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Pregnancies and contraceptive use in four African countries during the COVID-19 pandemic

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Abstract

The COVID-19 pandemic and the public health measures adopted in response to it have triggered plenty of speculation about the potential impact on fertility in different regions of the globe. This study provides evidence on the fertility response in four sub-Saharan African countries during the first year of the pandemic. Using harmonized data on women of childbearing age from the Performance Monitoring for Action (PMA) data series, this study compares pregnancy rates at the turn of the year 2020/21 to a pre-pandemic baseline. There is no indication of a general increase in pregnancy rates after the beginning of the pandemic. In some of the sample countries, pregnancy rates during this phase of the COVID-19 pandemic instead fell significantly among the youngest and the least educated women of childbearing age, respectively. The findings also indicate that over this period, rates of modern contraceptive usage rose significantly among the surveyed female populations in several sample countries.

Keywords: fertility; pregnancy; COVID-19; sub-Saharan Africa

1 Introduction

Understanding the potential impact of the COVID-19 pandemic on human fertility is of great importance for demographic science and for the formulation of demographically oriented policies in the coming years. This issue is particularly relevant in the context of developing countries, as reducing fertility has been deemed essential for advancing education and economic development in these countries, while a stalling of fertility declines had already been observed in some sub-Saharan African

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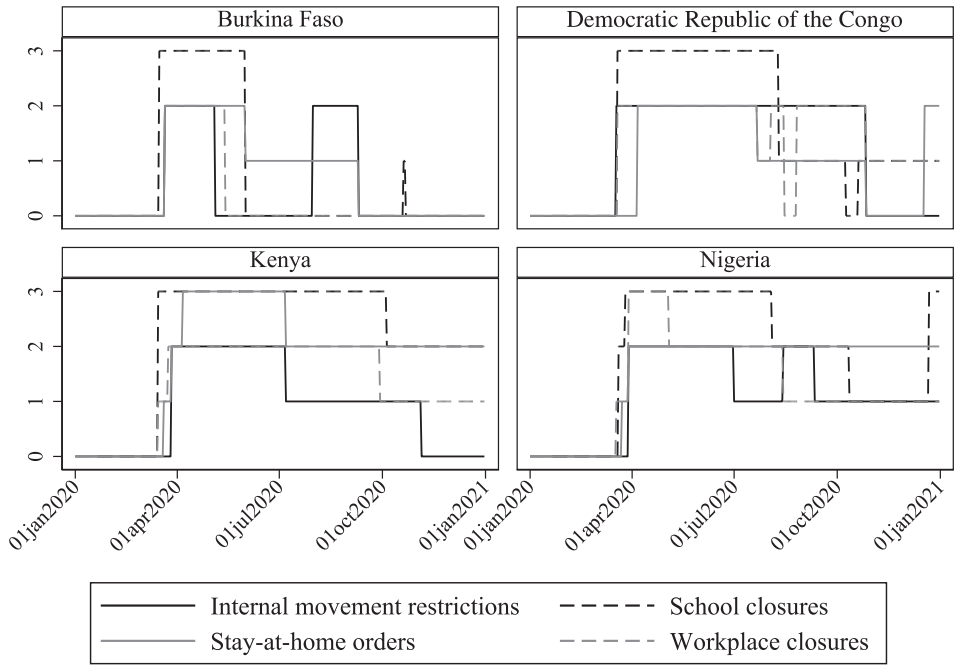
countries prior to the pandemic (Kebede et al., 2019; Schoumaker, 2019; Tabutin et al., 2020). If the pandemic caused the fertility declines in these countries to remain stalled or even to reverse, it could have lasting demographic consequences beyond the pandemic's actual duration. However, up to now, there has been very limited evidence on the actual effects of the COVID-19 pandemic on fertility in sub-Saharan Africa. Consequently, Beaujouan (2021) called for replacing speculation about these effects with cross-national evidence.

This study provides evidence on the fertility response in four sub-Saharan African countries during the first year of the pandemic. Using harmonized data from the Performance Monitoring for Action (PMA) data series, the following analysis compares pregnancy rates among women of childbearing age at the turn of the year 2020/21 to a pre-pandemic baseline in Burkina Faso, the Democratic Republic of the Congo (DR Congo), Kenya and Nigeria. The available data allow for an analysis that is differentiated by the women's age and educational background. Furthermore, a particular concern in the context of developing countries during the COVID-19 pandemic has been that the pandemic and the wide-ranging measures implemented to contain it may have restricted women's access to family planning services and modern contraceptives. Therefore, in addition to providing evidence on pregnancy rates, this study also examines rates of modern contraceptive usage among women in the four sample countries before and during the COVID-19 pandemic.

