

Utilisation of services along the continuum of maternal healthcare during the COVID-19 pandemic in Lubumbashi, DRC: findings from a cross-sectional household survey of women

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Research Article

Keywords:

Posted Date: April 15th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1454838/v1>

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Abstract

Introduction:

The continuum of maternal care along antenatal (ANC), intrapartum, and postnatal care (PNC) is fundamental for protecting women's and newborns' health. The COVID-19 pandemic and accompanying mitigation measures interrupted the provision and use of these essential services globally. This study examines maternal healthcare utilisation along the continuum during the COVID-19 pandemic in the Democratic Republic of the Congo, and explores factors associated with use of the full continuum.

Methods:

This is a cross-sectional study using data collected on a survey of 599 households in Lubumbashi using stratified random sampling. We included 604 women (15-49 years) who were pregnant between March 2020-May 2021. A structured interview involved questions on sociodemographic characteristics, attitudes regarding COVID-19, and maternal service use and cost. Complete continuum of care was defined as receiving ANC 4+ consultations, skilled birth attendance, and at least one PNC check for both mother and newborn. Data were analysed in SPSS using descriptive statistics and multivariable logistic regression.

Results:

Of the women who gave birth during the COVID-19 pandemic, 61% had ANC 4+ consultations, most had a skilled birth attendant (97%), and more than half (55%) had a PNC check for themselves and the newborn. One-third (36%) of women completed the continuum of maternal healthcare. Factors significantly associated with completing the continuum included higher education (aOR=2.6; p-value<0.001) and positive attitude towards the COVID-19 vaccination (aOR=1.9; p-value=0.04). Reasons for not seeking maternal care included lack of money and avoiding COVID-19 vaccination.

Conclusion:

During the COVID-19 pandemic, maternal healthcare seeking behaviours were shaped by vaccine hesitancy and care unaffordability in Lubumbashi. By disproportionately affecting women and vulnerable populations, the pandemic could exacerbate pre-existing structural barriers to maternal healthcare utilisation. Addressing the high cost of maternal healthcare and vaccine hesitancy appear essential to avoid deepening pre-existing socio-economic inequalities.

Background

Maternal health refers to the health of women during pregnancy, childbirth and the postnatal period (until 6 weeks after childbirth), according to the World Health Organisation (WHO)[1]. While pregnancy and childbirth should be positive experiences helping ensure that all women and their babies reach their full potential for health and well-being, many women risk losing their life while giving birth. Although important progress in reducing maternal mortality was made in the last two decades, about 295,000

women are estimated to have died during and following pregnancy and childbirth in 2017. Up to 99% of maternal deaths occur in low- and middle-income countries (LMICs) and 66% in sub-Saharan Africa (SSA) alone[2]. Ensuring continuity of care in maternal healthcare has become a key program strategy for improving the health of mothers and newborns[3]. The continuum of care in maternal health refers to the continuity of care throughout pregnancy, childbirth, and after birth; namely the use of antenatal care (ANC), presence of a skilled attendant at birth in an enabling environment, and postnatal care (PNC)[4]. Several factors contribute to the completion of the continuum of maternal health care such as socio-demographic characteristics, accessibility and affordability of healthcare services, and women's and their families' attitudes and trust towards the health system[4, 5].

Since early 2020, the world has been confronted by a pandemic caused by the SARS-CoV-2 virus, affecting people and health systems worldwide in all stages of life, including pregnant women and newborns[6, 7]. During the pandemic, two new streams of maternal healthcare research emerged[8–10]. On one hand, researchers study the direct effects of COVID-19 on maternal health, including severity of infection during pregnancy and extent of vertical transmission[11]. On the other hand, assessments of the indirect effects of the pandemic on maternal health explore how COVID-19 mitigation measures influence healthcare use and provision. Examples include lower levels of utilisation of health services among pregnant women due to fear of infection with SARS-CoV-2 in health facilities and the massive effect of lockdowns, travel bans, and curfews on access to and availability of essential services (such as emergency obstetric care)[12]. While the indirect effects are thought to cause a greater burden of ill-health, they have received insufficient attention in shaping and implementing policies aiming at preventing the spread of the SARS-CoV-2 virus[10, 13, 14].

