

# Factors Associated with Changes in Reproductive Outcomes during the first year of COVID-19 pandemic in Burkina Faso: A multinomial analysis from a longitudinal study using PMA 2030 data

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## Research Article

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# Abstract

**Background:**The advent of COVID-19 pandemic has dramatically affected women's life and livelihoods. In the past decade, the promotion of family planning contributed to reduced poverty and averted poor maternal and child outcomes. There is evidence that these gains may be threatened by social restrictions following COVID-19 outbreak.

**Methods:**We used data from a longitudinal survey collected by the Performance Monitoring Accountability in Burkina Faso. Data were collected over one-year period, from before (November 2019–February 2020) and during (November 2020–February 2021) COVID-19 pandemic. We evaluate changes in reproductive outcomes with respect to changes in health and economic circumstances as well as sociodemographic conditions among 1372 women aged 15-49 at risk of pregnancy and potential contraceptive users. Bivariate and multivariate multinomial logistic regression were performed to examine correlates of reproductive outcomes.

**Results:**Half (52%) of women did not change their reproductive status. While, 29% had childbearing, 19% started using a contraceptive method. In the multivariate analysis, childbearing was relatively higher among women exposed to family planning promotion, healthcare utilization, but relatively lower among those employed without cash paid and those who experienced household income loss. As of contraception, women exposed to family planning promotion were also associated with a relatively higher contraceptive use while concerns about getting COVID-19 infection had the opposite effect.

**Conclusion:**After a year period of COVID-19 outbreak, contraceptive adoption increased significantly, but at a slower pace which was not enough to reduce childbearing. The most vulnerable women may remain at greater risk of unintended pregnancies and poor maternal and child outcomes. Therefore, family planning programs should direct their efforts into combatting misinformation and reaching out women in communities in the context of COVID-19 restrictions.

## Introduction

The COVID-19 pandemic has disproportionately impacted women, from reduced economic opportunities, increased violence to decreased access to sexual and reproductive health and rights (SRHR) [1]. An estimated 12 million women could have experienced COVID-19 related disruptions in the area of access to family planning services, leading to a yearly 1.4 million unintended pregnancies, especially in low- and middle-income countries (LMICs) [2]. Although early evidence points to smaller and transient disruptions in the provision of family planning services, the severe social and economic impacts of the pandemic may intensify and wreak havoc on the gains made earlier [3, 4]. So far, it is unclear to what extent changes in women's daily life during COVID-19 pandemic has affected their reproduction outcomes, especially in countries with poor resources.

In the early stage of COVID-19 outbreak, family planning facilities have either been disrupted or closed, leading to a decline in utilization [5]. In comparison with pre-pandemic figures, service closures and

product shortages accounted for 27–44% of pregnant women who delayed or avoided pregnancy, and led to the denial of a fewer women in the quest for contraceptive satisfaction [6]. In response to this challenge, innovative approaches such as mobile, community and virtual based outreach delivery services were developed to reduce the need for in-person visits while enforcing containment measures [7]. Besides health concerns, the COVID-19 restrictions caused uncertainty and instability in women's daily lives which may affect their reproductive behaviors [8]. According to literature, the social and economic impacts of the pandemic vary widely, depending on the context, severity, and duration of the disruptions [9, 10]. Indeed, in the early stage of the pandemic, most women sustained their contraceptive status and needs; but no consistent pattern has been reported yet [3, 11]. However, several indications suggest that health and economic concerns may restrict access to contraception, decrease short-term fertility intentions, and affect reproductive outcomes [4, 12], but the drivers of fertility regulation following COVID-19 restrictions remain unclear [13].

In LMICs, a key gap in the existing literature is the dearth of studies on the pandemic's long-term impact on multiple reproductive outcomes [13]. Analyzing the disruptions of COVID-19 containment measures and its effects on their reproductive outcomes would help tailor the response as we enter the recovery phase, especially in Sub-Saharan Africa (SSA). As reported in a study one-year before and during the COVID-19 pandemic in SSA, the usage of modern contraceptives coincided with a decrease in pregnancies especially among the youngest and the least educated women living in Burkina Faso [14]. However, the lack of longitudinal feature of the study prevents conclusions on how changes in reproductive outcomes operate with respect to COVID-19 restrictions. Moreover, in spite of being statistically more efficient, no study combine multiple reproductive outcomes into one multinomial logit model instead of separate binary logit models [15].

Burkina Faso is a west African nation in the rank of the least developed but with a fast-growing population country in the world. Since the COVID-19 outbreak in March 2020, the government imposed containment measures including border, school, workplace and market closures, curfew, ban on gatherings, and regional quarantine [16]. As of March 26th 2023, the health authorities have confirmed 22056 cases and 396 deaths related to COVID-19 infection [17]. Before the pandemic, the country recorded improvements in access to contraception [18]. Yet, the prevalence of unintended pregnancies remains high while the rate of changes is suboptimal to achieve the component of the Sustainable Development Goals (SDGs), calling for universal access to sexual and reproductive health services by 2030 [19, 20]. Previous evaluation shows that the economic impacts and COVID-19 concerns were associated with contraceptive dynamics [3]. After a year-long into the pandemic, it is crucial to assess its health and economic impacts on key reproductive outcomes including childbearing and contraceptive use.

