COMPARATIVE ANALYSIS OF EFFECT OF SARS NCOV 2 ON SELECTED MATERNAL-NEONATAL OUTCOMES IN MIGORI COUNTY

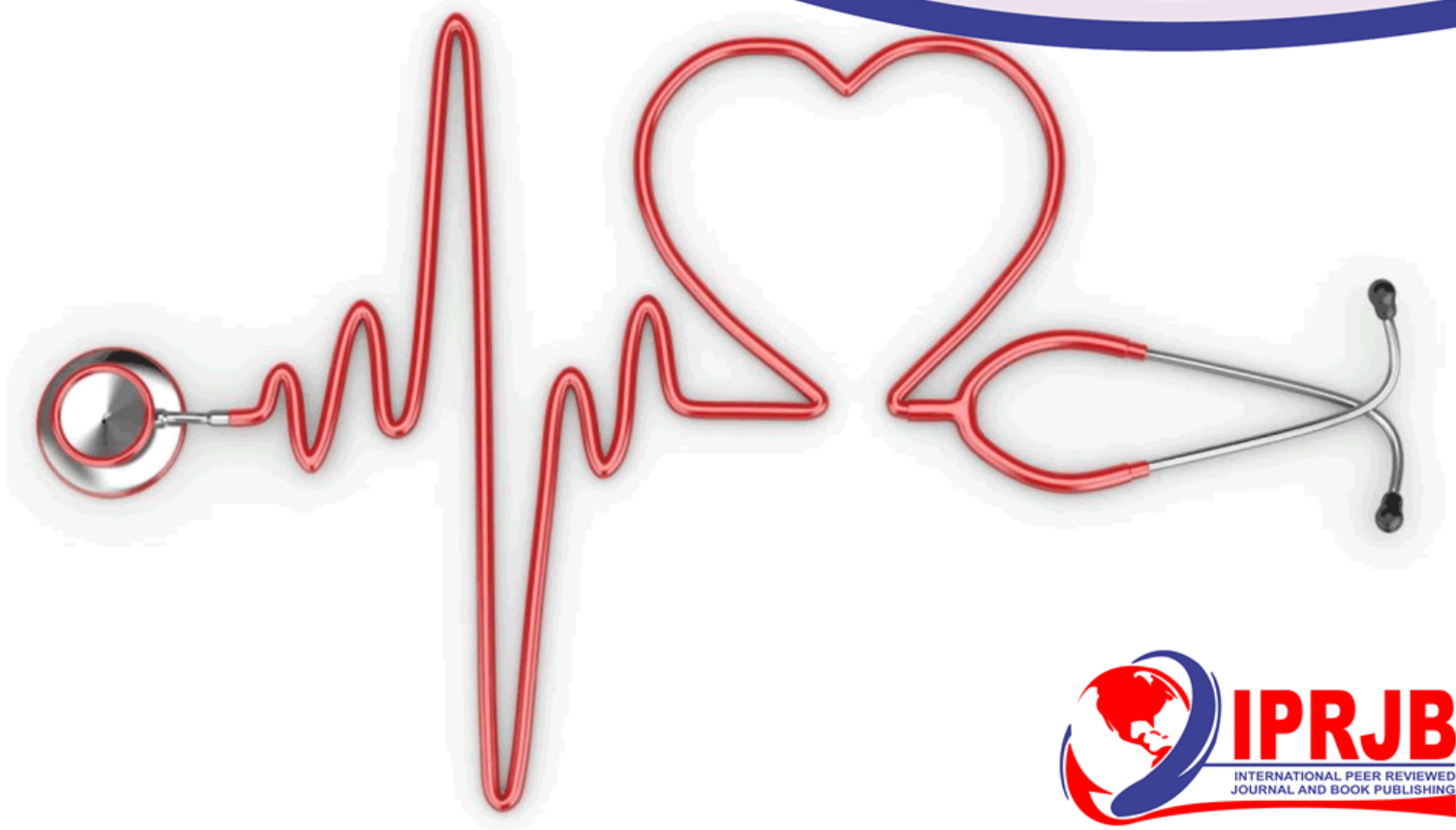Ochieng Odhoch, Dalmas O. Oyugi and Ian Omuom

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COMPARATIVE ANALYSIS OF EFFECT OF SARS NCOV 2 ON SELECTED MATERNAL-NEONATAL OUTCOMES IN MIGORI COUNTY

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Abstract

Purpose: To assess the effect of the pandemic on selected maternal/neonatal outcomes in Migori County.

