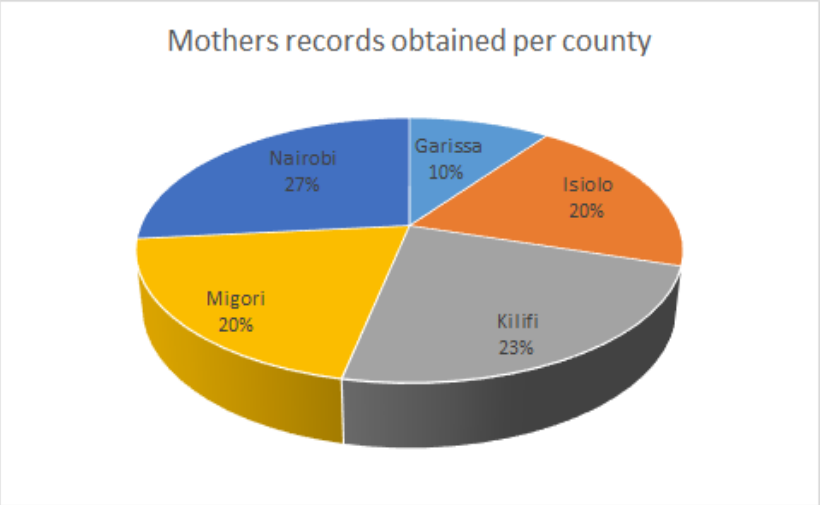

Fig 1: Mothers records obtained per county

Table 1: Demographic Characteristics of the Midwifery Managers (N= 31)

Variable	Frequency	Percentage
County		
Garissa	4	12.9
Isiolo	2	6.4
Kilifi	11	35.5
Migori	10	32.3
Nairobi	4	12.9
Level of facility		
Three	16	51.6
Four	15	48.4
Duration of service		
Less than a year	15	48.4
1-3 years	7	22.6
4-5 years	3	9.7
>5 years	6	19.3
Education level		
Certificate	1	3.2
Degree	9	29
Diploma	21	67.7

3.2 Managers' perceptions on the effect of Covid-19 on maternity services and facilities preparedness.

According to the managers, COVID 19 affected women's utilization of ANC services given that ANC visits reduced (67.9%), with the 1st ANC visits reducing by (50%). Only 3.6% of the managers responded that 1st ANC visits increased majority being from facilities that acted as referral centres. Provision of midwifery services was similarly affected; 58.1% of the managers reported that emergency services were available, 51.6% of the managers indicated that the services were not affected while 41.9% of them were of the opinion that midwives had limited opportunities to carry out routine ANC visitations in the community- **Error! R eference source not found.**.