This study discussed changes in women's reproductive status in relationships with changes in their health and socioeconomic circumstances one year before and during COVID-19 pandemic. We considered contraception and childbearing as potential reproductive indicators in a multinomial approach which could yield more comprehensive statistics than binary. Besides, the focus on longitudinal data

could also result in more robust estimates. The findings of this study would guide policymakers to have a comprehensive approach on reproductive outcomes when drafting social policies to prevent or mitigate the effects of pandemics on women's life.

## Methods

### Study design

This study draws from a longitudinal data collected in Burkina Faso, by Performance Monitoring for Action (PMA) surveys. The survey rounds started data collection of a longitudinal data from December 2019 to February 2020, with a baseline round data collected just before the COVID-19 outbreak (March 2020). Then, a year later, (December 2020 to February 2021), a follow-up round of enrolled participants initially interviewed at the baseline survey were surveyed. In both surveys, a face-to-face interview was used to collect data across all 13 regions of Burkina Faso with a multiple stage cluster sampling approach. Using, the master sampling frame stratified by urban-rural areas, firstly, 167 Enumeration Areas (EA) were randomly selected by probability proportional to size. Second, each EA is mapped and a census of all households is established. Using the household listing frame for the EA, 35 households were randomly selected. Third, interviewers identified all eligible women aged 15 to 49 years-old, using the roster household questionnaire. Finally, at each survey round, women provided written informed consent before the interview. However, the study required parental consent and adolescent assent for women younger than age 18. The female questionnaire collected information on women sociodemographic characteristics, their reproductive histories, and their fertility behaviors. Around 99.0% of women at the baseline survey consented to be follow-up. Of the 6,532 eligible respondents at baseline, 2.6% were lost to follow-up. Of those reached, 5,871 (84.1% of the eligible sample) completed the survey with a response rate of 99.7% among contacted women. For sampling information and full data sets, visit [www.pmadata.org/countries/burkina-faso](http://www.pmadata.org/countries/burkina-faso). Further information on the design of PMA surveys has been covered in a previous study [21].

### Data

For this study, at baseline, we restricted the analytical sample to *de facto* women at risk of childbearing and contraceptive use. Therefore, we excluded women who reported one or more of the following situations: usual household members who slept elsewhere the night before the survey, not married, infertile and/or menopausal, unsure, or current pregnancy, and current contraceptive users. At the end of the follow-up, we further excluded women who become infecund and/or menopausal. Also, we removed women with missing data on key variables. Finally, we included all fecund women at risk of pregnancy and potential contraceptive users with valid data. Figure 1 illustrates the sampling selection process.

## Variables

Our outcome variable informs key reproductive events that may occur during the study period such as childbearing and contraceptive use. In this study, we considered childbearing as the process of giving

birth irrespective of the outcome. Childbearing includes pregnancy, childbirth, abortion, miscarriage, and stillbirth. To construct the outcome variable, we successively asked four questions on the reproductive history. The first question asked: "Have you had a pregnancy that miscarried, was aborted, or ended in a stillbirth since the baseline survey interview date?". Then, another question asked: "Have you had any birth since the baseline survey interview date?". In both instances, the response categories were "Yes", "No" and "No response". Women who either had history of pregnancy termination (abortion, miscarriage, stillbirth) or childbirth (live birth) at the end of the follow-up, were coded "1" and considered as having had a "childbearing" event. Among women who did not have such history, the third question asked: "Are you pregnant now?" with the following response categories, "Yes", "No", and "Unsure". A "Yes" answer was coded "1" as a "childbearing" event. Among women who responded "No", the last question asked: "Are you or your partner currently doing something or using any method to delay or avoid getting pregnant?", with the following response categories, "Yes", "No", and "No response". A "Yes" answer was coded "2" and was considered as "Contraception" event. Women who were unsure about their current pregnancy status were removed from the study population unless they were currently using any contraception. Furthermore, women with "No response" in the first two questions were also removed. Finally, women with no history of pregnancy/childbirth throughout study period and those with no current pregnancy/contraception at the end of the follow-up. were coded "0" and considered as having had "No event". In summary, we categorized reproductive events as: (0) no event, (1) "childbearing" and (2) contraception.

## Exploratory variables

Reproductive and lifestyle changes in sampled women throughout the study period was assessed. For instance, we investigated changes in access to healthcare services in the last 12 months including exposure to family planning messages, healthcare utilization and concerns about getting COVID-19 infection. In addition, we also evaluated personal economic changes such as employment and type of earnings, household income loss since COVID-19 and levels of financial autonomy in the last 12 months.

We measured a woman's exposure to family planning messages by combining six type of exposure channels which include radio, television, voice/text message, health worker, social media, and newspaper/magazine. The frequency of each exposure was assessed and coded "1", if a woman was exposed to at least one message and "0" if otherwise. We assessed healthcare utilization by asking: "In the last 12 months, have you visited a health facility or camp for your self-care?". The response categories were "No", "Yes", and "No response". A "Yes" answer was coded "1" while a "No" answer was coded "0". To assess women's concerns over getting COVID infection, a question was asked: "How concerned are you about getting infected with Coronavirus (COVID-19)?" We coded "0" if she was "Not concerned", "1" if "A little concerned", and "2" for "Very concerned".