Methodology: This was a comparative cross-sectional study where selected maternal/neonatal indicators for similar periods of the financial years 2019 and 2020 were considered. Sampling method was census as all data pertaining to maternal-neonatal outcomes were considered. The data on maternal/neonatal outcomes were extracted from DHIS (District Health Information System) and analyzed with SPSS IBM Version 20 software. This was then presented using tables and frequency graphs.

Findings: There was a significant variation ($p < 0.001$) county neonatal deaths which increased from 31 to 55 as a result of Covid -19 outbreak. Maternal deaths also significantly increased from 4 to 14 ($p < 0.01$); and 4th ANC visits significantly increased from 7101 to 7754 ($p < 0.001$). On the contrary, referral-ins significantly reduced from 507 to 403 ($p < 0.001$) following the outbreak.

Unique contribution to theory, practice and policy: This study aims to redirect policy formulation in Low /middle income countries which are ill prepared to handle epidemics and pandemics leading to unnoticed neglect of other health needs especially maternal/neonatal child health.

Keywords: *SARS COV 2, maternal deaths, perinatal mortality and live births*.

1.0 INTRODUCTION

SARS nCoV 2 is an acute respiratory disease, caused by a novel corona virus (SARS-CoV-2, previously known as 2019-nCoV). The corona virus disease 2019 (COVID-19) was first detected in Wuhan, China from where it has spread across the globe receiving international attention (Peretto, Sala & Caforio, 2020). It first manifested itself as a mysterious but spontaneous cases of pneumonia in December 2019. The causative agent was then identified as a new corona virus (2019-nCoV) on the 7th January 2020, and the disease was later named, COVID-19 by the World Health Organization (WHO) (Keni, Alexander, Nayak, Mudgal, & Nandakumar, 2020). On 30 January 2020, WHO officially declared the COVID-19 epidemic as a public health emergency of international concern. The emergence of SARS-CoV-2 followed the Severe Acute Respiratory Syndrome Corona Virus (SARS-Cove) in 2002; and Middle East Respiratory Syndrome Corona virus (MERS-CoV) in 2012, to mark the third introduction of a highly pathogenic and large-scale epidemic corona virus into the human population in the twenty-first century (Peretto *et al*., 2020). The WHO on March 11, 2020, declared the novel corona virus (COVID-19) outbreak a global pandemic (Cucinotta and Vanelli, 2020). By this time, the world had recorded 118,000 cases in 114 countries with 4,291 deaths (WHO, 2020). As of 11th March 2020, a total of 47 confirmed COVID-19 cases, with no deaths, had been reported across nine countries in Africa: Algeria (20), South Africa (13), Senegal (5), Nigeria (2), Cameroon (2), Burkina Faso (2), Cote d'Ivoire (1), Democratic Republic of the Congo (1), and Togo (1). A total of 66 confirmed COVID-19 cases were reported from three other African countries: Egypt (59), Tunisia (5), and Morocco (2) (WHO, 2020). Kenya recorded her first case on 13th March, 2020, and within 12 days, the cases had shot up to 28. Consequently, this was followed with stringent measures to curb the spread of the disease. Amongst such measures especially in Kenya - which is the focal point of this study, included daily curfew from dusk to dawn (Kenyatta, 2020). Migori County recorded its first two cases on the 2nd of May, 2020. The County has since been classified as one of the fourteen counties with high risk of Covid-19. This is because of its porous borders with neighboring countries, major road works which attract international travelers, and a highway connecting Kenya and Tanzania at the Isebania border (Kebaso, 2020).

Covid-19 situation as at end of June 2020

The covid-19 curve had been on an upward trajectory in Africa since the index case was reported especially in the first three months. By 30th of June, a total of 9,866,077 COVID-19 cases and 496,180 (CFR: 5%) related deaths had been reported from 215 countries and territories with Africa having 393,305 cases. Kenya has reported 6190 cases (Africa CDC, 2020). Three months later, Kenyan cases registered an alarming increase to 28 on 13th march, 6190 cases by 25th June 2020.

