

Impact of Covid-19 on Maternal Health-Seeking in Ghana

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Abstract

The Covid-19 pandemic is widely speculated to have disrupted the delivery of primary health care in low-income countries. Yet, there is little rigorous empirical research identifying this effect. This paper estimates the impact of Covid-19 on facility and skilled delivery and utilization of ANC services by comparing these outcomes for women who were pregnant/delivered before and during the Covid-19 period. The results show that Covid-19 led to a 17% reduction in the likelihood of both facility and skilled delivery but no significant effect on ANC attendance. These findings highlight the need to build more resilient health systems in low-income settings.

1. Introduction

The Covid-19 pandemic has posed a huge economic and humanitarian challenge to nations worldwide (UNICEF, 2021). Efforts to contain the virus and halt its spread has led to significant disruptions in economic activity, social life and healthcare delivery in many nations. Low and middle-income countries with limited health system capacities have been particularly hit hard by the pandemic (Menendez et al., 2020; World Health Organisation, 2020). In the early stages of the pandemic, the primary focus of health systems was on managing the disease and providing care to affected persons (Ali & Feroz, 2020). This subsequently led to interruptions in routine and primary healthcare delivery especially, maternal and child healthcare services as resources had to be diverted to other critical areas (Graham et al., 2020; Pant et al., 2020).

Fear of contracting the disease, movement restrictions and transport challenges served as barriers to seeking treatment. This was even more pronounced for pregnant women who were faced with a choice of staying at home and avoiding exposure to the virus or risk contracting the virus in order to prevent complications associated with pregnancy and delivery (Graham et al., 2020). This has potential negative consequences for health behaviour and outcomes. For instance, evidence from past health emergencies shows that in 2014/2015, the Ebola outbreak in West Africa led to about 80% drop in maternal and delivery care (Delamou et al., 2017; Elston et al., 2017). A recent analysis by the United Nations Population Fund forecasts a 20% decline in the use of sexual and reproductive health services by women in the Asia-Pacific region (DDe & Maurizio, 2020).

On 12th March, 2020, Ghana confirmed its first two cases of Covid-19. As part of the efforts to curb the spread of the virus, the government of Ghana banned public gatherings and closed the country's borders. On account of the detection of additional cases, a partial lockdown was imposed in two major cities in the country with a greater number of infections, Accra and Kumasi from 30th March 2021. This restricted the movement of many people but exemptions were made for members of the Executive, Legislature and the Judiciary and persons involved in the production, distribution and marketing of food, pharmaceuticals, medicine, media and telecommunications. As of 24th April 2021, there had been 90,358 confirmed cases of Covid-19 with 777 deaths. Table 1 below presents the confirmed number of cases per region. The table shows wide disparity in the number

of infections by region. It is worthy of note that the five regions from which the data for this paper was collected have the lowest number of infections and deaths in the country.

Insert Table 1 here: Confirmed Covid-19 Cases by Region

Understanding the extent of impact of the pandemic on health care delivery is therefore essential for governments and development agencies to reassess health priorities and restructure health systems to promote better health for all, especially for vulnerable groups like pregnant women and children. This paper, therefore, delivers an assessment of the impact of Covid-19 on maternal health behaviour (specifically, facility and skilled delivery and antenatal care (ANC) attendance) within a developing country context like Ghana using data collected from September 2020 to November 2020. Using a sample of about 535 observations, our analysis measures the impact of the pandemic by comparing the outcomes of delivery for the same woman who has had children during Covid-19 and some pre-Covid-19.

Our results show that deliveries in the Covid-19 era were 11 percentage points less likely to be in health facilities compared with deliveries by the same women that occurred prior to the Covid-19 pandemic. Our results show a similar negative impact on the probability that deliveries will have a skilled health personnel present. The magnitudes of the effects are large: they represent a 17% reduction in the likelihood of facility delivery and delivery with skilled attendant present. Moreover, given that our sample is largely rural and the cases in Ghana are largely concentrated in urban areas, the impact in the country as a whole is likely to be larger than the estimates presented in this paper. Our results show that the pandemic has had no significant impact on the use of ANC services. Even though the coefficient on our Covid-19 exposure variable in the 4 or more ANC visits regressions is negative, it is not statistically significant.