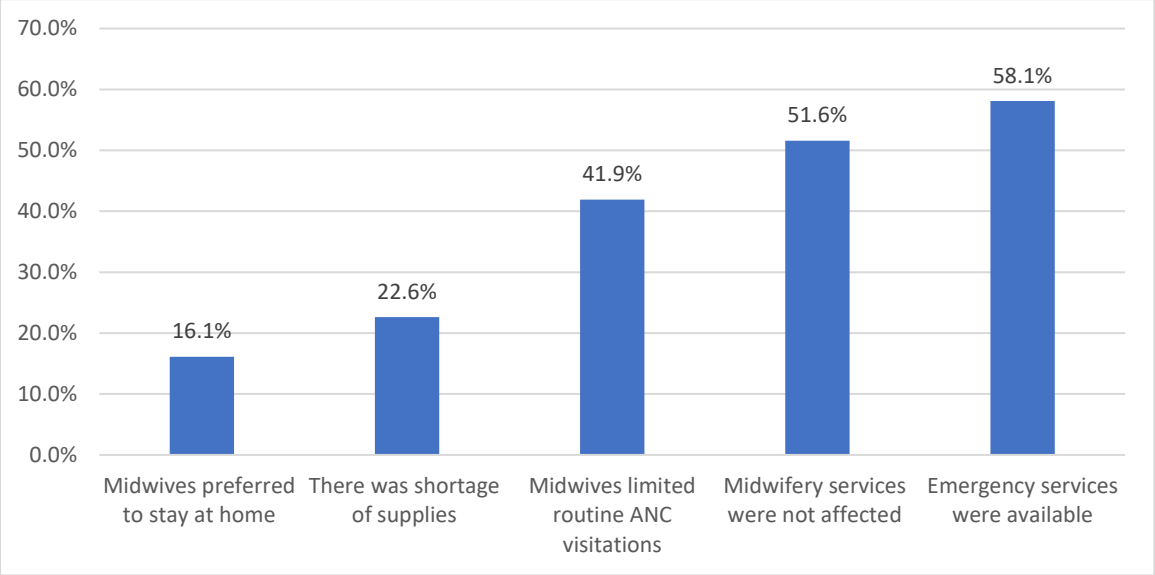

Fig 2; How Covid-19 affected the provision of Midwifery services

On Skilled Birth Attendance, the mangers responded that mothers feared delivering in hospitals (64.5%), some mothers were delivering with the assistance from TBAs (45.2%) and referrals of mothers with complications was getting delayed (29%) as a result of the government instituted movement restrictions that affected the whole country. The managers also observed that during COVID 19 there was an increase in cases of Gender Based Violence (71%), unplanned pregnancies (90.4%) and still births (48.3%). They also indicated that uptake of FP commodities had reduced (64.5%), uptake of immunization services was low (80.6%) and opportunities for educating antenatal mothers were quite limited by the pandemic (83.9%). A total of 25(80.7%) facility managers confirmed that midwives received training on how to handle reproductive health clients during the covid-19 pandemic. More than a third (35.5%) of the facilities according to the managers were operating below the capacity, 9(29%) were running at a normal capacity, 6(19.3%) on average while 5(16.1%) were above their capacity especially those that were serving as referral centres. The most affected perinatal services according to the managers were ANC services (74.2%), EPI services (71%), family planning services (61.3%) and post-natal services (54.8%). The least services affected were new-born care services (16.1%) and emergency services (29%) as depicted in Figures **3 and 4**