Impact on health outcomes

Outbreaks have had indirect effects on health outcomes. Roberton (Roberton *et al*., 2020) pointed out that the effect of the recent 2014 Ebola outbreaks in West Africa had more indirect effects than the outbreak itself. WHO (2020) notes, "People, efforts, and medical supplies all shift to respond to the emergency. This often leads to the neglect of basic and regular essential health services. People with health problems unrelated to the epidemic find it harder to get access

to health care services" (Roberton *et al*., 2020). This has been observed in many jurisdictions including Kenya. Primary healthcare ensures people access quality and affordable comprehensive care ranging from promotion and prevention to treatment, rehabilitation, and palliative care. The concept of universal health coverage (UHC). Access to healthcare is a fundamental human right, but the strain that the COVID-19 pandemic has placed on healthcare systems everywhere has, in turn, affected many people's primary healthcare provision (Maria Cohut, 2020). Although mortality rates for COVID-19 appear to be low in children and in women of reproductive age, these groups might be disproportionately affected by the disruption of routine health services, particularly in low-income and middle-income countries (LMICs) (Roberton *et al.*, 2020).

Empirical framework

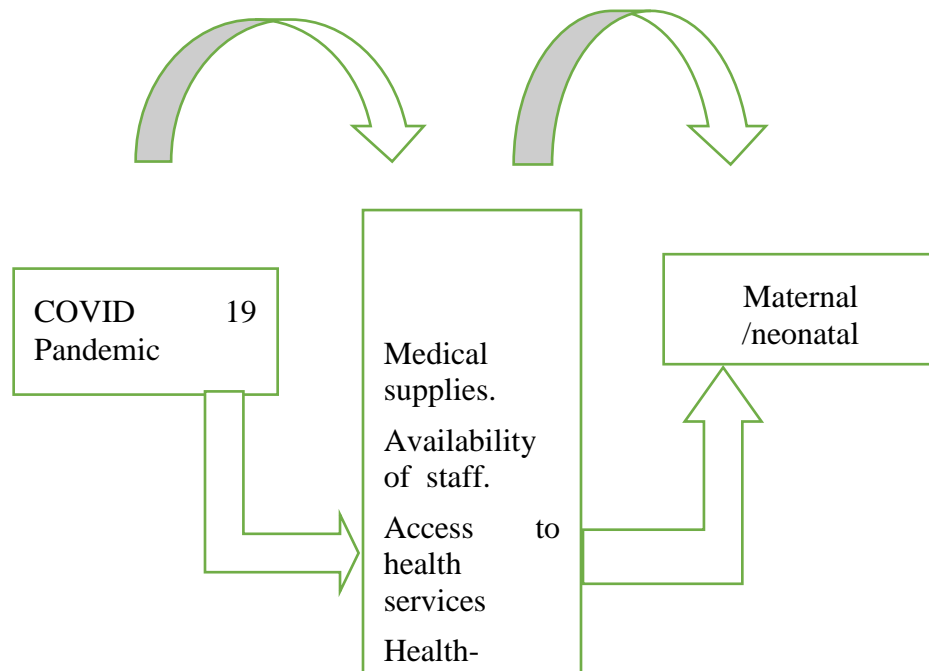**Independent variable Modifying factors   Dependent variable**

Fig.1. Empirical framework-relationship between Covid 19 pandemic and desired health outcomes (Source; own work).

In review of departmental data quality and progress, a given a quarter of a financial year (i.e. April-June 2020) was compared and contrasted to "the same" quarter in the previous year (2019). For instance, April-June 2020 was unique due to the presence of the pandemic, SARS nCoV 2 compared to the same quarter in 2019 when there was no pandemic. This study therefore, hypothesized that the pandemic would not have any significant negative effects on health outcomes especially reproductive health indicators in Migori County. To test this hypotheses, a comparative cross-sectional study was conducted whose primary goal was to determine effects of SARS nCoV2 on selected maternal/neonatal indicators in Migori County

with specific objectives being to: determine the prevalence of SARS nCoV 2 in Migori County; compare these outcomes by sub-county; and determine the effect of the pandemic on selected outcomes in the county's largest hospital, Migori County Referral Hospital.