Due to their weak health system and limited emergency preparedness, low-resource settings such as SSA were expected to suffer a high burden of COVID-19 morbidity and mortality [15–17]. However, mortality rates due to COVID-19 in SSA appear significantly lower than elsewhere, which is partly attributed to Africa's youthful population [13, 18]. Nevertheless, the indirect effects of the COVID-19 pandemic seem to affect the SSA region similarly as the rest of the world, because most SSA countries also imposed strict mitigation measures, including lockdowns, travel bans, curfews and closures of essential healthcare services[19].

In the Democratic Republic of Congo (DRC), the number of COVID-19 cases and deaths has been relatively low with 67,000 cases and 1,126 deaths by the end of December 2021 among a population of 93 million people [20, 21]. However, COVID-19 had an important impact on daily life due to a decline in informal labour (e.g. by closure of markets), loss of income for 10–50% of households, and severe inflation [22]. Furthermore, a recent study by Hategeka et al showed important reductions in general health service utilization during the pandemic, noting that the impact was most severe in the Gombe section of Kinshasa due to a local outbreak and subsequent local lockdown[17]. Importantly, the study also showed hospitals were more severely affected than health centers, and a non-negligible impact on maternal healthcare utilization[17]. Another report using data from an online survey of healthcare providers from the DRC showed that maternal and newborn service provision continued during the first

year of the COVID-19 pandemic. Nonetheless, some mitigation measures could have contributed to a decline in the quality of care, such as reducing the number of routine antenatal checks during pregnancy, limiting close contact between providers and women during labour and childbirth, and reducing the number of birth companions allowed [23].

While limited available research suggests that women continued seeking healthcare services during the pandemic, the contextual and individual factors affecting decisions about utilisation of maternal care among women in DRC are not well known. The objective of this study was to examine the levels and determinants of healthcare utilisation along the continuum of maternal care among women in Lubumbashi, DRC during the first year of the COVID-19 pandemic.

Methods

Setting

According to the most recent national survey in the DRC conducted in 2018, 82% of women received at least one ANC consultation during their most recent pregnancy, and 43% received 4 or more ANC consultations [24]. Further, 85% of women had a skilled attendant at birth and 82% gave birth in a health facility. Coverage of outpatient PNC consultations reached 12% for newborns and 7% for mothers [24]. The maternal mortality ratio is high and estimated at 473/100,000 live births [25]. Due to ongoing conflicts, maternal healthcare coverage is unstable and deteriorating in several regions, hampering overall progress in maternal health outcomes in the country [26, 27].

In urban areas such as Lubumbashi, the health system is characterized by an increasing number of health facilities in the poorly regulated private sector. This has led to excessive commercialization of health care, including care related to maternal and child health [28, 29]. More than 90% of the population pays out of pocket to access basic and emergency obstetric and neonatal care, with the consequences of catastrophic expenditure for households and exacerbation of poverty [30].

The first case of COVID-19 in the DRC was identified on the 10th of March 2020[17]. The government immediately introduced a series of public health measures aimed at reducing virus transmission including the closure of bars, restaurants and schools which was followed by a declaration of a state of emergency, closure of international borders and restricting travel in and out of Kinshasa on 24 March 2020 [17]. The government implemented mandatory use of face mask and physical distancing on 20 April 2020. Mass testing for COVID-19 is highly recommended by the government, although not sufficiently available [27]. A total of 263,991 COVID-19 vaccine doses were administered as of end 2021, which below the WHO target to vaccinate 10% of the population by September 2021 [21, 28] .