This paper contributes to the rapidly emerging literature on the health impacts of Covid-19. Much of the earlier evidence seeks to model the effects of the pandemic on maternal and neonatal mortality using simulations (Riley et al., 2020; Roberton et al., 2020; Stein et al., 2020). Riley et al. (2020), for instance, estimate that a 10% decline in essential pregnancy and newborn care service provision could result in 28,000 additional maternal deaths and 168,000 neonatal deaths using data from 132 LMICs. Roberton et al. (2020) modelled three different scenarios where maternal and child health interventions were

reduced by 9.8% - 51.9% for 118 countries using the Lives Saved Tool. For their least severe scenario (9.8% - 18.5% coverage reduction), their results showed that child deaths and maternal deaths increased by 1,157,000 and 56700 respectively as a result of the pandemic. In as much as these simulations seek to reflect real-world situations, the precision of their forecasts is limited since it requires making assumptions about the nature of the disease.

With the progress of the pandemic, direct evidence on its impact on maternal health behaviour is evolving from survey data. This literature has shown severe effects of the pandemic in the form of reductions in facility deliveries, ANC attendance, family planning sessions and immunizations (Ahmed et al., 2021; Daskalakis et al., 2020; Goyal et al., 2021; Temesgen et al., 2021). To measure the effect of the pandemic, these studies compare information on maternal health service utilization post-pandemic with pre-pandemic levels. Ahmed et al. (2021) for example, investigated the impact of Covid-19 on maternal newborn and child health services (MNCHs) using data from 3 LMICs. By comparing MNCHs utilization levels in April/May 2020 with the same months in 2019, they observed a reduction in the utilization of basic MNCH services. Similarly, Goyal et al. (2021) assessed the effect of the pandemic on obstetric care and outcomes. Their data consisted of women who were admitted from April 2020 to August 2020 compared with data from October 2019 to February 2020. Their findings showed a drop in facility delivery by about 45% with significant reductions in antenatal care visits.

The main limitation of these studies is that they do not provide evidence on the causal impact of the pandemic on maternal health behaviour. This makes it difficult to provide accurate evidence on impact. Our paper seeks to fill this gap by providing robust evidence on the causal impact of the pandemic on facility and skilled delivery and ANC attendance. To the best of our knowledge, this paper is the first to compare pre-pandemic maternal health behaviour with post-pandemic information amongst the same women using data from 2018 to 2020. Since the data is based on women from mostly rural settings in Ghana, our paper is also able to provide much needed evidence of Covid-19's impact on a very vulnerable group of women who are already at a greater risk due to insufficient access to quality health care.

The remainder of the paper is structured as follows. Section two presents the study's methodology. Section three presents the findings. Section four discusses the findings and concludes the paper.

2. Methodology

2.1 Data source

The data used for the analysis of this paper comes from a survey of women in their reproductive age (15-49 years) in 14 districts in five regions in Ghana. The regions are Oti region, North East region, Northern region, Savannah region and Volta region. The data was collected for the evaluation of the CHPS project which was implemented in these regions.

The sample for the survey was designed to obtain a representative sample of women in their reproductive age in each district and employed a two-stage cluster random sampling strategy. In the first, stage 275 census Enumeration Areas (EA) were randomly sampled. The total number EAs was distributed to the various districts based on the district's contribution to the total population of the 14 districts. A complete listing of all households in each of the sample EAs was conducted to obtain information on all households with eligible women (i.e., women aged 15-49 years) in each EA. This formed the sampling frame for the second stage sampling. In the second stage, an average of 55 eligible women were sampled from each EA. This gave a total sample of 15,044 women.

The survey collected information on the household characteristics, assets, dwelling characteristics, socio-demographic information of women, marriage history, a complete birth history of each woman, and for all pregnancies occurring the last five years before the survey, detailed information on antenatal care attendance, delivery information and immunization information.