2.0 METHODOLOGY

Study site

This study was conducted in eight sub-counties of Migori namely: Suna East, Suna West, Kuria East, Kuria West, Uriri, Awendo, Nyatike and Rongo. The county Referral hospital which falls within Suna East sub-county was treated as the ninth sub-county considering its nature of operation, workload and being the largest facility within the County.

Study design

The study adopted a comparative cross-sectional study design comparing similar periods (April-June) of two calendar years (2019 and 2020).

Data collection

Data collection was done through extraction from pre-recorded hospital data from District Health Information System (DHIS). Consequently, data on maternal/neonatal outcomes for the months of June-April 2019 (pre-COVID 19) and June-April 2020 (intra-COVID 19) were extracted.

Sampling technique

Census method as all data within the study duration was adopted.

Data analysis

The data was managed and analyzed in SPSS IBM Version 20 software. Using the descriptive statistics, maternal/neonatal outcomes were aggregated quarterly from April-June 2019 to April-June 2020 and presented as frequency distributions. The change of outcomes was determined by comparing the pre and intra-Covid 19 variation of cases using a parametric Students t- test. The 95% confidence intervals (CI) around effect estimates were computed, and p-value less than 0.05 was considered statistically significant. This was later presented using tables and frequency graphs.

3.0 RESULTS

3.1 County maternal outcomes

Between April and June 2020, Migori County had 62 confirmed cases of Covid-19. Majority of these were males 43 (69%), with females being 19 (31%) (Fig. 2). All the maternal outcomes under review had statistically significant changes ($p < 0.05$; n =124), save for Post partum hemorrhage (PPH) that insignificantly increased by 19 ($p > 0.05$; n = 124). Referral-ins and 4th ANC visits, significantly varied ($p < 0.001$) between the periods under review. PPH did not change significantly ($P > 0.05$) **(Table 1).**
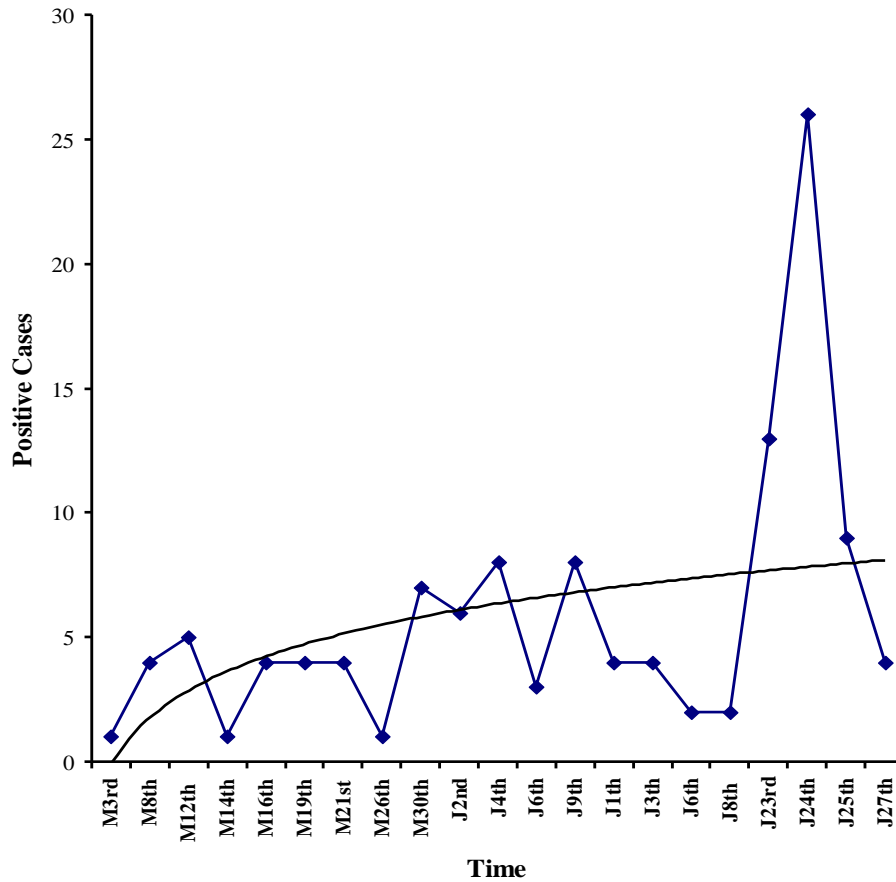
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Fig. 2. Trend of Covid-19 positive cases in Migori County as at June, 2020