This study took place in Lubumbashi city, the third-largest city in the DRC, with an area of 747 km² and an estimated population of over 2 million inhabitants in 2016 and an average density of 2,807 inhabitants per km². The city is located in Katanga Province and subdivided into eleven urban health zones (zones de santé – ZS), each with a General Reference Hospital (Hopital General de Reference - HGR) and, on

average, 15 Health Areas (Aires de Santé - AS). Each health zone can have up to 35 health centers (Formations Sanitaires – FOSAs), including public and private polyclinics and health centers (Centres de Santé - CS) [28]. The 11th health zone, Kowe, is nested within the Kamalondo and Kampemba ZS, resulting in 10 different ZS to be included in this study. At the time of data collection, Lubumbashi city was experiencing the third wave of COVID-19: the first was in April 2020, the second in December 2020, and the third between April and October 2021. Until mid-January 2022, the provincial Ministry of Public Health, Hygiene and Prevention (MoPHH) had notified 4,555 cases of COVID-19 of which 109 died (2.39%)[33]. The response to the pandemic has varied over time. At the beginning of the pandemic, the response was centralized at the MoPHH. However, during the second wave the response was decentralized to the Central Offices of Health Zones (Bureau Central des Zone de Santé - BCZS) because of difficulties in coordinating notification and monitoring of cases. At the time of data collection, each ZS had a mobile team that carried out community investigations of suspected cases for the purpose of epidemiological surveillance.

Design

This cross-sectional study was conducted to assess maternal healthcare utilisation among women who were pregnant during the COVID-19 pandemic in Lubumbashi. This study used data collected in a household survey conducted in May 2021. Households were eligible for inclusion in the study if at least one woman residing within the household had been pregnant between March 2020 and May 2021. If a household was eligible, the head of the household and all women that had been pregnant within the given period were interviewed.

Population and sampling

We included all women of reproductive age (15–49 years) living in sampled households who were pregnant between March 2020 and the survey in May 2021, if they were present at the time of data collection and agreed to participate in the study. Among women who had more than one pregnancy during the study period, we collected information about all pregnancies, but for this paper we analysed information about the most recent pregnancy only. Households were selected using stratified random sampling with probability proportional to population size per ZS. Within each ZS, the avenues were randomly selected, followed by the street, then the households by means of a random walk starting from a single entry point of the street. A minimum sample size of 600 women was needed to test our main hypothesis (difference in the proportion of women using antenatal, childbirth and postnatal care) with a conservative estimate of 50% and a 95% confidence interval of 46%-54%.

Data Collection

The questionnaire included questions on women's sociodemographic characteristics; knowledge, attitudes and practices regarding COVID-19; and a module capturing women's use of maternal healthcare services. The questionnaire was tested and adapted by conducting a pilot study involving 89 households (not included in the analysis). The complete questionnaire in French and English can be found in

Supplementary Material 1; the questions used for this analysis are set in bold. The data was collected using KoboToolbox on tablets by 10 trained enumerators.

Definitions

Use of maternal healthcare services was examined along the continuum of maternal health care with different denominators for each section. Complete care was defined as all women with a livebirth receiving at least four ANC consultations, having a skilled birth attendant during childbirth and receiving at least one outpatient PNC consultation. Women were asked if they received care for each component of care along the continuum and if not, for the reason. Reasons for not receiving each care component were formulated as open-ended questions and allowed for the recoding of multiple responses, which were categorised by the enumerators under predetermined categories or noted in free-text format. While the WHO recommends 8 ANC contacts since 2016 [29], we decided to keep the previous recommendation of four ANC consultations[30] as a threshold for complete ANC, taking into consideration that the new model is not yet fully implemented in the DRC. WHO recommends PNC at day three, between day 7 and day 14 and at 6 weeks after giving birth[31]. In line with these recommendations, women who had a child younger than two weeks at the time of survey and stayed in a health facility more than three days after birth were excluded from the estimates of PNC. Women who reported they received PNC for themselves and their baby (regardless of the timing) were defined as “receiving PNC”.

Women were also asked how much they spent in total for care received during pregnancy (= all ANC consultations) and for care received during childbirth. Women could answer either in the local currency CF (Congolese Frank) or US dollars. If the amount was given in US dollars, the exchange rate of the first of May 2021 was used to calculate the amount in CF. Furthermore, women were asked about care elements received during ANC consultations: blood pressure measurement, taking a urine sample, drawing a blood sample, measuring weight and height.