For context, it is important to note that the populations of the four sample countries were subject to substantial restrictions to public life during the first year of the pandemic, as indicated in Figure 1, which presents information on the relative stringency of four different COVID-19-related non-pharmaceutical interventions (NPIs) over the course of 2020. The governments of all four countries mandated school closures and restricted movements within each country for several months in the spring and summer of 2020. While Kenya further mandated stay-at-home orders, the other three countries at least recommended them. Nigeria, in turn, briefly mandated workplace closures, a measure which the other countries only recommended. While the underlying data assembled by Hale et al. (2020) and Ritchie et al. (2020) do not provide information on the degree of compliance with the various COVID-19-related measures that were implemented, the plots are at least indicative of the extent to which sub-Saharan African countries were subject to restrictions that had the potential to interrupt social and economic life to a similar extent as was occurring in Europe and in other regions of the world. The pandemic clearly had a detrimental impact on the economies of the four African countries, as they all experienced negative GDP per capita growth in 2020, according to The World Bank (2022). Thus, the pandemic may have had a negative impact on fertility via economic channels, as highlighted by Aassve et al. (2020): i.e., rising poverty may have caused the demand for unpaid child labor within households to rise while also increasing parents' reliance on their children to provide them with economic security in old age. In addition, both rising poverty and COVID-19-related restrictions may have limited women's access to contraception and family planning services, which might, in turn, have led to an increase in fertility. However, Aassve et al. (2020) also noted that past pandemics and other large-scale shocks

Figure 1:
Government policy responses to COVID-19 by country in 2020



Notes: Each panel displays four indicators of government policy responses to the COVID-19 pandemic in one of the four sample countries. The indicators refer to restrictions on internal movements, school closures, stay-at-home orders and workplace closures. With the exception of the indicator on internal movement restrictions, each of the indicators is scaled between zero and three, with level zero indicating that no restrictions are in place, level one indicating that restrictions are recommended, level two indicating that restrictions are mandatory to some extent, and level three indicating that restrictions must be followed to the greatest possible extent. The indicator on internal movement restrictions is scaled between zero and two, with level zero indicating that there are no restrictions, level one indicating that restrictions on movement are recommended, and level two indicating that movement is restricted.
Source: Author's own depictions based on Hale et al. (2020) and Ritchie et al. (2020).

were associated with falling fertility in the short run, and that births did not rebound or recuperate until after these disasters were over.

What still remains unclear at present is how severe the spread and the death toll of COVID-19 have been on the African continent. Highly constrained testing capacities have limited the detection of COVID-19 cases, and possibly also of COVID-19-related deaths. Thus, it has been difficult to assess to what extent COVID-19 itself has affected sub-Saharan African societies beyond the impact of the NPIs, by, for example, imposing a burden of disease on the population. It has also been hard to determine to what extent voluntary behavioral adjustments of the populations in these countries to the perceived threat from the disease may have affected their reproductive outcomes.

This study contributes to the fast-growing literature on the demographic impact of the COVID-19 pandemic, particularly with regard to the pandemic's potential effects on human fertility. In an analysis of high-income countries, Luppi et al. (2020) reported that in Italy, Germany, France, Spain and the UK, individuals aged 18–34 negatively revised their fertility plans during the early stage of the pandemic, while Naito and Ogawa (2021) found that pregnancies decreased more in areas of Japan where stricter containment measures had been imposed. Sobotka et al. (2021) analyzed births in 19 European countries, two East Asian high-income countries and the United States up to late 2020, and found evidence that a birth recession was occurring in many countries. However, the existing evidence on the impacts of the pandemic on fertility in low- and middle-income countries is much more sparse due to the lack of timely data. Lima et al. (2022) observed a large decline in the number of births in some Brazilian cities in late 2020 and early 2021 compared to previous years. Dasgupta et al. (2020) prospectively considered a scenario of the potential impact of the COVID-19 pandemic on contraceptive use in which the proportion of the need for family planning satisfied by modern methods is expected to decrease particularly sharply in sub-Saharan Africa. This projection is based in part on evidence indicating that short-term methods of contraception are widely used in sub-Saharan Africa, and that these forms of contraception are especially vulnerable to supply chain disruptions. Notably, Dasgupta et al. (2020) pointed out that while their scenario assumes that fertility preferences, sexual behavior and total demand for family planning remain constant during the pandemic, in reality, women and couples may actually postpone childbearing until after the pandemic is over. Also using data provided by IPUMS PMA, Karp et al. (2021) found that most women at risk of unintended pregnancy in Burkina Faso and Kenya did not change their contraceptive use status between the pre-COVID-19 surveys and the special COVID-19 surveys conducted in mid-2020, while Wood et al. (2021) found no evidence of either a broad increase in the need for contraception or a decline in its usage among women in union in the four sub-Saharan African countries surveyed during the pandemic. The present study complements and extends their findings by focusing on pregnancy as an outcome that is strongly predictive of future births, while also considering changes in modern contraceptive usage as a potential channel for changes in fertility.

2 Data

The data used in this study have been provided by IPUMS PMA (Boyle et al., 2022). IPUMS PMA processes the Performance Monitoring for Action (PMA) data series to provide harmonized variables on family planning, water and sanitation, and health. While IPUMS PMA regularly collects data from 11 countries, nine of which are located in sub-Saharan Africa, harmonized datasets are currently only available for four sub-Saharan African countries since the outbreak of the COVID-19 pandemic: Burkina Faso, the DR Congo, Kenya and Nigeria.