Table 1: Comparison of county maternal outcomes from the referral hospital

Maternal Outcomes	APRIL/MAY/ JUNE 2019 (Pre-Covid-19)	APRIL/ MAY/ JUNE 2020 (Intra-Covid-19)	*P*-VALUE
Maternal death	4	14	0.0027
Obstructed labor	246	211	0.0245
Post-partum hemorrhage	105	124	0.09254
Referrals In	507	403	<0.001
4TH ANC Visit	7101	7754	<0.001

5

3.2 County Neonatal Outcomes

There was a significant increase in late neonatal deaths from 31 to 55 ($p < 0.001$). Other neonatal outcomes did not significantly change ($p > 0.05$) **(Table 2).**

3.2.1 County Referral Hospital Maternal outcomes

There was a significant increase of 24 PPH cases ($p < 0.01$), and a significant reduction of 48 4th ANC visits ($p < 0.01$). Maternal deaths also significantly increased from 3 to 9 ($p < 0.05$) **(Table 3).**

Table 2. Comparison of the county referral neonatal outcomes

Maternal outcomes	APRIL/MAY JUNE 2019 (Pre-Covid-19)	APRIL/ MAY/ JUNE 2020 (Intra-Covid-19)	P-value
Early Neonatal death (0-7days)	40	47	0.363
Late neonatal deaths (8-28days)	31	55	<0.001
Live births	9377	9368	0.9341
Fresh still births	58	74	0.06484
Macerated still births	70	68	0.9042

Table 3. Maternal outcomes at the County Referral Hospital

Maternal outcomes	APRIL/MAY JUNE 2019 (Pre-Covid-19)	APRIL/ MAY/ JUNE 2020 (Intra-Covid-19)	*P*-VALUE
Maternal death	3	9	0.04123
Obstructed labor	31	43	0.07055
Post-partum hemorrhage	15	39	<0.001
Referral In	246	224	0.1707
4th ANC Visits	241	193	0.00142

3.2.2 County Referral Hospital Neonatal outcomes

Late neonatal deaths (8-28days) significantly increased by 25 ($p < 0.001$) with a reported decreased in live births by 79 ($p < 0.05$). Other neonatal parameters were not significantly affected ($P > 0.05$) **(Table 4).**

Table 4: Neonatal outcomes in the County Referral Hospital

Maternal outcomes	APRIL/MAY JUNE 2019 (Pre-Covid-19)	APRIL/ MAY/ JUNE 2020 (Intra-Covid-19)	P -value
Early Neonatal death (0-7days)	14	16	0.7963
Late neonatal deaths (8-28days)	30	55	<0.001
Live births	968	889	0.01047
Fresh still birth	21	31	0.07756
Macerated still birth	21	23	0.8312

3.3 Comparison of maternal outcomes in the entire county

Even though by magnitude, the County experienced some variation in maternal outcomes namely maternal deaths, obstructed labour; PPH; and referral outs as a result of Covid -19 outbreak, Students t-test for means found no significant variation in such outcomes ($p > 0.05$), except for 4th ANC where the visits significantly increased from a mean of 887 to 968 ($p < 0.05$) during the intracovid period. **(Figure. 3).**