For the purposes of this analysis, the sample was restricted to women who have more than one child, with at least one of the births (or at least part of the most recent pregnancy, in the case of our ANC attendance analysis) occurring during the Covid-19 period. Applying this restriction limited our analysis sample to 535 pregnancies from 288 women.

2.2 Empirical Strategy and Estimation

The goal of this paper is to estimate the impact of Covid-19 on delivery of maternal health services using antenatal care attendance and delivery at health facilities as outcomes. The ideal identification strategy will randomly assign some pregnant women to Covid-19 and some to pre-Covid-19 and compare the ANC attendance and delivery at health facilities between the two groups. However, this is neither possible nor desirable under the circumstances of Covid-19. In the absence of this ideal, the thrust of the empirical strategy of this paper is to restrict the sample to women who have had multiple children, some before the occurrence of Covid-19 and some during Covid-19 and compare the outcomes for deliveries of the same woman, comparing deliveries that occurred in Covid-19 and with the woman's most recent delivery prior to the Covid-19 period. Our general estimation equations are of the form:

$$\begin{aligned} facilitydelivery_{iwt} \\ = \alpha_1 + \alpha_2 Covid1_{iwt} + \alpha_3 age_{iwt} + \alpha_4 ANC_{iwt} + \alpha_5 month_{iwt} + w_t \\ + \varepsilon_{iwt} \end{aligned} \quad (1)$$

$$ANC4_{pwt} = \beta_1 + \beta_2 Covid2_{pwt} + \beta_3 age_{pwt} + \beta_4 pregdur_{pwt} + w_t + \mu_{pwt} \quad (2)$$

Where iwt denotes child i born to woman w at time t and pwt denote pregnancy p of woman w at time t . $facilitydelivery$ is an indicator that takes a value of one if the child was delivered in a health facility and zero otherwise and $ANC4$ is an indicator variable that takes a value of one if woman had four or more ANC visits during the pregnancy p . w_t represents woman fixed effect and ε_{iwt} and μ_{pwt} denote errors terms for the $facilitydelivery$ and $ANC4$ outcomes respectively. Equation (1) is used to estimate the impact of Covid-19 on delivery in health facilities while equation (2) is used to estimate the effect of Covid-19 on ANC attendance. We also estimate equation (1) using $skilleddelivery$ as an outcome variable. $skilleddelivery$ is an indicator that takes a value of 1 if delivery was attended by a skilled birth attendant (a doctor, midwife, nurse or community health officer) and zero otherwise.

The independent variables of interest are $Covid1$ and $Covid2$, our main variable of Covid-19 exposure. $Covid1$ is the variable that identifies the impact of Covid-19 on

delivery in health facility and is defined as an indicator variable that takes a value of 1 if the delivery took place on or after 1st April 2020 and zero otherwise. The first case of Covid-19 in Ghana was reported on 12th March 2020. However, it was the imposition of the 21-day lockdown in some parts of the country starting from 30th March 2020 that really brought nationwide attention to the pandemic in Ghana. Therefore, in this paper we classify any delivery from 1st April 2020 as Covid-era delivery. *Covid2*, is the indicator for identifying the effect of Covid-19 on ANC coverage and it is defined as an indicator variable that takes a value of 1 if 5 or more month of the pregnancy p was spent in the Covid-19 period (that is from 1st April 2020).

In each equation, the variable *age* denotes the age of the women at the end of the pregnancy. In equation (1), we control for an indicator for whether the women attended ANC during the pregnancy (*ANC*). Previous works have found that ANC is a strong predictor of delivery in health facilities (Boah et al., 2018 & Shahabuddin et al., 2016). We also control for month of delivery (variable *month*) to account for possible impact of seasonality on place of delivery. Equation (2) controls for duration of pregnancy (*pregdur*) because the pregnancies have varying durations and the duration can affect the number of ANC visits. In all estimations, standard errors were clustered at the EA level.