We also measured changes in women's economic conditions. For employment and type of earnings, one question asked was "Aside from your own housework, have you done any work in the last 12 months?" with the following response categories "Yes", "No", and "No response". Women who answered "No" were considered as "Not employed" and coded "0". Among those who answered "Yes", another question was

asked “Are you paid in cash or kind for this work or are you not paid at all?”, the response categories were “Cash”, “Cash and kind”, “In-kind”, “Not paid” and “No response”. Women who were “Not paid” or paid “In-kind” were considered employed without cash paid and coded “1”. Women who received “Cash” or “Cash and kind” from work were considered employed with cash paid and coded “2”. To assess household income loss since covid-19 restrictions, a question asked: “During the last 12 months, how much of a loss of income did your household experience?” and the response categories were “None”, “Complete”, “Partial”, and “No response”. Women who experienced any household income loss were coded “1” and “0” if otherwise. Women’s financial autonomy was assessed with the following question: “Are you currently economically reliant on your husband/partner for basic needs?”. The response categories were “Yes”, “No”, and “No response”. If a woman was reliant on their partner, we considered she had “no” autonomy and coded “0”. But, we coded “1” for a woman who was not reliant on her partner. Women with “No response” on any question were also removed.

## **Covariates**

They included sociodemographic (age, residence, and parity) and economic (education, and wealth) factors that may be linked to women’s reproductive life.

## **Statistical methods**

In the descriptive statistics, we first examined the occurrence of reproductive events during the study period. Then, bivariate analysis was conducted to assess the strength and magnitude of independent variables associated with reproductive events. We considered eligible variables for the multivariate analysis based on a p-value less than 0.30 from the bivariate analysis. Multivariate, multinomial logistic regressions examined the likelihood of a reproductive event adjusting for independent variables. In the multivariable analysis, we reported the adjusted relative risk ratio (aRRR) with its 95% confidence interval (CI). All variables with a p-value < 0.05 were considered as significant predictors of women’s reproductive life. Data management (extraction, recoding, and cleaning) and statistical analyses (descriptive and analytical analysis) were performed using STATA version 14. Testing for multicollinearity revealed that VIFs did not exceed 0.6 and 2.0. Therefore, all covariates were retained in multivariate analysis. The modelling process involved three different models and the null model was fitted with the outcome variable only. After that, Model 1 included variables related to woman’s access to healthcare services and their economic conditions during the study period. In model 2, we adjusted sociodemographic and economic characteristics. Finally, Model 3 included all the independent variables. All analyses were weighted to make the data representative nationally, to account for the non-response rate, and to get better statistical estimates.

## **Ethical considerations**

The Institutional Review Boards at the Comité d’Ethique Institutionnel Pour La Recherche en Santé (Burkina Faso - No. A14-2020), and the Bloomberg School of Public Health at Johns Hopkins University in Baltimore, USA approved the study protocol. In addition, informed consent from each respondent was sought and obtained prior to the enrolment at both surveys.

# Results

## Proportion of reproductive events and background characteristics

A total weighted sample of 1372 women aged 15-49 at risk of pregnancy and potential contraceptive users were included in the study population. Of these women, 52% neither got pregnant nor use any contraception during the study period. They did not have any reproductive event. However, 2 out of 10 and 3 out of 10 adopted contraception and birthed a child, respectively. Figure 2 displays the repartition of different reproductive events.

## Health and economic conditions and women's background characteristics

Table 1 shows that during the last 12 months, 63% of women were exposed to family planning promotion, 83% attended healthcare services while 47% were not employed. Since COVID-19 outbreak, 74% of women were very concerned about getting infected, 45% experienced household income loss, while 53% relied on their partners for basic needs. In addition, more than two-thirds of women were over 24 years-old, lived in rural areas, had over two children, had no formal education, but lived in no poor households. There was a significant association ( $p < 0.30$ ) between all independent variables and the occurrence of reproductive events. Therefore, we included all variables in the multivariable analysis.

## Predictors of reproductive events in Burkina Faso

Table 2 displays the result of the multinomial logistic analysis showing parameter estimates of "No event versus Childbearing" as well as "No event versus Contraception". The modelling process involves three models. The null model which does not include predictors found an Akaike's information criteria (AIC) of 3503.7. In Model 1, we included variables related to women's health and economic conditions during the study period. The results show that exposure to family planning promotion was positively associated with both childbearing and contraception. Compared with those who had no reproductive event, women who had childbearing were more prone to healthcare utilization and financial dependency but less likely to be employed without cash paid or to have experienced household income loss. Model 2 controls for women's background characteristics. We found that exposure to family planning promotion remains positively associated with childbearing (aRRR = 1.48; 95%CI: 1.03, 2.13) and contraception (aRRR = 2.44; 95%CI: 1.54, 3.85) compared with no reproductive event. Also, relative to women who did not have any reproductive event, those who reported childbearing were more than three times more likely (aRRR = 3.91; 95%CI: 2.08, 7.34) to have visited a health facility. But, they were less likely to be employed without cash pay (aRRR = 0.50; 95%CI: 0.30, 0.85) and less likely to have experienced household income loss (aRRR = 0.68; 95%CI: 0.48, 0.97). On the other hand, relative to women who did not have any reproductive event, those who reported contraception were less likely to be concerned about getting infected by COVID-19 (aRRR = 0.46; 95%CI: 0.22, 0.99). Furthermore, relative to women who did not have any reproductive event, women aged 35 - 49 were significantly less likely (aRRR = 1.95; 95%CI: 1.07, 3.55) to childbearing as opposed to those with primary education (aRRR = 1.63; 95%CI: 1.05, 3.17). But, women with at least secondary education were more likely to use contraceptives (aRRR = 2.21; 95%CI: 1.16, 4.02) relative to no

reproductive event. The likelihood ratio tests show that Model 2 was significantly different from Model 1 (Chi<sup>2</sup>:86.2; p<0.0001). Moreover, Model 1 was also significantly different from the null Model (Chi<sup>2</sup>:179.2; p<0.0001). This means that each step of the modeling had a significant contribution to the analysis. In addition, the AIC diminished in each of the consecutive models.