3.3.1 Comparison of neonatal outcomes in the entire county

Student t-test revealed that there was no significant variation in the neonatal outcomes before and during the intra-covid periods ($p > 0.05$) **(Figure. 4)**
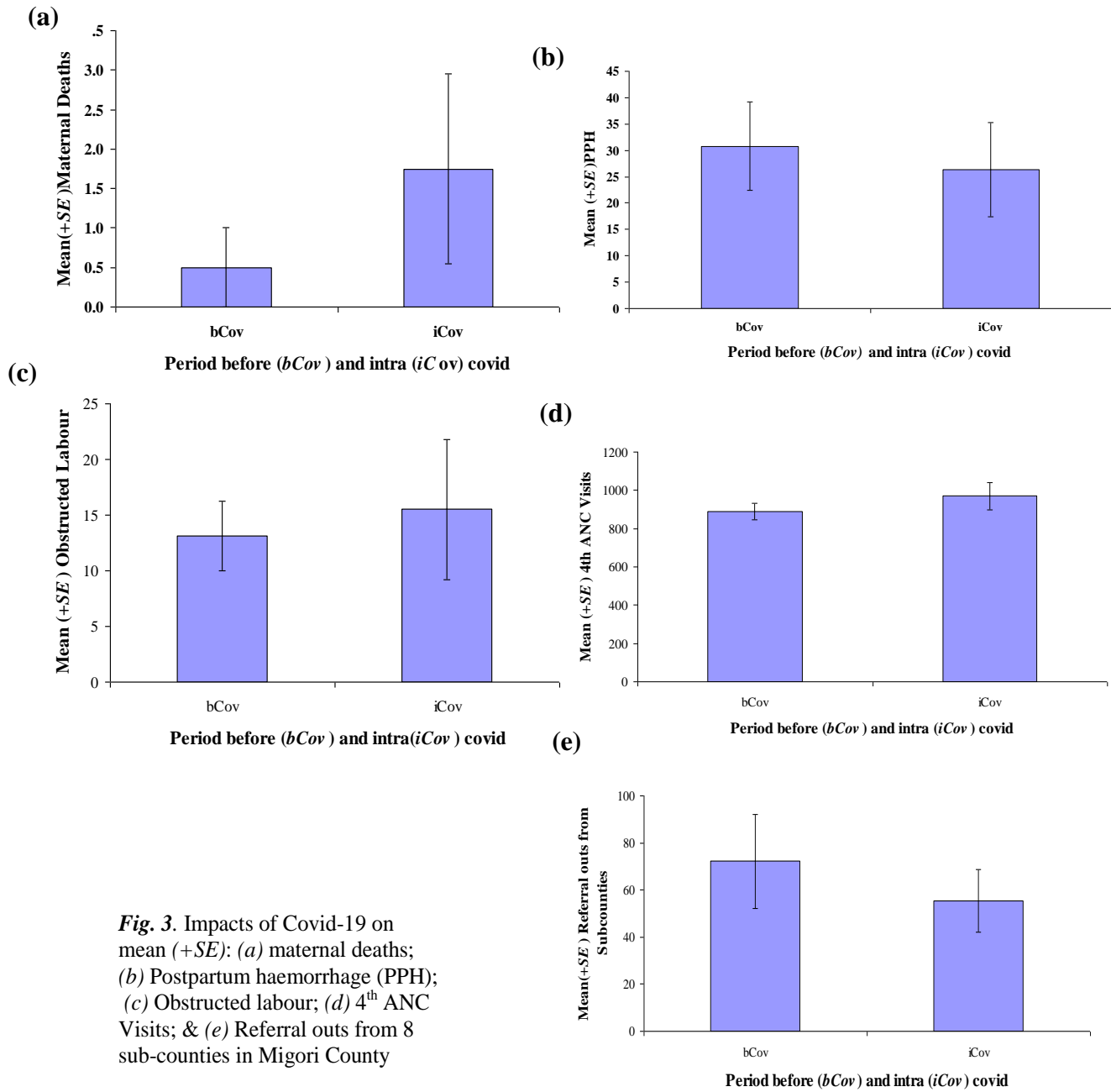
Fig. 3. Impacts of Covid-19 on mean *(+SE)*: *(a)* maternal deaths; *(b)* Postpartum