Equations (1) and (2) identify the casual impact of Covid-19 on the two outcomes under the assumption that w_t controls for time-invariant characteristics of the mother that affect the outcomes. Two potential challenges with the above identification strategy above are circular trends improvements in ANC attendance and delivery at health facilities over time and there could be other time-invariant characteristics of the household that could affect the outcomes. The first challenge is likely to introduce downward bias and thus our estimates are likely to be represent lower bounds of the impact of Covid-19. The second challenge could affect the consistency of our estimates. For instance, factors like education of the women, proximity to health facilities and wealth status could affect the outcomes. We believe that limiting the sample to each woman's two most recent births reduces the possibility of observed time-varying characteristics affecting our results. In our sample, the births of each woman occurred within a 36-month period. We believe woman's time-varying characteristics are likely to remain constant for this relatively short period of time.

3. Results

3.1 Descriptive Statistics

Table 2 presents the descriptive statistics from the data used for the analysis. The sample consists of 535 pregnancies for 288 women. Women in our sample are quite young with more than half of the women being less than 35 years old. Almost all (95%) of the women in our sample are married or living together with a partner. In terms of wealth, the proportion of the sample coming from the various wealth quintiles are almost the same, except the richest quintile which contributes only 17% to our sample.

Insert Table 2 here: Descriptive Statistics

As expected in this largely rural setting, farming is the largest occupation, followed by trading. Educational attainment is quite low: about 46% of the women have no formal education and less than 10% had secondary education or higher. Health facilities are generally accessible as 43% of the women in our sample live within 1 kilometer of a health facility even though almost a third (32%) live more than 3 kilometers from the nearest health facility.

In terms of our main independent variable, 42% of all these pregnancies took place during the Covid-19 period and for 61% of pregnancies, 5 or more months coincided with the Covid-19 period.

In terms of our outcome variables, 64% of deliveries took place in a health facility with 65% of deliveries supervised by a skilled birth attendant. The proportion of pregnancies that had 4 or more ANC visits is 73%

3.2 Impact of Covid-19 on facility delivery and skilled delivery

Table 3 presents the results of the fixed-effects estimation of the impact of Covid-19 on facility and skilled delivery. The table reports regression results from the fixed-effects models together with the standard errors. All regressions control for month of delivery. The outcome variable for the results in Panel A is an indicator for delivery in health

facility while the outcome variable for the results in Panel B is an indicator that takes a value of 1 for the presence of skilled health personnel at delivery and zero otherwise.

From Panel A, the results show that Covid-19 had a significant negative impact on facility delivery and this is statistically significant at 5 percent. Specifically, deliveries occurring during the Covid-19 era were 11 percentage points less likely to take place in a health facility compared with other deliveries by the same women prior to the Covid-19 pandemic. The coefficients on the other covariates are consistent with expectation. Age of woman at time of delivery has an effect on facility delivery. Delivery in health facility is increasing the age of the woman. Relative to women under 20 years, women in all other age groups are more likely to deliver in a health facility. Consistent with expectation, pregnancies in which the woman attended 4 or more ANC are more likely to deliver in a health facility. The results show that having 4 or more ANC visits increases the likelihood of a woman delivering at a health facility by 22 percentage points.

Insert Table 3 here: Impact of Covid-19 on facility delivery and skilled delivery

From Panel B, the results also indicate a negative impact of Covid-19 on skilled delivery. The findings are very similar to results in Panel A. Deliveries during the Covid-19 era were 12 percentage points less likely to be supervised by a skilled birth attendant compared with similar deliveries by the same women prior to the pandemic and this is significant at 5 percent. The coefficients on the other covariates are also largely consistent with the results in Panel A. Skilled delivery is increasing in age. Also, pregnancies with 4 or more ANC visits are more 22 percentage points more likely to be delivered under the supervision of skilled health personnel.

3.3 Impact of Covid-19 on having four or more ANC visits

Table 4 presents results of the fixed-effects estimation of the impact of Covid-19 on having four or more ANC visits. The regression controlled for duration of pregnancy. Overall, the results show that the Covid-19 had no significant impact on ANC attendance. Although, the sign of the coefficient on our Covid-19 variable is as expected, and reasonably large (5 percentage points reduction) it is not statistically significant. The

results did not show a significant effect of the age of woman and duration of pregnancy on having 4 or more ANC visits.