This study uses data from the IPUMS PMA survey rounds which have been collected since 2014 in Burkina Faso, since 2015 in the DR Congo and Kenya, and since 2016 in Nigeria. In late 2019, PMA launched a new phase of longitudinal data collection. The baseline round collected in late 2019 and early 2020 represents the latest available data before the beginning of the pandemic, while the first follow-up round of the longitudinal surveys, which was collected in late 2020 and early 2021, provides the earliest available data after the outbreak of the pandemic. In order to obtain a broader pre-pandemic baseline from all available survey rounds, this study does not exploit the longitudinal character of the two most recent rounds, but instead treats all rounds as cross-sectional data. Prior to the launch of the longitudinal surveys, the timing of each survey round within a given year varied substantially across countries and rounds. However, as the dates of the interview collection are available in the data, adjustments for seasonal fluctuations in pregnancies can be made in the following analysis.

Geographically, the IPUMS PMA survey covers all 13 regions of Burkina Faso, and it covers 11 of Kenya's 47 counties, including the capital city of Nairobi. In the case of Nigeria and the DR Congo, the earlier sample rounds cover more subnational geographical units than the more recent longitudinal sample rounds. Observations collected in the additional subnational units are removed from the earlier sample rounds in order to increase comparability. As a result, the data from the DR Congo solely cover the capital city of Kinshasa, while the data from Nigeria only cover the capital city of Lagos and the state of Kano. A round of COVID-19-specific PMA surveys is not utilized in the following analysis, as the surveys were collected in June and July of 2020, and thus only a few months after the outbreak of the pandemic, which might be too early to detect whether pregnancy rates in 2020 deviated from those in previous years.

Table 1:
Observations per PMA survey round

Round	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
1	2033	0	3715	0
2	2078	0	4289	0
3	3202	0	4351	3042
4	3104	2711	4869	3171
5	3489	2567	5722	3290
6	3316	2498	5826	0
7	0	2579	5638	0
8	6545	2604	9431	2551
9	6350	2352	9293	2587
Total	30117	15311	53134	14641

Notes: The table reports the number of women surveyed by PMA in each round in the four sample countries.
Source: Author's own compilation.

Table 2:
Observations per PMA survey year

Year	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
2014	1996	0	0	0
2015	2115	2705	8004	0
2016	6089	2573	9220	3042
2017	3702	2498	5722	3171
2018	3107	2579	5826	3290
2019	237	987	5635	1966
2020	9325	3697	9434	3093
2021	3546	272	9293	79
Total	30117	15311	53134	14641

Notes: The table reports the number of women surveyed by PMA in each year in the four sample countries.
Source: Author's own compilation.

Table 1 displays the number of observations that are available in each sample country per survey round, while Table 2 displays the number of observations available per survey year.

Every round of the IPUMS PMA survey records the pregnancy status of each female respondent. However, as this individual pregnancy status is self-reported, it is possible that pregnancies that recently occurred have not yet been noticed by the respondent and/or been medically confirmed yet. In addition, information

Table 3:
Summary statistics

	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
Pregnancy rate	0.085	0.054	0.054	0.073
Age	28.60	28.04	28.54	29.56
Share never attended school	0.618	0.016	0.041	0.196
Share w. primary/middle school	0.171	0.148	0.468	0.139
Share w. secondary/post-primary school	0.194	0.676	0.358	0.439
Share w. tertiary/post-secondary school	0.018	0.160	0.133	0.226
Rate of modern contraceptive usage	0.271	0.246	0.469	0.170
Observations	30098	15292	53096	14635

Notes: The table reports summary statistics on women surveyed by PMA in the four sample countries. Statistics for modern contraceptive usage are computed while excluding non-pregnant women from the sample. Sampling weights are applied.
Source: Author's own computations.

on the female respondents' age, educational background and usage of modern contraceptives is available. Table 3 reports summary statistics on the women of childbearing age included in the sample.

3 Empirical strategy

The availability of data for periods both before and since the beginning of the pandemic makes it possible to empirically test whether the frequency of the pregnancies and the usage of modern contraceptives reported by the surveyed women changed during the pandemic relative to earlier periods. For this purpose, data from the pre-pandemic periods are pooled in order to form a baseline group to which the observations collected during the pandemic can be compared. This approach boils down to first regressing the binary female pregnancy status $Pregnant_i$ on a binary indicator $SincePandemic_t$ that is equal to one if a woman was surveyed after the outbreak of the pandemic, and to zero otherwise, as expressed by Equation (1):

$$Pregnant_i = \alpha + \beta SincePandemic_t + \gamma X_i + \delta SincePandemic_t \times X_i + \epsilon_i, \quad (1)$$

The vector X_i contains controls for the surveyed women's ages, which are organized into four groups (ages 15–19, 20–29, 30–39, 40–49); and for the women's educational levels, which are also grouped into four categories (never attended, primary/middle school, secondary/post-primary, tertiary/post-secondary). In addition, the vector contains indicators for the calendar months of the women's interviews. Elements of the vector X_i can also be interacted with the $SincePandemic_t$ indicator in order to allow for age group- and education-specific deviations from the baseline of the pregnancy status after the outbreak of the pandemic. ϵ_i is an error term. Equation (1) is estimated as a linear probability model using OLS, and separately for each sample country in the following. As well as enabling the study of changes in pregnancy rates during the pandemic, the available data also allow for the examination of changes in the usage of modern contraceptives. For this analysis, the binary pregnancy outcome in Equation (1) will then be substituted for a binary indicator that is equal to one if a non-pregnant woman uses modern contraceptives, and is otherwise equal to zero.