haemorrhage (PPH); *(c)* Obstructed labour; *(d)* 4th ANC Visits; & *(e)* Referral outs from 8 sub-counties in Migori County
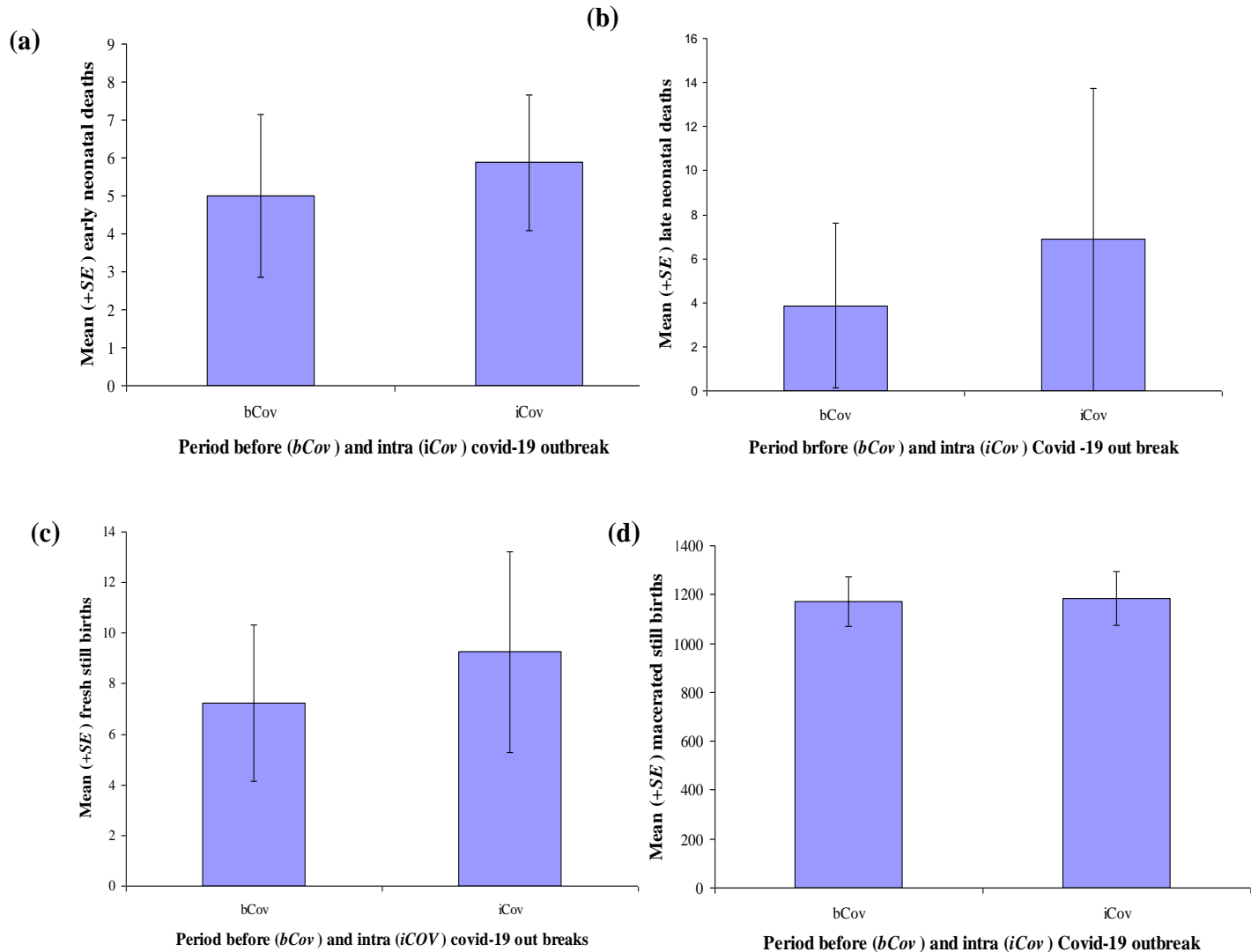
Fig. 4. Impacts of Covid -19 on: *(a)* early neonatal deaths; *(b)* late neonatal deaths; *(c)* fresh still births; and *(d)* macerated still births in Migori County.