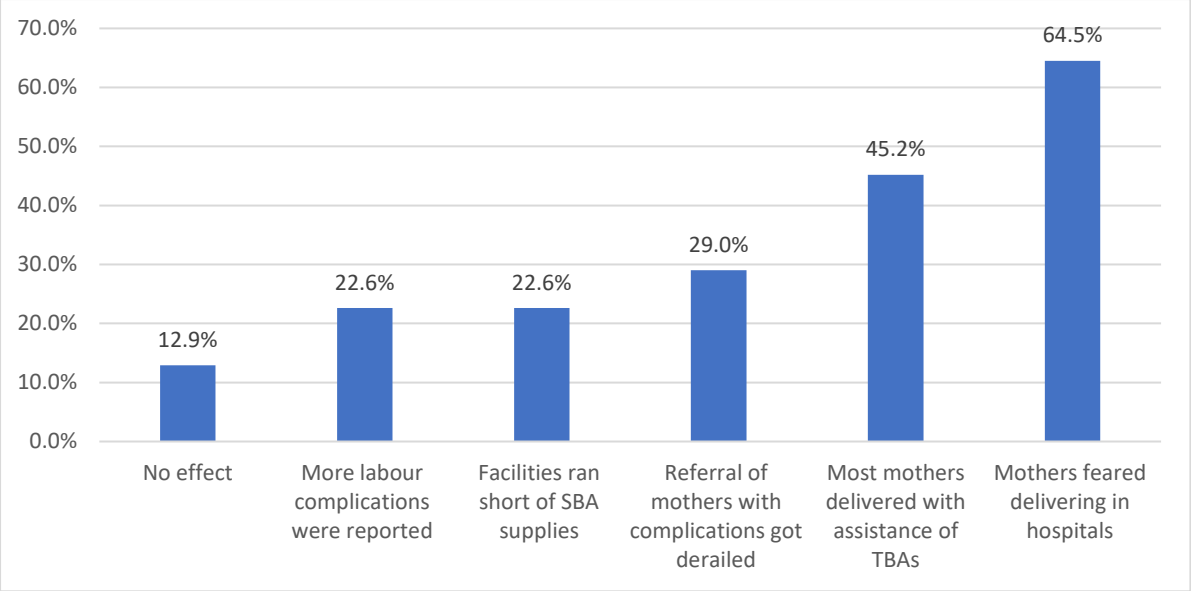

Figure 1 How COVID 19 affected Skilled Birth Attendance (SBA) services

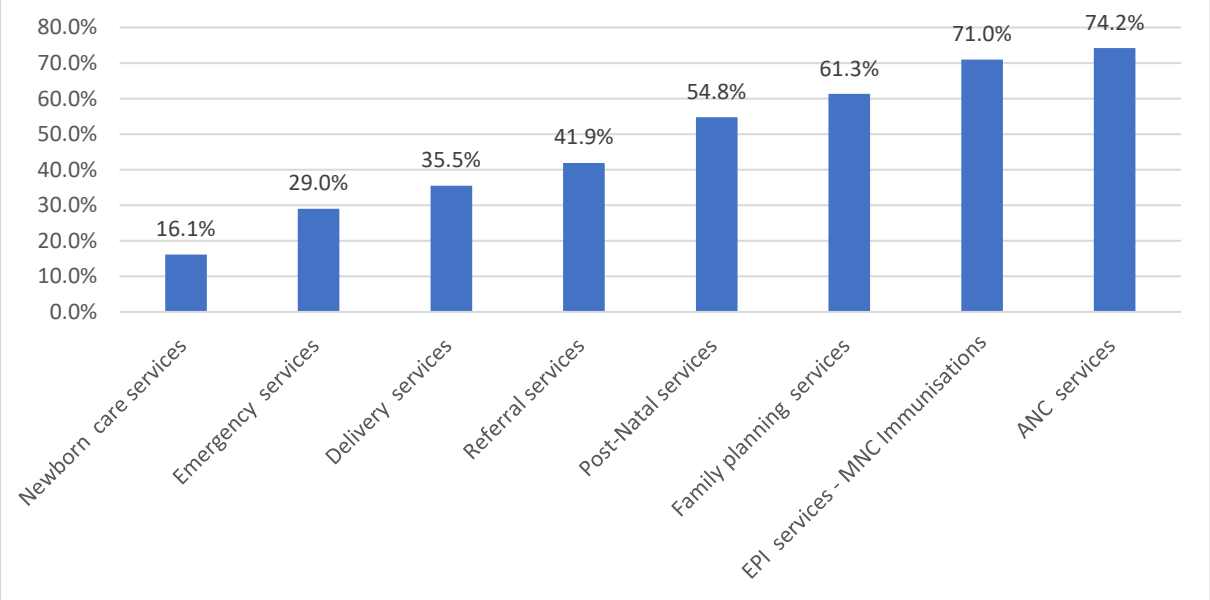

Figure 4: Managers perceptions on how Covid-19 affected perinatal services

The major source of information on Covid-19 for the health workers was national guidelines (74.2%), trainings by the hospital (64.5%) and MOH/County website (51.6%). Social media ranked fourth (41%) while WHO website was (25.8%). No association was found between the facilities that had diagnosed COVID-19 cases with their socio demographic characteristics and other health related variables. However, more cases were reported in Nairobi city County and level IV hospitals. In addition, out of the 11 facilities that were operating below the normal capacity, 72.7% had a COVID 19 case diagnosed in them. As far as ANC visits were concerned, more than two thirds (63.2%) of the reduced ANC visits were among the facilities that diagnosed COVID 19. More than three quarters (77.8%) of referrals of mothers that were delayed and 64.3% of reported cases of mothers who delivered with assistance from TBAs occurred in facilities that diagnosed COVID 19cases as depicted in **Table 2.**

Table 2: Cross-tabulation between facilities who had diagnosed COVID 19 cases with other variables

	Facility had diagnosed COVID-19 cases		Statistics
Variable	**Yes n (%)**	**No n (%)**	
County			
Garissa	1(25)	3(75)	*P*= 0.21
Isiolo	1(50)	1(50)	
Kilifi	7(63.6)	4(36.4)	
Migori	4(40)	6(60)	
Nairobi	4(100)	0	
Facility level			
Level IV	10(66.7)	5(33.3)	$\chi^2 = 1.64$, *P*=0.2
Level III	7(43.7)	9(56.3)	
Operational capacity			
Above normal	1(20)	4(80)	
At normal	5(55.6)	4(44.4)	
Below	8(72.7)	3(27.3)	
On average	3(50)	3(50)	
All ANC Visits Reduced			
Yes	12(63.2)	7(36.8)	$\chi^2 = 1.37$, *P*=0.24
No	5(41.7)	7(58.3)	
Effect on Skilled birth attendance			
More labour complications reported			
Yes	4(57.1)	3(42.9)	*No statistic*
No	13(57.2)	11(45.8)	
Mothers feared delivering in hospitals			
Yes	11(55)	9(45)	*No statistic*
No	6(54.5)	5(45.5)	
Referrals of mothers with complications got derailed			
Yes	7(77.8)	2(22.2)	*P*= 0.13
No	10(45.4)	12(54.5)	
Mothers delivered with assistance from TBAs			
Yes	9(64.3)	5(35.7)	*P*= 0.47
No	8(47.1)	9(52.9)	