## Discussion

This is the first longitudinal study to assess the incidence of reproductive outcomes during the COVID-19 pandemic. More specially, it assessed how changes in women's health and economic conditions impacted their reproductive behaviors over one year period in Burkina Faso. We found that, over one-year period before and during COVID-19 outbreak, 52% of women of reproductive age neither got pregnant nor adopted contraceptive method. However, childbearing occurred among 29% of women while 19% adopted contraception. Moreover, we also found that, relative to women with no reproductive event, greater exposure to family planning promotion increased both the likelihood of childbearing and contraception while greater healthcare utilization increased the likelihood of childbearing only. In addition, relative to women with no reproductive event, being employed without cash paid and having experienced household income loss reduced the likelihood of childbearing, while being concerned about getting COVID-19 infection has the same effect on contraception. Furthermore, relative to women with no reproductive event, childbearing was less likely among women aged 35–49 but more likely among those with primary education. Whereas, relative to women with no reproductive event, contraception was more likely among women with at least secondary education.

### Changes in women's reproductive status during COVID-19 pandemic

The COVID-19 pandemic restrictions significantly affected women's reproductive outcomes in Burkina Faso, during a year before, during and after the pandemic outbreak. We found an 19% and 17.7% increase in contraceptive adoption nationally and in rural setting, respectively. Although previous research found 25.4% and 17.4% contraceptive adoption at national level and in rural Burkina Faso, in a shorter study period [3, 11]. It is possible that the increase in contraceptive adoption decelerated or stalled overtime. Similar trend was observed during the 2013–2016 West African Ebola outbreak in Liberia and in Sierra Leone [22]. The pandemic may not have led to widespread or lasting changes in fertility intentions, especially in poor countries [12]. Nevertheless, the most vulnerable women may attempt to accelerate their childbirth period for greater support and marital stability [4]. We found relatively high rates of childbirth as 29% of women became pregnant over one-year period. In 2010, the Demographic and Health survey in Burkina Faso found that only 20.6% of women aged 15–49 had live births over three-year period [23]. Increased stress and financial insecurity may have led to sexual coercion, inability to negotiate contraception and unintended pregnancies. In Ethiopia, the magnitude of unintended pregnancy was found to be higher during COVID-19 pandemic, especially in disadvantaged communities [24]. In addition, limited access to contraception may have also given rise to unplanned pregnancies during the pandemic. Conversely, in high income countries, women had forgone their immediate fertility intentions and avoid getting pregnant after the COVID-19 outbreak. For instance, fewer women who were mothers of young



children in New York (U.S.) were planning or attempting to become pregnant [25]. In Catania (Italy), all married women continued the use of contraceptive method while unmarried women reported unplanned pregnancies due to contraceptive discontinuation [26]. Moreover, a study found that women sought parenthood during COVID-19 pandemic so as to bring some positivity in their lives and to increase family bound [27]. The effects of the pandemic on women's reproduction may be context-dependent. In high income countries, most women may have the means to revise their immediate fertility intentions, whereas in LMICs, vulnerable women struggled taking similar decision. As an example, a panel survey in four rural health districts of Burkina Faso found a higher desire to stop or postpone pregnancy, including a higher contraceptive use, over one-year period before and during the pandemic among women aged 15–49 [28]. Yet, unwanted pregnancy and self-reported history of miscarriages, abortions, or stillbirths had reportedly increased during the same period. Fear of COVID-19 infection, unavailability of the preferred method or of providers and lack of money may explain unintended pregnancies and limited contraceptive access during our study period [6]. Eventually, socioeconomic effects of the COVID-19 pandemic exacerbate access to contraception, especially for the disadvantaged populations [29]. In Kenya, adolescent secondary schoolgirls who remained out of school for 6 months due to the COVID-19 lockdown had twice the risk of becoming pregnant [30]. Globally, economic loss and food insecurity did not affect women's fertility intentions in the early months of the COVID-19 pandemic. However, those in low income countries experienced more strain in healthcare system and economic hardship [4, 26, 31].

## **The effects of changes in health and economic conditions**

Similar to previous studies, we found that family planning promotion during COVID-19 pandemic increased access to contraceptive services [8]. Experiences from Kenya, Nigeria, and Zimbabwe showed that innovative approaches to ensure continuity of care during the COVID-19 pandemic can decrease the need for in-person visits, improved services and increase contraceptive uptake [7, 32]. In Burkina Faso, community mobilization helped introduce and expand self-administered subcutaneous injectables before and during the pandemic [33]. Such community-based service delivery allows the availability of contraceptives without impeding on the access of critical health services. Despite experiencing major disruptions in the early stage, family planning services have adapted to COVID restrictions [34]. However, it is possible that this resilience has not been enough or timely to avoid an upsurge in childbearing [4]. Women who experienced childbearing may have been lately informed on the continuity of family planning services. Another explanation may be that those who wanted to access contraception experienced restrictions either at home or at the health facility. For instance, fear of infection at health facilities was the most frequently reported COVID-19-related reason associated with non-usage of contraceptive in Burkina Faso and Kenya, respectively [3]. In fact, we found that women who visited a health facility in the last 12 months experienced childbirth. This finding may be a case of reverse causation in which women who got pregnant attended ante-, delivery and post-natal care or post-abortion treatment. In 2016, Burkina Faso has introduced exemption policy for maternal and child healthcare services, including family planning [35]. Literature shows that this policy significantly increase healthcare utilization for pregnant women [36]. Yet, in terms of contraceptive use, it only facilitates the negotiation