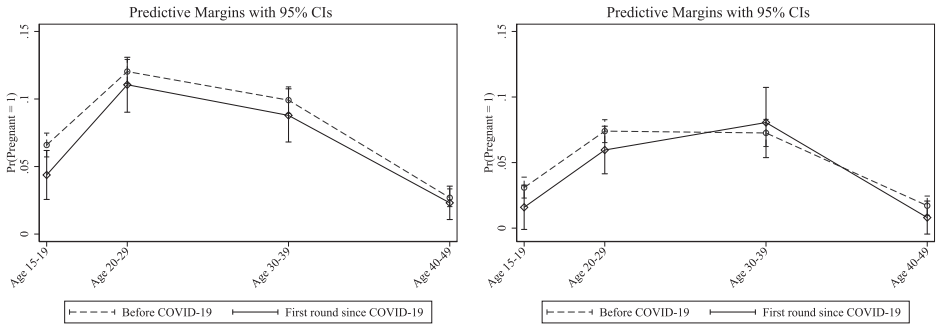
4 Results

The results of the empirical analysis are presented in two different ways: First, plots for each country display the predicted probabilities of being pregnant and of using modern contraceptives, respectively. These plots differentiate by the $SincePandemic_t$ indicator in Equation (1); i.e., they allow for the visual comparison of the predicted probabilities for the pre-pandemic baseline periods to the predicted probabilities for the period after the outbreak of the pandemic. Second, tables

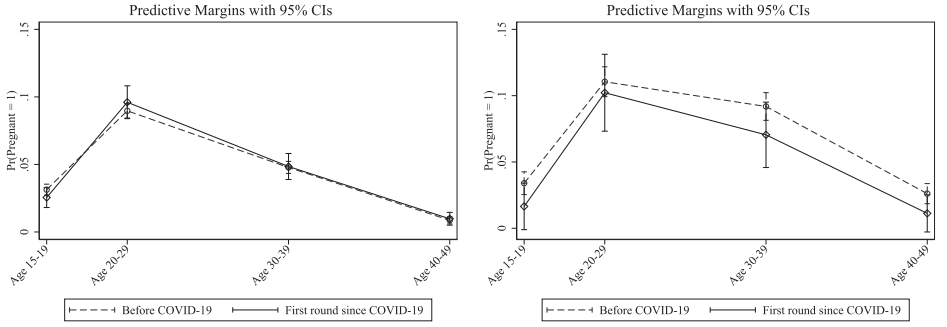
report marginal effects computed from the underlying regressions, as well as baseline rates of the outcome variable for the pre-pandemic periods. These marginal effects, together with their reported standard errors, indicate whether the pregnancy rates and the rates of modern contraceptive usage estimated for the period since the outbreak of the COVID-19 pandemic differ statistically and in quantitatively relevant magnitudes from those in the baseline periods.

Figure 2 displays the predicted probabilities of being pregnant before and after the start of the pandemic across the four age groups. In Burkina Faso and Nigeria, the predicted probabilities of being pregnant for the period after the outbreak of the pandemic are lower than the baseline across all age groups, but

Figure 2:
Pregnancy rates by age group and country



(a) Pregnancy rates by age group in Burkina Faso (b) Pregnancy rates by age group in DR Congo



(c) Pregnancy rates by age group in Kenya (d) Pregnancy rates by age group in Nigeria

Notes: Each panel displays the predicted probabilities of being pregnant in an individual sample country. Predicted probabilities are displayed for four different age groups. The dashed line indicates the predicted probabilities of being pregnant in the baseline period 2014–2020. The solid line indicates the predicted probabilities of being pregnant in the period affected by the COVID-19 pandemic.
Source: Author's own computations. Sampling weights are applied.

the overlapping confidence intervals do not yet indicate any statistically significant deviations. In the DR Congo, only the predicted probability for the 30–39 age group during the pandemic slightly exceeds the baseline probability. In Kenya, the gaps between the predicted probabilities are very small to non-existent across age groups. Similarly, Table 4 reports that in the youngest age group of 15–19, the pregnancy rates are lower after the outbreak of COVID-19 in all four countries, while the marginal effect is statistically significant only in Burkina Faso, indicating a decrease in pregnancy rates of 2.2 percentage points. This is a large decrease, as it represents a decline of one-third relative to the pre-pandemic baseline rate of 6.6%. All marginal effects in the higher age groups are statistically insignificant at the 5% level in all four countries.