3.3 Effect of Covid-19 on pregnancy outcomes

3.3.1 ANC services

Data extracted from the facilities supported the maternity facility manager's opinions; 1st, 2nd, 3rd and 4 Plus ANC visits revealed 5 a mean reduction during Covid-19 as shown in **Figure 5**. The results indicate a difference in the proportion of mothers attending ANC clinics with lower proportion observed during COVID as compared to Pre-Covid-19. This was true across the 1st, 2nd, 3rd and 4th ANC visits before COVID. **Figure 6** highlights the high decline in mothers attending ANC clinics in later visits as compared to earlier visits. Further analysis indicated that cumulatively, ANC attendance was 19% higher before Covid-19 than during the pandemic. Facility data indicated a decline in the proportion of ANC visits for all the four visit in the early months after COVID 19 cases were reported in the country (between March to May 2020)) and

thereafter an increase in the number of visits was observed between months of May and June 2020 when movement restrictions got lifted as depicted in **figure 6.**

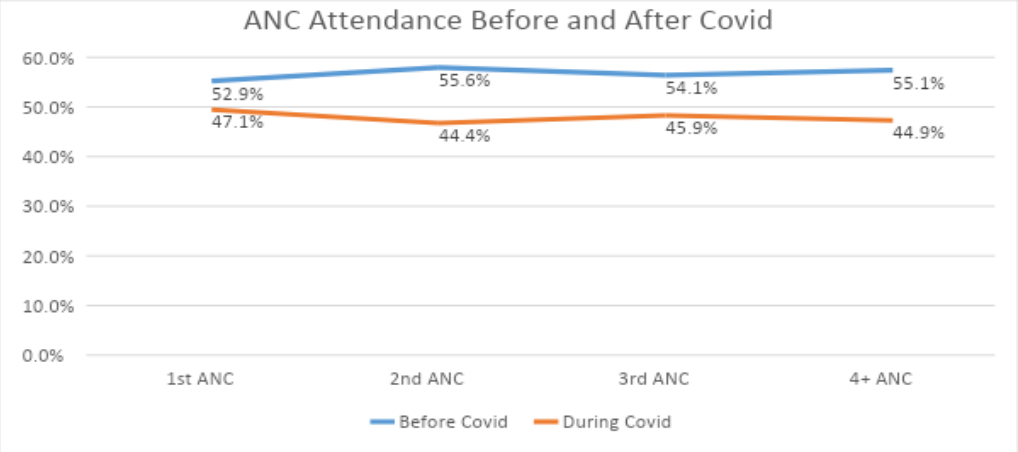

Figure 5: Trends of ANC visits comparison before and during Covid-19

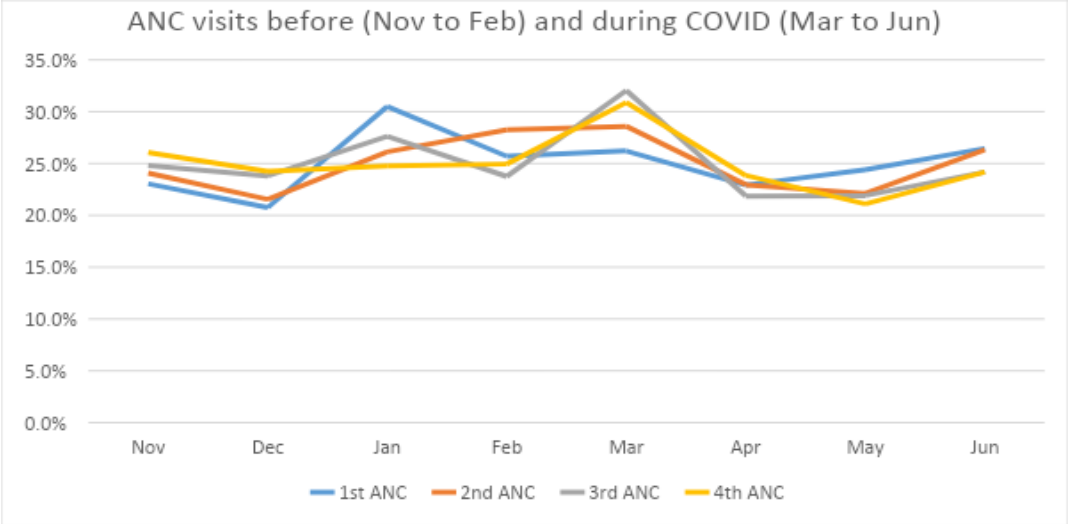

Figure 6: Monthly trends in proportion of mothers attending ANC visits 4 months before and four months during the covid-19 pandemic