Additional questions collected information about women’s sociodemographic characteristics, including age, marital status, education, and occupation. Questions regarding women’s attitudes towards mitigation measures during the COVID-19 pandemic and COVID-19 vaccination were open-ended. Responses were categorised by the enumerators under predetermined categories or written open-text format. Open-text answers were recoded by the data analyst (AG) as follows: if women answered that COVID-19 had “a huge impact on earning daily bread and/or education of the children”, the answer was coded as “huge impact on daily life”. If the answer did not indicate clearly a positive or negative attitude, the answer was recoded as “no opinion”. The four final response categories to this question (Attitude regarding COVID-19 measures taken by authorities - Table 1) were mutually exclusive. The same approach was used for handling the data from the question regarding women’s attitude toward COVID-19 vaccination. The following responses regarding women’s attitude towards the COVID-19 vaccine were coded as “dangerous/conspiracy ideas/ineffective”: the vaccines are dangerous, it’s only for business, it’s a way to kill the black people and Africans, it is way to control the world population, the virus does not exist, and similar responses. If women said they wanted to wait before getting vaccinated or had

doubts/concerns the answer was coded as “doubts/concerns”. If women did not express a clearly positive or negative attitude or the answer was not clear, the data was recoded as “no opinion”.

Analysis

The data were exported to SPSS, and checked for completeness, cleaned, coded and analysed. Descriptive statistics (percentages and their associated 95% confidence intervals, means and standard deviation) were used for to describe the characteristics of women included in the study.

We examined factors associated with the use of the full continuum of maternal healthcare by building a logistic regression model. The Akaike information criterion (AIC) was used for selecting the best fitted model[32]. Associated factors included women’s sociodemographic characteristics (mother’s age, newborn’s age, marital status, education level, occupation, ZS) and their attitudes to the COVID-19 restriction measures and vaccination. All categorical variables were recoded as dichotomous. Education was recoded into less than 4 years of secondary education versus four or more. Occupation was recoded into currently in employment or studying versus not. Marital status was recoded as currently married or cohabiting versus not. Attitudes regarding COVID-19 measures and vaccination were recoded into positive or not (including neutral). The age of the infant in days and age of the mother in years were added as continuous covariates. P-values of less than 0.05 were considered to have significant association between the outcome and the explanatory variables.

Missing data

Due to the automated skip-patterns and required answers in KoboToolbox, missing data was minimal for most variables with the exception of the question “how much did you pay for antenatal care (in total)?”, where 48 missing values were observed due to an initial incorrect skip pattern in the questionnaire. For descriptive analysis missing values are reported as such and in logistic regression analysis, pairwise deletion was applied, meaning that cases with missing values for any of the component variables of continuum of maternal care or independent variables in the model were excluded. This means that 28 out of 317 (8.83%) women with a livebirth were excluded from all analyses regarding completing the maternal health care continuum due to missing data regarding ANC, skilled birth attendance or PNC consultations for mother and baby.

Results

The study team selected 692 households for an interview; 602 household heads indicated there was at least one woman of reproductive age in the household who had been pregnant between March 2020 and May 2021, leading to a total of 623 women who had been pregnant during the study period and eligible for interview. Out of the 623 women, 12 were not available for an interview and 7 did not consent to participate; resulting in a final sample of 604 women from 599 different households (Fig. 1).

Sociodemographic characteristics and attitudes towards COVID-19 restriction measures and vaccination

Of the 604 women, 7.1% were illiterate, 18.4% followed primary education, 62.4% had at least one year of secondary education and 11.4% had higher education (Table 1). The mean age of respondents was 27 years (SD 8.3) and the majority of women (82.9%) were currently married or cohabiting. More than a quarter (26.2%) of women perceived the COVID-19 mitigation measures to be good or effective for increasing overall safety (Table 1). Most respondents found COVID-19 vaccination to be dangerous or ineffective, with many women believing that the virus does not exist or that vaccines aim to reduce population growth in Africa (Table 1).