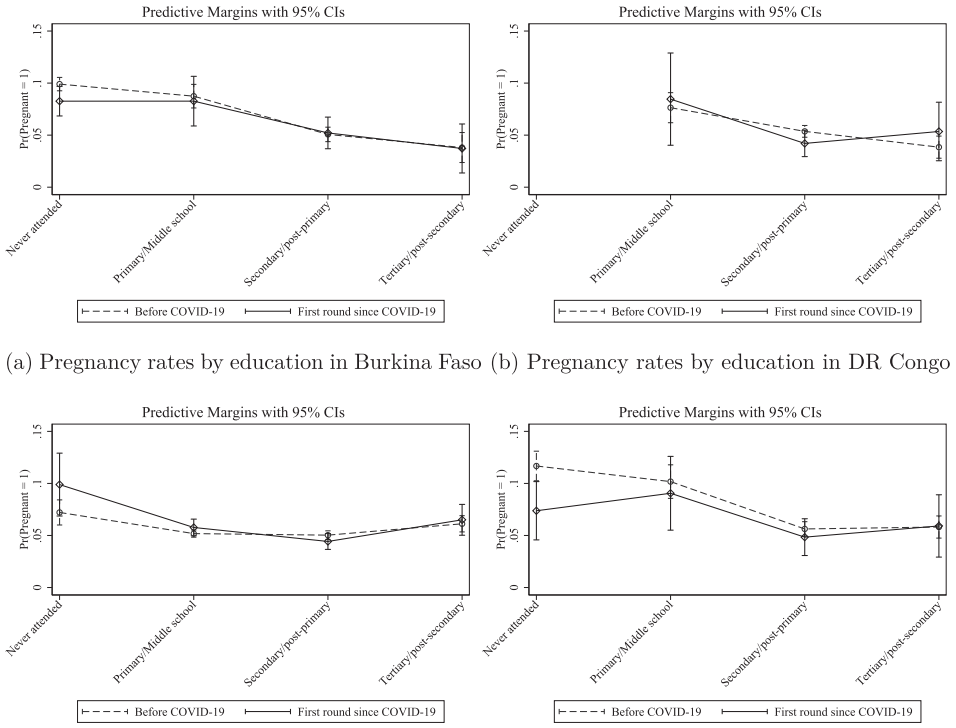
Figure 3 displays the predicted probabilities of being pregnant across different female educational background levels, while controlling for the four age groups. In Burkina Faso, the predicted probability of being pregnant is visibly lower among

Table 4:
Marginal effects on pregnancy rates by age group

	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
Since COVID-19				
Age 15–19	−0.022**	−0.015	−0.006	−0.018
	(0.01)	(0.01)	(0.00)	(0.01)
Age 20–29	−0.010	−0.014	0.006	−0.008
	(0.01)	(0.01)	(0.01)	(0.02)
Age 30–39	−0.011	0.008	0.001	−0.021
	(0.01)	(0.01)	(0.01)	(0.01)
Age 40–49	−0.004	−0.009	0.001	−0.015*
	(0.01)	(0.01)	(0.00)	(0.01)
N	30117	15311	53134	14641
Interview month FE	Yes	Yes	Yes	Yes
Baseline rates				
Age 15–19	0.066	0.030	0.031	0.033
Age 20–29	0.120	0.073	0.090	0.110
Age 30–39	0.099	0.071	0.048	0.091
Age 40–49	0.027	0.016	0.009	0.025

Notes: The table reports the marginal effects from linear regressions of the pregnancy status on an indicator for the survey round during the COVID-19 pandemic, age group indicators, and interactions of the two. Results for Burkina Faso are reported in column 1. Results for the DR Congo are reported in column 2. Results for Kenya are reported in column 3. Results for Nigeria are reported in column 4. Interview month fixed effects are included in all regressions. Sampling weights are applied. Robust standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Author's own computations.

Figure 3:
Pregnancy rates by educational background and country



(a) Pregnancy rates by education in Burkina Faso (b) Pregnancy rates by education in DR Congo

(c) Pregnancy rates by education in Kenya (d) Pregnancy rates by education in Nigeria

Notes: Each panel displays the predicted probabilities of being pregnant in an individual sample country. Predicted probabilities are displayed for four different levels of education. The dashed line indicates the predicted probabilities of being pregnant in the baseline period 2014–2020. The solid line indicates the predicted probabilities of being pregnant in the period affected by the COVID-19 pandemic.
Source: Author's own calculations. Sampling weights are applied.

women who have never attended school after the outbreak of the pandemic, while there are no notable differences among women with higher levels of educational attainment. In the DR Congo, the number of women who have never attended school is very small due to the urban focus of the surveys there; thus, the lowest level of educational attainment is omitted for that country. Across the remaining three levels, the predicted probabilities of being pregnant after the outbreak of the pandemic deviate somewhat from the baseline, but the directions and magnitudes are alternating. Among women who have never attended school, the predicted probabilities of being pregnant after the start of the COVID-19 pandemic rise in Kenya but fall in Nigeria. In both countries, the predicted probabilities of being