3.3.2 Maternal deaths

Facility data indicated a sharp increase in the number of maternal deaths in the early months after COVID 19 cases were reported in the country (between month 5 (14.3%; n=3) and 6(28.6%; n=6)) compared to the cases before COVID-19 (month 4 (9.5%; n=2)). Thereafter a reduction in the number of maternal deaths was observed between months 6 to 8 (4.8%; n=1) when movement restrictions got lifted. Despite the reduction in absolute numbers, further analysis found no sufficient evidence that maternal deaths were significantly affected by COVID 19 (p=0.05784).

3.3.3 Neonatal Deaths

The number of neonatal deaths reported in facilities between month 4(6.4%; n=8) and 5(24.8% ; n=31) which were months when the first COVID-19 cases were reported increased. After month 5, the number of neonatal deaths were observed to decrease up to month 6(11.2% ;

n=14) with minimal changes in numbers between month 6 and 8(12.8%; n=16) this being the period when movement restrictions got lifted. Overall the increase of neonatal mortality increased significantly during covid-19 pandemic at P= 0.010)

3.3.4 Live Births and Still Births

An upward trend was observed in the number of live births during COVID 19 compared to before COVID 19. The highest increase in live births was observed between month 4 (12.1%; n=2797) and 5 (14.8%; n=3418). However, a slight decrease in the number of cases between month 5 and 6 (12.8%; n=2960) as well as 7 (14.1%; n=3263) and 8 (12.2%; n=2805). There was no significant evidence that the number of stillbirths changed before and during COVID-19. However, there was an increase in the number of stillbirths in the early period between month 4 (12%; n=55) and 5(15.5%; n=71)

3.3.5 Caesarean sections and Labour complications

An upward trend was observed during COVID-19, although a slight reduction in the number of labour complications was observed in months 5(14.2%; n=215), 6(12.9%; n=195), 7 (14.6%; n=220) and 8 (12.9%; n=195). Further analysis showed that the number of labour complications significantly increased (p=0.0003) by 17% during the Covid-19 period (**Refer table 3).** Compared to the period before COVID 19, higher cases of caesarean section were reported during COVID 19. There was an increase in the cases between month 4 (10.9%; n=380), 5(13.3%; n=461), 6 (12.8% n=445) and 7(14.9%; n=516). Incidence Rate Ratio (IRR) revealed that there was a significant($p<0.001$) increase in the number of caesarean sections by 15% during the Covid-19 period.

Table 3: Effect of Covid-19 on pregnancy outcomes

	IRR	Std. Err.	z	P>|z|
Maternal death	0.40000	0.19321	-1.8969	0.0578
Neonatal deaths	0.62338	0.11464	-2.5699	0.0101
live births	0.85457	0.01128	-11.901	<0.0001
stillbirths	0.96996	0.09056	-0.3267	0.7439
labour complications	0.83030	0.04292	-3.5976	0.0003
caesarean section	0.85478	0.02909	-4.6101	<0.0001
BCG immunisations	0.88195	0.01372	-8.0756	<0.0001
FP services uptake	0.99281	0.01153	-0.6213	0.5344
returned for follow up	0.91689	0.01396	-5.7007	<0.0001
postpartum complications	0.81421	0.08984	-1.8627	0.0625

Key: IRR of <1 suggest increase risk to the exposed group (during Covid 19) To get the percent chance the (1-IRR) eg Maternal death 1-0.4 = 0.6 interpreted as 60% difference of incidence between before and during Covid 19) Since the IRR is <1 it means increased risk to the exposed thus 60% increase in numbers. The P>|z| indicates if the IRR is significant based on the std error and the z values. As is the standard case any value <=0.05 is significant.