Table 1

– Women's sociodemographic characteristics and attitudes towards COVID-19 restriction measures and vaccination

| Education | n | % |
|---------------------------------------|----------|----------|
| Illiterate | 43 | 7.1 |
| Primary education | 111 | 18.4 |
| Secondary education (1–3 years) | 165 | 27.3 |
| Secondary education (4 years or more) | 212 | 35.1 |
| Higher education | 69 | 11.4 |
| Others | 2 | 0.3 |
| No Answer | 2 | 0.3 |
| Occupation | | |
| Unemployed | 92 | 15.2 |
| Housewife | 320 | 53.0 |
| Sales | 78 | 12.9 |
| Agriculture | 7 | 1.2 |
| Public Sector | 2 | 0.3 |
| Private Sector | 7 | 1.2 |
| Entrepreneur | 77 | 12.7 |
| Student | 19 | 3.1 |
| No Answer | 2 | 0.3 |
| Marital status | | |
| Single | 89 | 14.7 |
| Married or cohabiting | 501 | 82.9 |
| Divorced | 7 | 1.2 |
| Widow | 7 | 1.2 |
| Age group (years) | | |
| < 16 | 2 | 0.3 |
| 16–24 | 252 | 41.7 |
| 25–34 | 277 | 45.9 |

| Education | n | % |
|--|----------------|----------|
| 35 and older | 73 | 12.1 |
| Mother's age at time of survey (mean ± SD) in years | 27 ± 8.3 | |
| Health zone | | |
| Kamalondo | 7 | 1.16 |
| Kampemba | 126 | 20.8 |
| Katuba | 35 | 5.8 |
| Kenya | 57 | 9.4 |
| Kisanga | 78 | 12.9 |
| Lubumbashi | 53 | 8.8 |
| Mumbun | 65 | 10.7 |
| Rwashia | 109 | 18.0 |
| Tshamilemba | 45 | 7.5 |
| Vangu | 29 | 4.8 |
| Attitude regarding COVID-19 measures taken by authorities | | |
| Good for reduction of virus circulation/Decreasing Insecurity | 158 | 26.2 |
| Ineffective for reduction of virus circulation/increasing insecurity | 259 | 42.9 |
| Huge impact on daily life | 71 | 11.8 |
| No opinion (neutral) | 116 | 19.2 |
| Attitude regarding COVID-19 vaccination | | |
| Good initiative | 117 | 19.4 |
| Doubts/Concerns | 7 | 1.2 |
| Dangerous/Conspiracy ideas/No need | 471 | 78.0 |
| No opinion (neutral) | 9 | 1.5 |

Maternal healthcare utilisation, content and cost

Of the 604 women, the most recent pregnancy outcome included 28 who had an abortion/miscarriage, 10 had a stillbirth, 317 had a live birth (309 had a singleton and four sets of twins), and 249 were still pregnant at the time of the interview (Fig. 1).

Antenatal Care

Only women who already had given birth at the time of survey (n = 327, including livebirth or stillbirth) were included in further analysis on continuum of maternal healthcare utilization. Ten percent (n = 32) of the 327 women did not use ANC and the major reason for not attending ANC among the 21 women who provided reasons was lack of financial means (Fig. 2). Of those who used ANC (n = 295), the number of consultations ranged from one to 10 with an average of four; 35.6% (n = 105) of women reported fewer than four ANC consultations, 61.4% (n = 181) had four or more, and 3.1% (n = 9) could not remember. Only 3.1% (n = 10) reported receiving eight or more ANC consultations. Around one third of women (34.2%; n = 101) had their first ANC consultation in the first trimester of pregnancy and 90.5% (n = 166) before the third trimester. One percent (n = 3) of women could not remember the timing of the first ANC consultation.

Women who received ANC were asked which components of care were performed during at least once during pregnancy. 98% (n = 289) reported that their blood pressure was measured, 97% (286) reported that a urine sample was taken, 96% (n = 282) said their blood was drawn, 98% (n = 289) were weighed and 79% (n = 234) had their height measured. Of the 295 women who used ANC, 247 women responded to the question on out-of-pocket expenditures for the service. The mean payment for all ANC received during pregnancy was 16,873 CF (8.40 USD) and ranged from zero to 640,320 CF (= 320 USD).

Childbirth Care

Of the 327 women who had given birth, 313 (= 95.7%) reported giving birth in a health facility. Of the 14 women who gave birth outside a facility, five delivered at home without a health professional, three at home with a health professional, four on the way to the health facility, one in the forest, and one in a pharmacy. The reasons why these women did not deliver in a health facility were lack of money (n = 4), fast childbirth (n = 2), fear of being vaccinated against COVID-19 against their will (n = 2), fear of experiencing more pain (n = 1), and distance (n = 1). Four women did not give a reason.