processes without changing social norms and gender inequalities that still limit women's decision-making power [37]. In line with previous researches, we found that women who were concerned about getting infected were less likely to use contraception [3, 6]. This may be an indirect impact of epidemics on sexual and reproductive health service utilization [38]. Women may be avoiding those services due to stigma, fear of testing positive, and misconceptions about service denial or unavailability. In Kenya, a research found that government restrictions on movement have heightened the fear and anxiety surrounding COVID-19, leading people to non-usage of health services for other health matters [39]. This finding raised several concerns, including how authorities and the media informed the public during the pandemic. Fear of going to the facility for contraceptive services during COVID-19 has been noted among patients and health workers [40]. In Egypt, it was reported that women stopped using contraception during the pandemic for a variety of reasons, including fear of contracting COVID 19 during a visit to the primary health care centers [41]. The same reason may play out among those who wish to adopt contraception. As a result, unintended pregnancy may increase along with its negative effects on maternal and newborn health, especially in poor resource countries [42]. Inevitably, the economic shocks following COVID-19 outbreak has affected women's fertility intentions and behaviors. Our results imply that economic instability in the form of women's employment without cash paid and household income loss was associated with greater birth control in Burkina Faso. Similarly, Karp *et al*, found that household income loss or food insecurity was associated with greater contraceptive protection in Burkina Faso, but not in Kenya [3]. Shifts in fertility timing preferences often occur in response to changes in life circumstances, including income loss [43]. In Burkina Faso, it is possible that women living in rural areas expressed stronger intentions to postpone or limit childbearing in the COVID-19 context. In fact, a study suggested that those women may have benefited from lighter COVID-19 restrictions, targeted outreach programs and free contraceptive provision [11]. In addition, evidence shows that disadvantaged populations kept using contraception, despite difficulties accessing their preferred method [29]. It is possible that disadvantaged women postponed childbearing to allow time for the household to recover financially. Another reason may be that the pandemic had reduced couples' sexual functioning and activity. A systemic review and meta-analysis demonstrates that COVID-19 related restrictions were correlated with lower rates of sexual desire and reduced sexual activity, especially among women [44]. Stress, anxiety, and depression following COVID-19 restrictions may be the psychological factors that negatively affect couples sexual function in general and that of women in particular [41]. Besides, during the COVID-19 outbreak, quarantine and self-isolation with children and extended family may limit the opportunity for couples to have privacy for intimacy. But, the relationship between COVID-19 restrictions and childbearing may be context-dependent. In contrast however, a study in Malawi found that changes in economic circumstances did not predict the direction of fertility's timing and quantum [43].

## **The role of women's background characteristics**

In line with previous research, we found that during COVID-19 pandemic older women had lower childbirth events while we observed opposite effect among those with primary education level. The plausible explanation may be that older women were less subjected to sexual abuse, less pressure to bear a child, and freer to access family planning services. In Nigeria, a study found that younger age increased the

odds of experiencing intimate partners violence during the pandemic [45]. In this study, older women may hold reproductive decision-making power in their relationships due to negotiation skills, greater autonomy, and financial independence. In fact, despite being statistically insignificant, we found that women who lack financial independence were also more likely to bear a child during COVID-19 pandemic. This finding is significant as it may depict increase vulnerability to unintended pregnancies during COVID-19 pandemic. In Nigeria, a study found that amidst the pandemic, younger and less educated women had lower disposition of being unhappy towards pregnancy [10]. While older women are culturally allowed to control birth after proving their fertility, those with lower formal education use high fertility to gain better social position in their households and communities. In Ethiopia, a study related the increase in the proportion of teenage girls who got unintended pregnancy and used abortion care services to school closures during the pandemic [46]. It is possible that women with primary education lacked awareness about contraception and safe abortion services and its availability during COVID-19 pandemic. Curiously, a research found that younger women and those with higher education had an increase in the need for contraception in urban Nigeria (Lagos), but not in three other SSA countries [11]. In most rural areas and among younger women, sociocultural hurdles may prevent the translation of inherent desire to delay pregnancy into effective birth control. It is also possible that older women have less sexual desire and sexual activity leading to lower childbirths. Surprisingly, our results contradict that of a previous research comparing two cross-sectional surveys. That research found a decline in pregnancy rates and an increase in modern contraceptive prevalence among younger women and those without formal education in Burkina Faso, one-year apart before and during COVID-19 outbreak [47]. Yet, we expected that the economic downturn triggered by the pandemic would activate channels toward higher fertility, especially in vulnerable population [14]. Since, the evidence presented in this study came from a longitudinal survey. Differences may arise as our study does not account for the history of pregnancy at the start of the study, but uniquely, followed the not pregnant, fecund women during the study period. Expectedly, we found that women with higher education were more likely to adopt a contraceptive method during the pandemic, a trend that has been observed in previous research [11]. It is also possible that highly educated women had increased need for contraception and more access to reliable information about family planning services availability [48, 49]. Amidst the pandemic, they may desire to delay childbearing, given the uncertainty of the pandemic. Highly educated women may be aware of substantial costs associated with childrearing as well as the risks of unemployment and loss of income associated with the long-term effects of COVID-19 restrictions. In fact, in the early months of the pandemic, some research found no association between women's education and contraceptive adoption [3, 10]. Our study accounted for a much longer time needed for women to adapt their fertility intentions to the health and economic repercussions of COVID-19 pandemic. Further research on the time lapse and women's ability to translate fertility intentions into actual behavior is required to better capture the impact of COVID-19 pandemic on reproductive health.