3.4 Discussions

The significant increase in maternal deaths ($p < 0.01$, could partly be explained by increase in PPH, which though showed no significant increase during the time under review ($p > 0.05$). In his study, Odhoch (2020) reports PPH as the leading cause of maternal death in the referral hospital accounting for majority of the deaths in Migori County. It is paradoxical from this study that completion of ANC attendance didn't necessarily improve maternal outcomes as would be hypothesized. The maternal mortality still remained high despite ANC attendance significantly increasing by 653 ($p < 0.001$). Odhoch (2020) also found no relationship between ANC

attendance and maternal deaths in Migori ($p < 0.05$). It would therefore, be important to further explore from a more expansive study with a broader scope to typically associate or disassociate antenatal care visits with safe births to support in the development of a more accurate reproductive health care guidelines. Not so much studies have been done in Kenya on effects of Covid-19 on maternal outcomes. However, elsewhere studies have found that most pregnant women shun hospitals due to fear of contracting the dreaded virus and so, present to health facilities when it is too late with complications (Mukami, 2020). As far as the ANC visits are concerned, this study revealed the contrary, reporting significantly increased 4th ANC visits in the 8 sub-county hospitals during the intracovid period ($p < 0.05$). Conversely, there was a significant reduction in referrals into the county referral hospital by 104 ($p < 0.001$) perhaps elucidating the fear of pregnant mothers visiting the referral hospital lest they contract the virus. Even before Covid-19 outbreak, low and middle income countries like Kenya, had relatively poor health systems which has been further strained during the current covid pandemic. At the same time, majority of women have financial disadvantage in accessing care (Mills, 2014). The outbreak of the pandemic may have exacerbated the unfavorable economic power of such women further aggravating their inability to seek medical attention besides the fear of contracting the disease. This may inevitably determine maternal outcome especially during the pandemic. It is important to note that Kenya implemented various interventions to curb the spread of the Virus. Amongst these included dusk to dawn curfew i.e. from 7:00 pm to 5:00 am; social distancing; and use of face masks while in public places (The Presidency, 2020). Coincidentally, majority of deliveries occur at night and early morning hours of between 0200hrs and 0900hrs (Ford, 2018). It obviously be expected that the declaration of the curfew would have direct impact skilled deliveries as travel to hospitals during these hours were hampered since majority of the women depend on either motorcycles to reach the health facilities or trekked to hospitals. This could perhaps lead to delay (second delay) in accessing medicare. Though not signigcantly related ($p > 0.05$), the slight increase on maternal complications (obstructed labour) as depicted in **Figure 3(c),** may be attributed to such delay in seeking for medical facilities to access skilled deliveries. Study in Iran amongst pregnant women and their husbands on fear and psychological effects of Covid 19 confirms this observation (Ahorsu *et al.*, 2020). The pandemic had strained on resources especially staffing and commodities. Staffs remained anxious due to either lack of PPEs or fear of contracting the disease. This led to change of schedule including reorganization of special obstetrics' clinics as was the case after H1N1 outbreak (Bondy, Parkovnick, & Barnsley, 2014). This resulted to third delay as confirmed by local media reports that staffs occasionally abandoned patients during such times due to either lack of proper PPEs or fear of contracting the disease and carrying it to their families. In her study (Gold, 2020), a psychiatrist also confirmed the probable fear to Covid outbreak which disrupted health seeking behavior among pregnant women. Inadequate training among health workers on how to handle maternal emergencies in the context of SARS COV2 during the early days, compounded the fear amongst healthcare providers. Thus all these factors synergistically led to compromised quality of maternal health services.

This study revealed some level of resilience in neonatal outcomes particularly in subcounty hospitals. For instance, though on a positive trend, the impact of Covid-19 outbreak in Migori did not register any signicant change on neonatal outcomes in sub-county hospitals: early

neonatal deaths, late neonatal deaths, fresh still births, nor macerated still births.   Review of pregnancy outcomes during pandemic period at St. George's hospital, London found a significant increase in still births from 2.38 per 1000 births to 9.31 per 1000 pre pandemic to intra-pandemic respectively (Knight *et al*., 2020). This was consistent with our study that found an increase in perinatal mortality of 21 per 1000 births pre-pandemic period, to, 26 per 1000 births during the pandemic period in the referral hospital.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The Covid-19 outbreak significantly affected late neonatal deaths at the County referral hospital, with no significant impact on other neonatal outcomes. The Covid -19 outbreak led to significant increase in maternal deaths, post partum haemorhage with significant reduction in 4th ANC visits at the referral hospital. Other maternal outcomes namely referral ins and obstructed labour were not affected in the referral hospital. This study didn't consider causal association between these observed outcomes and the current pandemic. It is therefore, important to explore further analytical qualitative studies to investigate any probable association between other reproductive health indicators and the Covid-19 pandemic.

Recommendations

Research institutions: Further analytical qualitative studies to investigate any probable association between other reproductive health indicators and the Covid-19 pandemic.

Ministry of health: Near-equal resource distribution to all areas during medical emergencies such as pandemics otherwise such jurisdictions have a risk of losing gains made on areas such as maternal-neonatal health.

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