Table 5:
Marginal effects on pregnancy rates by educational background

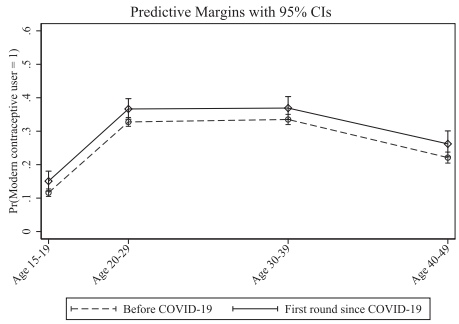
	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
Since COVID-19				
Never attended	−0.016**	omitted	0.027	−0.043***
	(0.01)	(.)	(0.02)	(0.02)
Primary/middle school	−0.005	0.008	0.006	−0.011
	(0.01)	(0.02)	(0.00)	(0.02)
Secondary/post-primary	0.001	−0.012	−0.006	−0.008
	(0.01)	(0.01)	(0.00)	(0.01)
Tertiary/post-secondary	−0.001	0.015	0.004	0.001
	(0.01)	(0.02)	(0.01)	(0.02)
N	30101	15062	53128	14635
Age group FE	Yes	Yes	Yes	Yes
Interview month FE	Yes	Yes	Yes	Yes
Baseline rates				
Never attended	0.099	.	0.073	0.116
Primary/middle school	0.087	0.072	0.053	0.102
Secondary/post-primary	0.050	0.051	0.051	0.056
Tertiary/post-secondary	0.037	0.046	0.062	0.058

Notes: The table reports marginal effects from linear regressions of the pregnancy status on an indicator for the survey round during the COVID-19 pandemic, indicators for educational background, and interactions of the two. Results for Burkina Faso are reported in column 1. Results for the DR Congo are reported in column 2. Results for Kenya are reported in column 3. Results for Nigeria are reported in column 4. Age group and interview month fixed effects are included in all regressions. Sampling weights are applied. Robust standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Author's own computations.

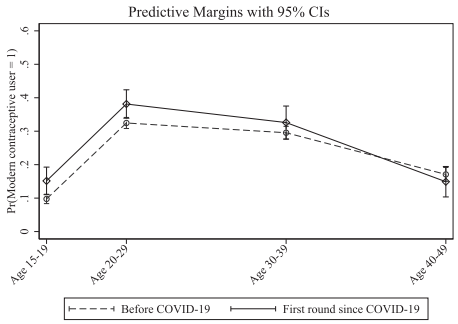
pregnant vary little among women with higher levels of educational attainment. Turning to the marginal effects reported in Table 5, pregnancy rates indeed decline significantly among women with no formal education, by 1.6 percentage points in Burkina Faso and by 4.3 percentage points in Nigeria after the outbreak of the pandemic. Again, these declines are large, constituting 16% and 37% of the pre-pandemic baseline levels, respectively. Among women with higher levels of education, all marginal effects are insignificant in all four countries.

Next, the binary pregnancy indicator in Equation (1) is substituted for the binary indicator that is equal to one if a woman uses modern contraceptives, and is equal to zero otherwise, with pregnant women now being excluded from the estimation sample. Figure 4 displays the predicted probabilities of modern contraceptive usage differentiated by the four age groups. Notably, in the period after the start of the COVID-19 pandemic, the probabilities of usage shift upward across most

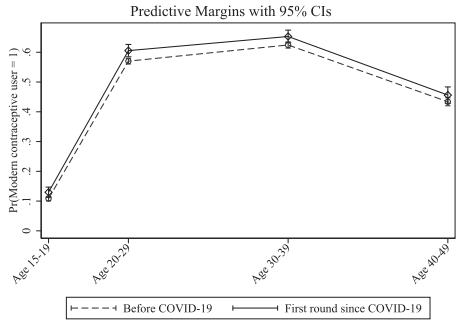
Figure 4:
Rates of modern contraceptive usage by age group and country



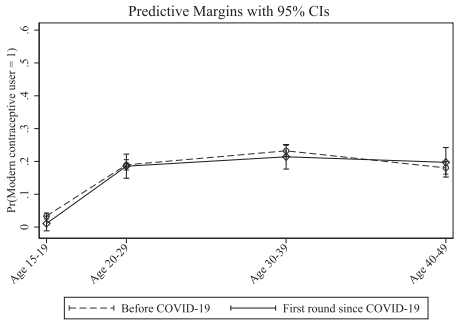
(a) Rates of modern contraceptive usage by age group in Burkina Faso



(b) Rates of modern contraceptive usage by age group in DR Congo



(c) Rates of modern contraceptive usage by age group in Kenya



(d) Rates of modern contraceptive usage by age group in Nigeria

Notes: Each panel displays the predicted probabilities of using modern contraceptives in an individual sample country. Predicted probabilities are displayed for four different age groups. The dashed line indicates the predicted probabilities of using modern contraceptives in the baseline period 2014–2020. The solid line indicates the predicted probabilities of using modern contraceptives in the period affected by the COVID-19 pandemic.
Source: Author's own computations. Sample is restricted to non-pregnant women. Sampling weights are applied.

age groups in Burkina Faso, the DR Congo and Kenya, while they change in varying directions in Nigeria. According to the marginal effect estimates presented in Table 6, the rates of modern contraceptive usage among the 15–19 and 20–29 age groups increase significantly by more than three percentage points in Burkina Faso and by more than five percentage points in the DR Congo. In comparison to the pre-pandemic baseline rates, these are large increases. Among the 15–19, 20–29 and 30–39 age groups, the rates of modern contraceptive usage during the COVID-19 pandemic increase significantly by more than two percentage points in