Insert Table 4 here: Impact of Covid-19 on having four or more ANC visits

4. Discussion

This paper sought to estimate the impact of Covid-19 on maternal health seeking with specific focus on facility and skilled delivery and ANC attendance. We provide evidence to establish a causal impact of the pandemic on maternal health. We do this by comparing outcomes of ANC attendance, facility delivery and skilled attendant at delivery for pregnancies during the Covid-19 pandemic with pregnancies by the same women before the pandemic. Our results show that the pandemic has had significant negative impact on the likelihood of women delivering in health facilities and deliveries supervised by skilled health personnel but no significant effect on ANC attendance.

Although our findings are consistent with expectation and existing literature. The magnitude of the negative effects found are quite large. The 11 percentage points and 12 percentage points reduction in facility delivery and skilled delivery represents 17% reduction from the average values of both outcomes. The impact is also large in the context of the rising levels of facility delivery and skilled attendant at delivery both nationally and within our sample. Our samples show that facility delivery has risen every year in the past five years, from 53% in 2016 to 64% in 2019. Similarly, the fraction of deliveries supervised by a skilled health personnel increased from 50% in 2016 to 62% in 2019.

While our sample may not be representative of the overall impact for even Ghana, our findings suggests that the overall impact of Covid-19 in primary health care delivery may be higher in other parts of country. This is because as data in Table 1 shows, the five regions from where our sample was taken have among the lowest number of infections from Covid-19 in the country. Moreover, our sample is predominantly rural while the Covid-19 cases and deaths have been concentrated mainly in the urban areas of the country.

The study is not without limitations. One of the main limitations is the relatively small sample size. This was the result of the need to impose restrictions on the sample to enable an identification of impact. We believe this is an acceptable trade-off because many of the existing studies are based solely on trend analysis from which it is difficult to identify impact. Another limitation of the paper is our inability to identify the potential channels through which impact affects the delivery of maternal and child health outcomes. Existing literature has identified resource diversion toward dealing with the pandemic and fear of contracting the virus as possible channels through which the pandemic has affected health care utilization. Our data does not allow us to identify which of these factors is more prominent in explaining the negative impacts found.

5. Conclusions and Policy Recommendations

The Covid-19 pandemic has posed significant challenges for the health systems of most countries in the world with a more profound impact on the fragile health systems of Lower- and Middle-Income countries. This has the potential to erode the gains made in maternal and child health over the years. It is therefore imperative that governments develop the right policy responses to address the indirect effects of the pandemic on maternal health. An informed policy response requires adequate understanding of the extent of the pandemic on the delivery of primary health care.

The findings from our study show that the Covid-19 pandemic has had a significant impact on the delivery of primary health care services in Ghana. These findings have significant implications for policy making especially for developing countries. With Covid cases increasing in some countries, governments and development partners need to take into account the important role of maternal and child health services and establish a plan to prevent interruptions in routine and primary care. Resources must be allocated to ensure continued access to reproductive health services and community-based interventions (UNFPA, 2020). Additionally, the role of technology in delivering health solutions can be explored. Telemedicine and teleconsultations can be adopted to reach out to women who are likely to avoid hospital visitations due to anxieties about the pandemic. Finally, our results also bring into sharp focus the need for developing countries to build resilient health systems to deal better with the next pandemic.

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Table 1 Confirmed Covid-19 Cases by region (April 26, 2021)

Region	Cumulative Cases
Greater Accra Region	50666
Ashanti Region	15466
Western Region	5750
Eastern Region	4164
Central Region	3324
Volta Region	2419
Northern Region	1651
Bono East Region	1424
Bono Region	1371
Upper East Region	1311
Western North Region	861
Ahafo Region	707
Upper West Region	493
Oti Region	406
North East Region	223
Savannah Region	122
Total cases	90,358

Source: Ghana Health Service website

(<https://www.ghanahealthservice.org/covid19/dashboardm.php>)