Our study is not without limitations. First, misclassification is possible as women with history of contraceptive use may be unaccounted for. Some women may start and stop contraception during the study period. However, they largely remain at risk of unintended pregnancies due to inconsistent use of

contraception. Second, we lacked data on family planning service delivery during the pandemic. Therefore, we cannot rule out the effects of service functionality, provider's attitudes and commodity availability on reproductive outcomes. Instead, we used women's exposure to family planning promotion and their health care utilization in the last 12 months to capture the level of care during the study period. Finally, COVID-19 outbreak emerged as Burkina Faso is facing serious security and humanitarian crisis following terrorist activities and insurgency. It is possible that terrorist attacks contributed to reduce or limit access to contraceptive services. In fact, research found that these attacks changed delivery practices by reducing the number of antenatal care visits, assisted deliveries and cesarean sections in the country [50].

## Conclusion

Despite the limitations, we were able to provide long-term evidence on the effects of COVID-19 pandemic on women's reproductive health in Burkina Faso. We found that contraceptive use continues to increase during the pandemic, but at a slower pace overtime. Meanwhile, a significant proportion of women became pregnant during the study period. Although the promotion of family planning contributed to contraceptive adoption, the uptake was not enough to avoid pregnancies. Healthcare utilization significantly increased among women who got pregnant during the study period. Furthermore, we found that fear of COVID-19 infection, unpaid work and income loss were detrimental to childbearing and contraceptive adoption. As the pandemic eases, further research is needed to assess the overall political responses and health system adaptations to the COVID-19 outbreak. More specially, family planning practitioners need to develop and implement mitigation strategies to safeguard access to sexual and reproductive health and protect hard-won gains for women and girls.

## Declarations

### Ethics approval and consent to participate

'Not applicable'

### Consent for publication

"Not applicable"

### Availability of data and materials

All the data for this study are openly available at <https://www.pmadata.org/countries/burkina-faso>

### Competing interests

"The authors declare that they have no competing interests" in this section.

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No funding was received for this study.

## Authors' contributions

SYMS conceptualized the study, developed the design section and drafted the first manuscript, data extraction, data analysis, drafted the final manuscript and led the process of critical revision of the manuscript. MEA and JA read and approved the final manuscript. The authors read and consented for the manuscript to be submitted for peer review.

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## Tables

**Table 1: Prevalence of reproductive outcomes by changes in women's life circumstances before and during COVID-19 pandemic as well as their life conditions**



Variables	Percent (N)	No event 52% (647)	Childbearing 29% (436)	Contraception 19% (289)	P-value
<b>Access to healthcare services</b>					
<i>Sources of exposure to family planning services in the last 12 months</i>					
Radio	57.3 (834)				
Television	23.3 (466)				
Health worker	11.1 (121)				
Voice/ text messages	6.7 (134)				
Newspaper/magazine	4.2 (96)				
Social media	3.4 (98)				
<i>Scores</i>					0.0011
No exposure (0)	36.3 (427)	60.6	27.9	11.6	
At least one exposure (1)	63.7 (945)	47.1	30.4	22.5	
<i>Healthcare utilization in the last 12 months</i>					
No	16.9 (214)	68.0	12.6	19.4	0.0001
Yes	83.1 (1158)	48.8	32.9	18.3	
<i>Concerns about getting infected</i>					
Not/little concerned	10.0 (142)	44.5	34.8	20.8	0.2667
Concerned	16.2 (232)	60.3	27.0	12.7	
Very concerned	73.8 (998)	51.2	29.3	19.5	
<b>Economic conditions</b>					

<i>Employment in the last 12 months</i>					0.0533
Not employed	46.7 (536)	51.1	34.0	14.9	
Employed without cash paid	14.2 (177)	59.1	20.5	20.5	
Employed with cash paid	39.1 (659)	50.5	27.4	22.1	
<i>Household income loss since COVID-19</i>					0.0312
None	54.6 (639)	51.9	32.8	15.3	
Partial/complete	45.4 (733)	52.1	25.6	22.3	
<i>Financial autonomy</i>					0.0259
No	46.7 (663)	56.5	24.1	19.4	
Yes	53.3 (709)	48.1	34.2	17.7	
<b>Sociodemographic &amp; economic factors</b>					
<i>Age</i>					0.002
15-24	25.4 (308)	47.8	41.7	10.5	
25-34	41.8 (573)	50.2	29.6	20.3	
35-49	32.8 (491)	57.6	19.9	22.5	
<i>Place of residence</i>					0.0170
Rural	87.0 (766)	53.2	29.1	17.7	
Urban	13.0 (606)	44.0	32.4	23.6	
<i>Parity</i>					0.0279
0-2	31.2 (476)	48.4	36.5	15.1	
3-4	30.8 (452)	49.3	32.6	18.1	
5-13	38.0	57.1	21.2	21.7	

(444)