Table 6:
Marginal effects on modern contraceptive usage by age group

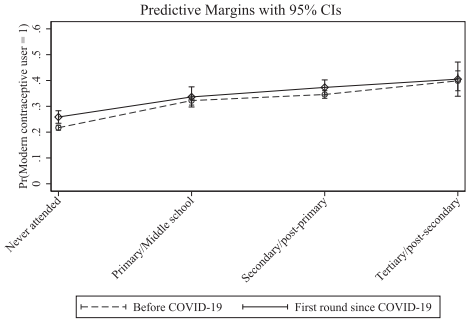
	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
Since COVID-19				
Age 15–19	0.035**	0.054**	0.022**	−0.023*
	(0.02)	(0.02)	(0.01)	(0.01)
Age 20–29	0.039**	0.057**	0.035***	−0.004
	(0.02)	(0.02)	(0.01)	(0.02)
Age 30–39	0.034*	0.030	0.029**	−0.018
	(0.02)	(0.03)	(0.01)	(0.02)
Age 40–49	0.041*	−0.022	0.022	0.017
	(0.02)	(0.03)	(0.02)	(0.03)
N	27885	14462	50327	13551
Interview month FE	Yes	Yes	Yes	Yes
Baseline rates				
Age 15–19	0.113	0.095	0.108	0.029
Age 20–29	0.323	0.322	0.568	0.186
Age 30–39	0.330	0.293	0.623	0.229
Age 40–49	0.218	0.169	0.432	0.177

Notes: The table reports marginal effects from linear regressions of the modern contraceptive usage status on an indicator for the survey round during the COVID-19 pandemic, indicators for age groups, and interactions of the two. Results for Burkina Faso are reported in column 1. Results for the DR Congo are reported in column 2. Results for Kenya are reported in column 3. Results for Nigeria are reported in column 4. Interview month fixed effects are included in all regressions. Sample is restricted to non-pregnant women. Sampling weights are applied. Robust standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Author's own computations.

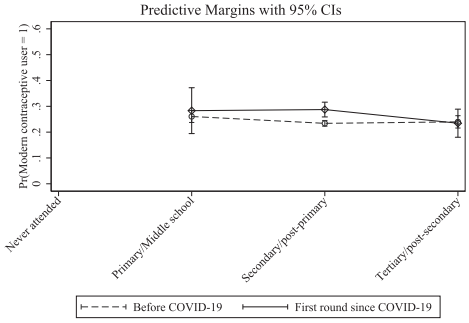
Kenya. However, in Nigeria, the changes in the rates of modern contraceptive usage are insignificant at the 5% level.

Finally, Figure 5 displays the predicted probabilities of using modern contraceptives among women with different levels of education, while controlling for the four age groups. The plots indicate that in Burkina Faso, the DR Congo and Kenya, the probabilities of using modern contraceptives are higher after the outbreak of the COVID-19 pandemic for women with educational attainment below the tertiary/post-secondary level, while the predicted probabilities move in varying directions across the different levels of female education in Nigeria. According to the marginal effect estimates presented in Table 7, the usage of modern contraceptives increases significantly among the least educated women in Burkina Faso, while it increases significantly among women with secondary or post-primary education in the DR Congo. Again, these increase are large relative to

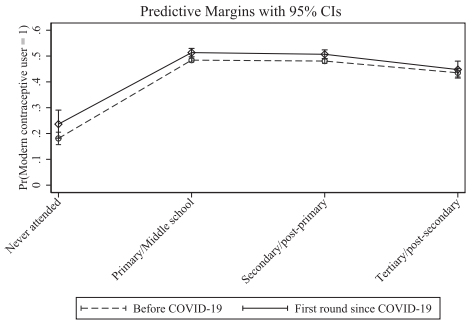
Figure 5:
Rates of modern contraceptive usage by education and country



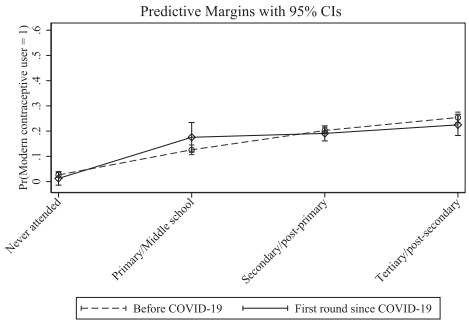
(a) Rates of modern contraceptive usage by education in Burkina Faso



(b) Rates of modern contraceptive usage by education in DR Congo



(c) Rates of modern contraceptive usage by education in Kenya



(d) Rates of modern contraceptive usage by education in Nigeria

Notes: Each panel displays the predicted probabilities of using modern contraceptives in an individual sample country. Predicted probabilities are displayed for four different levels of education. The dashed line indicates the predicted probabilities of using modern contraceptives in the baseline period 2014–2020. The solid line indicates the predicted probabilities of using modern contraceptives in the period affected by the COVID-19 pandemic.
Source: Author's own computations. Sample is restricted to non-pregnant women. Sampling weights are applied.

the pre-pandemic baseline rates. In Kenya, women with primary or secondary/post-primary education are significantly more likely to use modern contraceptives after the outbreak of the pandemic, while in Nigeria, there are no significant changes in the predicted probabilities of using modern contraceptives at any level of education.