Table 2 Descriptive Statistics

VARIABLES	Sample
Number of pregnancies	535
Number of women	288
Woman's Age	
15-19 years	3.74%
20-24 years	21.87%
25-29 years	26.36%
30-34 years	22.80%
35-39 years	16.45%
40-44 years	7.29%
45-49 years	1.50%
Marital Status	
Never married	3.93%
Married/living together	94.58%
Separated/Divorce/Widowed	1.49%
Wealth Quintile	
Poorest	22.58%
Poorer	18.98%
Middle	20.30%
Richer	21.44%
Richest	16.70%
Occupation	
No occupation	17.76%
Student	0.37%
Farming	42.62%
Trading/Selling	22.43%
Hairdressing/Dressmaking	7.10%
Housewife	5.79%
Other occupation	3.93%
Education	
None	45.61%
Primary	20.00%
Middle School/JHS/JSS	25.42%
Secondary +	8.97%
Distance to nearest health facility	
Less than 1km	43.18%
Between 1km & 2km	15.33%
Between 2km & 3km	9.72%
More than 3km	31.78%

VARIABLES	Sample
Duration of pregnancy: Mean(std)	9.03(0.43)
Delivered at facility	64.30%
Had skilled delivery	65.79%
Delivered during COVID period	41.68%
Had 4 or more ANC visits	72.97%
More than 5 months of pregnancy spent during COVID	60.87%

Table 3 Impact of COVID-19 on facility delivery and skilled delivery

Variables	Margins
PANEL A: FACILITY DELIVERY	
Delivery during COVID	-0.109** (0.050)
Age of woman at delivery	
Under 20 years (ref)	
20-24 years	-0.124 (0.107)
25-29 years	0.037 (0.166)
30-34 years	0.275 (0.240)
35-39 years	0.548* (0.300)
40-44 years	0.843** (0.371)
45-49 years	0.860* (0.485)
Had 4 or more ANC visits	0.220** (0.089)
Constant	0.266 (0.162)
Observations	527
R-squared	0.152
Number of women	288
PANEL B: SKILLED DELIVERY	
Delivery during COVID	-0.115** (0.051)
Age of woman at delivery	
Under 20 years (ref)	
20-24 years	-0.061 (0.131)
25-29 years	0.068 (0.185)
30-34 years	0.316 (0.258)
35-39 years	0.594* (0.315)
40-44 years	0.906** (0.385)

45-49 years	0.932*
	(0.504)
Had 4 or more ANC visits	0.217**
	(0.090)
Constant	0.226
	(0.186)
Observations	527
R-squared	0.140
Number of women	288

Notes: The table presents marginal effects from a fixed-effects model. The outcome variable for results in Panel A is an indicator that takes a value of 1 if a woman delivered in a facility. The outcome variable for results in Panel B is an indicator that takes a value of 1 if a woman had skilled delivery. All regressions controlled for month of delivery. Standard errors are reported in parentheses. Standard errors are clustered at the enumeration area level. *** p<0.01, ** p<0.05, * p<0.10

Table 4 Impact of COVID-19 on having four or more ANC visits

Variables	Margins
More than 5 months of pregnancy spent during COVID	-0.049 (0.047)
Age of woman at delivery	
Under 20 years (ref)	
20-24 years	-0.042 (0.189)
25-29 years	-0.022 (0.221)
30-34 years	-0.103 (0.256)
35-39 years	-0.206 (0.300)
40-44 years	-0.096 (0.329)
45-49 years	-0.047 (0.361)
Pregnancy Duration	
6 months (ref)	
7 months	-0.349* (0.207)
8 months	-0.658* (0.341)
9 months	-0.152 (0.115)
10 months	-0.264* (0.151)
11 months	-0.349* (0.207)
Constant	0.997*** (0.239)
Observations	521
Number of women	295
R-squared	0.037

Notes: The table presents marginal effects from a fixed-effects model. The outcome variable is an indicator that takes a value of 1 if a woman spent more than 5 months of her pregnancy during Covid. The regression controlled for the variable “Duration of pregnancy”. All standard errors are clustered at the enumeration area level. *** p<0.01, ** p<0.05, * p<0.10

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.