					0.0038
<i>Education</i>					
None	72.9 (853)	55.8	26.7	17.6	
Primary	18.3 (296)	44.2	36.5	19.3	
Secondary & more	8.8 (223)	37.1	38.2	24.7	
<i>Wealth tertile</i>					0.0461
Lowest	35.8 (325)	56.6	22.5	20.9	
Middle	39.8 (414)	49.8	34.6	15.6	
Highest	24.4 (633)	48.8	31.5	19.7	

**Table 2: Results of multinomial logistic regression to determine factors of reproductive outcomes (No event versus Pregnancy and No event versus Contraception) among married/cohabitating women aged 15-49 in Burkina Faso**

Variables	Null model	Model 1		Model 2	
		Childbearing	Contraception	Childbearing	Contraception
<b>Access to healthcare services before and during COVID-19</b>					
<i>Family planning promotion in the last 12 months</i>					
<i>Exposure scores</i>					
No exposure (0)		1.00	1.00	1.00	1.00
At least one exposure (1)		1.50* [1.05-2.13]	2.54*** [1.63-3.96]	1.48* [1.03-2.13]	2.44*** [1.54-3.85]
<i>Healthcare utilization in the last 12 months</i>					
No		1.00	1.00	1.00	1.00
Yes		4.00*** [2.16-7.41]	1.16 [0.71-1.89]	3.91*** [2.08-7.34]	1.21 [0.73-1.98]
<i>Concerns about getting infected</i>					
Not/little concerned		1.00	1.00	1.00	1.00
Concerned		0.61 [0.32-1.15]	0.45* [0.21-0.94]	0.67 [0.34-1.29]	0.46* [0.22-0.99]
Very concerned		0.64 [0.34-1.11]	0.74 [0.40-1.35]	0.74 [0.42-1.29]	0.75 [0.40-1.41]
<b>Economic opportunities before and during COVID-19</b>					
<i>Employment in the last 12 months</i>					
No employment		1.00	1.00	1.00	1.00
Employed without cash paid		0.54* [0.33-0.90]	1.33 [0.77-2.30]	0.50* [0.30-0.85]	1.33 [0.76-2.33]
Employed with cash paid		0.64 [0.37-1.11]	1.31 [0.84-2.02]	0.78 [0.53-1.14]	1.25 [0.84-1.88]
<i>Reliance on husband/partner for basic needs</i>					
No		1.00	1.00	1.00	1.00

Yes	1.61** [1.14-2.27]	1.15 [0.79-1.67]	1.41 [0.99-2.01]	1.26 [0.84-1.88]
<i>Household income loss since COVID-19</i>				
None	1.00	1.00	1.00	1.00
Partial/complete	0.71* [0.50-0.99]	1.30 [0.87-1.95]	0.68* [0.48-0.97]	1.27 [0.84-1.90]
<b>Sociodemographic &amp; economic factors</b>				
<i>Age</i>				
15-24			1.00	1.00
25-34			0.64 [0.37-1.09]	1.79 [0.98-3.25]
35-49			0.47* [0.23-0.92]	1.83 [0.86-3.89]
<i>Place of residence</i>				
Rural			1.00	1.00
Urban			1.26 [0.82-2.45]	1.06 [0.61-1.87]
<i>Parity</i>				
0-2			1.00	1.00
3-4			1.43 [0.84-2.45]	0.90 [0.51-1.58]
5-13			1.21 [0.63-2.32]	0.98 [0.50-1.95]
<i>Education</i>				
None			1.00	1.00
Primary			1.63* [1.05-2.53]	1.56 [0.91-2.68]
Secondary & more			1.73 [0.94-3.17]	2.21* [1.16-4.02]
<i>Wealth tertile</i>				
Lowest			1.00	1.00
Middle			1.41 [0.91-2.18]	0.79 [0.49-1.28]

Highest			1.16 [0.68-1.99]	0.79 [0.41-1.53]
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**Model summary**