4.0 Discussion and Conclusions

The COVID-19 pandemic has led to maternity services adjusting how they provide antenatal care to pregnant women due to the government restrictions regarding social distancing, which has impacted on pregnant women's access to routine antenatal care (Esegbona-Adeigbe, 2020). Both the views of the midwifery managers and the extracted data from the facility records show

Though rare, obstetric complications and outcomes including maternal death, stillbirth, miscarriage, preeclampsia, foetal growth restriction, coagulopathy, and premature rupture of membranes have been reported among pregnant women (Carter, et al., 2022).

In addition, a study in London suggests that stillbirths may become more common as a direct or indirect consequence of the pandemic (Khalil et al., 2022). This view seems to support our findings in which there were increase in neonatal deaths and labour complications during the COVID 19 period. The same is supported by Pallangyo et al., 2020 when they state that lack of antenatal care has reportedly led to poor maternal and neonatal outcomes such as ruptured uterus or stillbirth. In our However, pin pointing the association between the neonatal deaths to the same was beyond this study. study, ANC was majorly affected during the COVID 19 period (Jones & Nunes 2022).

The World Health Organization (WHO) appreciates that COVID-19 pandemic may cause disruptions in the provision of routine immunization services and may in addition reduce demand for such services (e.g., due to concern about virus transmission, inconvenience of rescheduled appointments or transportation barriers). According to the world health body, these challenges may result in an accumulation of susceptible individuals and ultimately the resurgence of vaccine-preventable diseases (WHO, 2022).In our study, the midwifery managers confirmed that there was in deed disruption of uptake of immunization. This is similar to a study by (Mansour et al., 2021 & Ali, 2020) in which the same was reported.

Evidence show the child deaths averted by sustaining routine childhood immunisation in Africa per COVID-19 death attributable to excess severe acute respiratory syndrome coronavirus 2 infections acquired through visiting routine vaccination service delivery points. (Abbas et al., 2020). Outbreaks of vaccine-preventable disease have been observed during previous interruptions to routine immunisation services, such as during the 2013–16 Ebola outbreak in west Africa, when most health resources were shifted towards the Ebola response and decreased vaccination coverage led to consequent outbreaks of measles and other vaccine-preventable diseases (Abbas et al., 2020). In another study conducted to assess the performance of routine immunization, thirteen of the 15 countries showed a decline in the monthly average number of vaccine doses provided, with 6 countries having more than 10% decline. Nine countries had a lower monthly mean of recipients of first dose measles vaccination in the second quarter of 2020 as compared to the first quarter (Masresha et al., 2020).

According to our findings more mothers feared delivering to the hospitals leading to almost half being assisted by traditional birth attendants. The findings are similar to numerous reports that have shown decrease in hospital deliveries (Kimani, 2020, Mwobobia, 2020). This could be attributed to restricted access to health facilities as a result of lockdown and curfews that Kenyan government had imposed to reduce infections. The knock-on effects of the lockdown may mean that some pregnant women or new mothers were not able to afford to pay for health care, while others out of fear of either contracting the virus or being mistaken for a patient seeking COVID-19 care (Rodrigues, 2020).

This study shows that more than a third of delivery services were affected during the pandemic This could have been necessitated by low activities and inadequate resources including health workers at the lower tiers hence referrals. In some instances, maternal and child health clinics might have been converted into isolation rooms or the facilities suspended altogether. In addition, the health workers in these facilities might have been infected by COVID 19 (Barasa, et al., 2020). For instance, a maternity wing in the coastal part of Kenya was converted into an isolation ward and in Mombasa County, maternity and other services were suspended when Tudor Hospital, a referral health facility, converted into an isolation centre. Although some healthcare providers had been trained to offer maternal health services, they lacked personal

protective equipment (PPE), putting themselves and pregnant women and mothers at risk for COVID-19. On 14 July 2020, it was reported that at least 41 employees (19 health care workers and 22 support staff) at the country's largest maternity hospital had tested positive for COVID-19 (Wangamati et al., 2020). Our findings show that there has been increase in domestic violence during COVID 19 with 71% of the health workers confirming the position. The findings are similar to a review by (Mittal et al., 2020) found an alarming rise in the incidents of gender-based violence during the COVID-19 pandemic. A study done in UK and Kenya also found an increase in patients seeking care for intimate partner violence three months into lockdown in Kenya (Johnson et al., 2020). According to WHO, the high cases of domestic violence could be attributed to stress, loss of income and isolation (WHO, 2020).

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