Table 7:
Marginal effects on modern contraceptive usage by educational background

	(1) Burkina Faso	(2) DR Congo	(3) Kenya	(4) Nigeria
Since COVID-19				
Never attended	0.041***	omitted	0.055*	−0.014
	(0.01)	(.)	(0.03)	(0.02)
Primary/middle school	0.014	0.023	0.029***	0.050
	(0.02)	(0.05)	(0.01)	(0.03)
Secondary/post-primary	0.027*	0.053***	0.026***	−0.012
	(0.02)	(0.02)	(0.01)	(0.02)
Tertiary/post-secondary	0.006	−0.005	0.012	−0.029
	(0.04)	(0.03)	(0.02)	(0.02)
N	27869	14230	50321	13545
Interview month FE	Yes	Yes	Yes	Yes
Baseline rates				
Never attended	0.234	.	0.246	0.038
Primary/middle school	0.303	0.243	0.494	0.129
Secondary/post-primary	0.281	0.226	0.431	0.175
Tertiary/post-secondary	0.446	0.281	0.520	0.278

Notes: The table reports marginal effects from linear regressions of the modern contraceptive usage status on an indicator for the survey round during the COVID-19 pandemic, indicators for educational background, and interactions of the two. Results for Burkina Faso are reported in column 1. Results for the DR Congo are reported in column 2. Results for Kenya are reported in column 3. Results for Nigeria are reported in column 4. Age group and interview month fixed effects are included in all regressions. Sample is restricted to non-pregnant women. Sampling weights are applied. Robust standard errors are reported in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: Author's own computations.

5 Conclusions

By the end of the first year of the global COVID-19 pandemic, the pregnancy rates in the four sub-Saharan African countries examined in this study had barely deviated from their pre-pandemic baselines, and in the few cases in which they did deviate significantly, they appear to have decreased. In Burkina Faso and Nigeria, the pregnancy rates of the least educated women have fallen significantly below their pre-pandemic baselines by the turn of the year 2020/21. Moreover, in Burkina Faso, the pregnancy rates of the youngest surveyed women had also decreased significantly. The relative magnitudes of these specific declines in pregnancy rates were large. By contrast, in the DR Congo and Kenya, the pregnancy rates had neither risen nor fallen to a statistically notable extent.

Taken together, these results may seem surprising given that the youngest and least educated women of childbearing age can be presumed to have been particularly vulnerable to the effects of the economic downturn triggered by the pandemic,

which may, in turn, have activated the economic channels toward higher fertility highlighted by Aassve et al. (2020). However, the evidence presented in this study does not contradict the timing of fertility effects that have been observed during and after past pandemics, as discussed by Aassve et al. (2020) and Ullah et al. (2020): i.e., the short-term effects of a pandemic on fertility tend to be negative, while any positive effects may occur only in the aftermath of a pandemic. Collected by the turn of the year 2020/21, the most recent IPUMS PMA survey data included and analyzed in this study clearly do not cover the late phase of the COVID-19 pandemic or the post-pandemic period. Thus, it remains to be seen how fertility evolves in the sub-Saharan African region as the pandemic burden eases. If the results of this study are complemented with analyses that focus on other sub-Saharan African countries, a more comprehensive picture of the impact of the COVID-19 pandemic on fertility in sub-Saharan Africa will emerge, which will, in turn, allow for further assessments of how the pandemic has interacted with the fertility stalls observed in some countries prior to the pandemic.

Interestingly, the findings of this study show that after the start of the pandemic, the usage of modern contraceptives increased significantly among women of various age groups and educational backgrounds in all sample countries except Nigeria. First, this result does not point to women having more limited access to modern contraceptives as a consequence of the pandemic. Second, the study found that the increase in the usage of modern contraceptives coincided with a decrease in pregnancies among the youngest and the least educated women of childbearing age in Burkina Faso. Third, while a broad decrease in pregnancies was not observed among women of all the age groups and educational strata whose usage of modern contraceptives increased, this does not imply that there was no association between the two outcomes, as this study did not control for other factors that may have been associated with both contraceptive usage and fertility during the pandemic. For example, while the economic downturn triggered by the pandemic may have exerted an upward pressure on fertility, women of childbearing age may have increasingly relied on modern contraceptives to counteract this pressure, which could have resulted in a net effect on fertility that cannot be statistically differentiated from zero. Further research on the potentially elevated role of contraceptives as a potential means of regulating fertility during the pandemic is warranted.

It is worth recalling that in some of the four African countries in the study sample, the IPUMS PMA surveys cover only particular states or other subnational entities; hence, the findings presented here cannot be interpreted as being nationally representative for these countries. Other data sources typically used in fertility research, such as birth registries and census waves, provide more comprehensive coverage of the population. However, as these kinds of sources are not yet available for sub-Saharan African countries during the COVID-19 pandemic, the IPUMS PMA surveys provide researchers with a valuable opportunity to obtain early insights into pandemic-related fertility changes in developing countries.

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