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<b>Akaike's information criteria (AIC)</b>	3365.8	3356.50	3306.32
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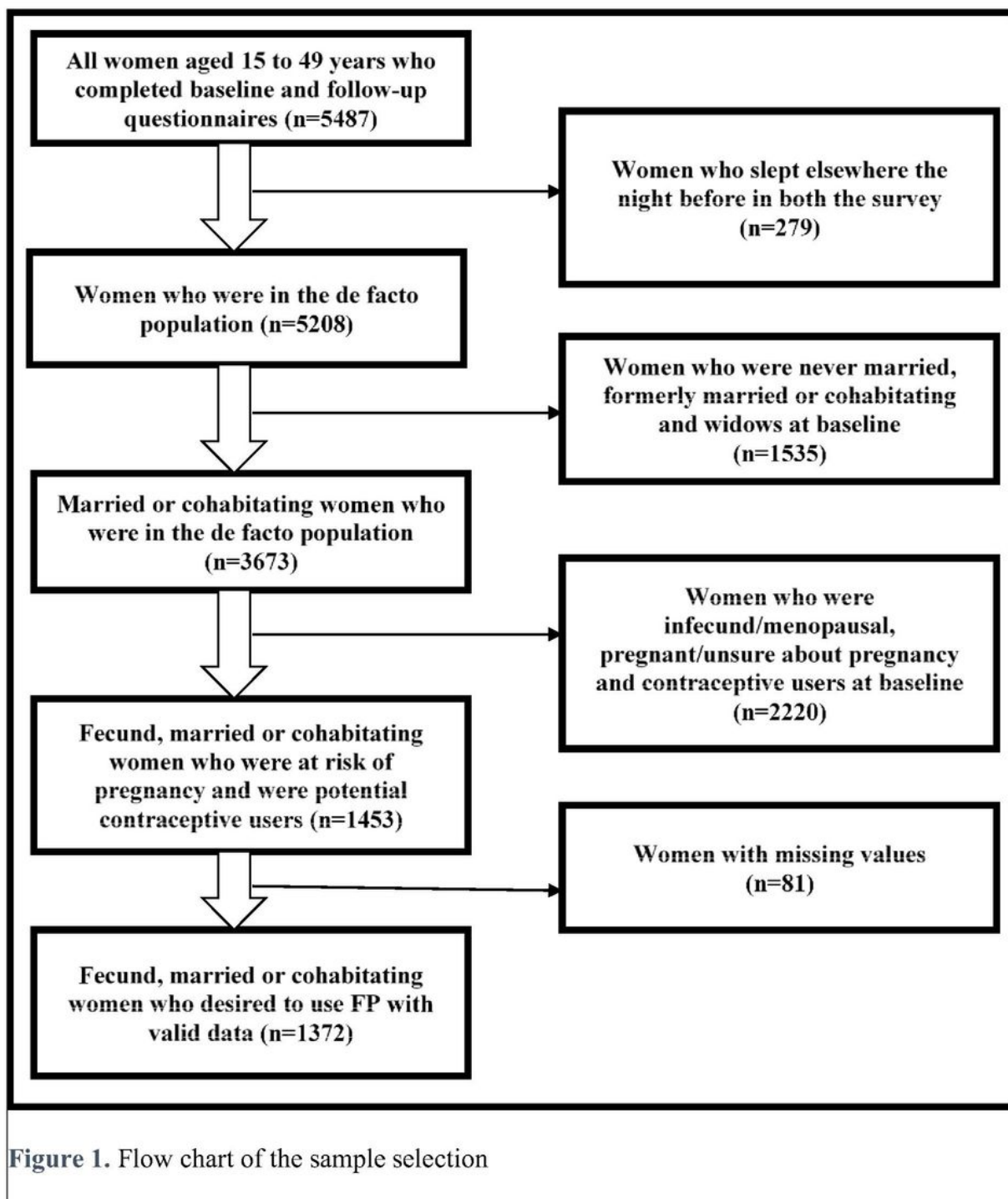
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Likelihood-ratio test (compared to previous model)	179.18***	86.17***
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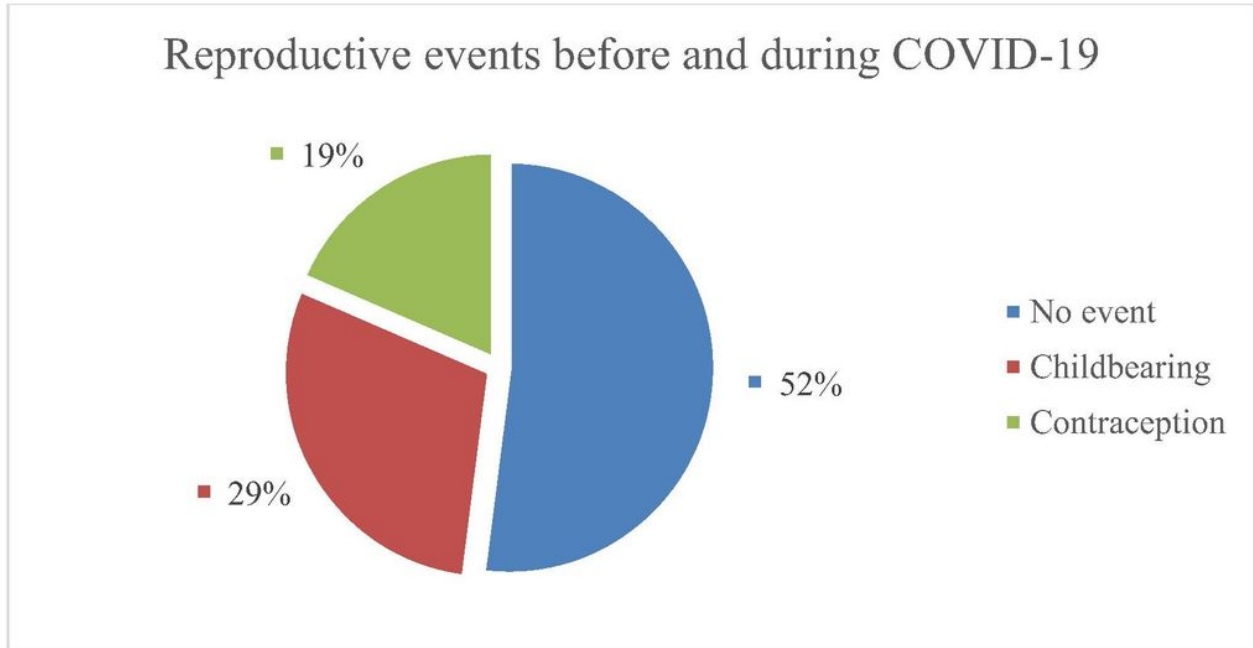
Wald chi-square statistics (X2)	75.65	126.21
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## Figures



**Figure 1**

See image above for figure legend.



**Figure 2: Repartition of reproductive events before and during COVID-19 pandemic among fecund women aged 15-49.**

**Figure 2**

See image above for figure legend.