Women who gave birth in a health facility paid between 0 and 700,350 CF (0-350USD) for the care; mean of 39,305 CDF (= 19.5 USD) (SD 36,631). All 313 health facility deliveries were attended by a health professional. One third (33%; n = 104) of health facility births were assisted by a medical doctor, mostly together with a nurse or midwife. Women stayed on average 3.5 days (SD 3.9) in the health facility after delivery, ranging from 1 hour to 8 weeks.

Postnatal Care

Of the 327 women who gave birth, twelve had a baby younger than two weeks and left the hospital after day three, and ten had missing data on PNC; they were excluded from the analysis of PNC. Among the 305 women who were asked about PNC: 66 (22%) women did not receive any PNC, 9 (3%) received care

for themselves but not for the baby, 49 (16%) reported care only for the baby, 169 (55%) received care for both the baby and themselves, and 3 (1%) women were examined by a health professional at home. Six women (2%) said they did seek PNC because the baby died during or shortly after childbirth and three women (1%) could not remember the PNC.

Among women with a baby younger than six weeks ($n = 56$), 8 women (14.2%) went to PNC with their child, 40 women (71.4%) said that the child only needed to go at 6 weeks and 8 other women (14.2%) did not go for other reasons (Fig. 3). Among women with a baby older than six weeks ($n = 240$), 89.6% ($n = 215$) women went to PNC with their child, while 10.4% ($n = 25$) did not go for other reasons (Fig. 3).

Continuum of maternal care

We examined the percentage of women who reported receiving all three services (ANC, skilled birth attendant during childbirth and PNC for both mother and baby) along the maternal continuum of care, in a subset of women with a live birth and non-missing data about maternal healthcare utilisation ($n = 289$). While 91.3% of women ($n = 264$) attended ANC, only 58.1% ($n = 168$) of women attended at least 4 ANC consultations. 57.4% ($n = 166$) of women attended four or more ANC consultations and had a skilled birth attendant during childbirth. Next, 46.4% ($n = 134$) of women attended four or more ANC consultations, had a skilled birth attendant during childbirth and attended at least one PNC for mother or baby. Finally, 36.0% (104 of 289) of women completed all three services along the care continuum during the COVID-19 pandemic, including PNC for mother and baby (Fig. 4).

Determinants of completing the maternal continuum of care

Table 2

Descriptive statistics, bivariate and multivariable analyses of completing the continuum of maternal healthcare services (n = 289)

| | Using all services along the continuum | Bivariate analysis | | | Multivariable analysis | | |
|---|--|--------------------|-------------|--------|------------------------|-------------|---------|
| | | % (n) | Odds Ratio | 95% CI | p-value | Odds Ratio | 95% CI |
| Age of woman (in years) | - | 0.988 | 0.948–1.031 | 0.582 | 0.998 | 0.958–1.049 | 0.934 |
| Age of baby (in days) | - | 1.001 | 0.998–1.003 | 0.690 | 0.999 | 0.998–1.003 | 0.666 |
| Maternal education | | | | | | | |
| Low | 24.6% (28) | REF | | | REF | | |
| High | 43.4 (76) | 2.358 | 1.413–4.013 | 0.001 | 2.62 | 1.500–4.690 | < 0.001 |
| Attitude toward COVID-19 vaccination | | | | | | | |
| Negative/Neutral | 33.5% (78) | REF | | | REF | | |
| Positive | 46.4% (28) | 1.722 | 0.950–3.113 | 0.072 | 1.94 | 1.029–3.672 | 0.040 |
| Marital status | | | | | | | |
| Married/Cohabiting | 38.0% (97) | REF | | | REF | | |
| Single/Widowed/Divorced | 20.6% (7) | 0.422 | 0.164–0.957 | 0.052 | 0.463 | 0.175–1.086 | 0.093 |
| Occupation | | | | | | | |
| Currently Unemployed/Housewife | 37.8% (74) | REF | | | REF | | |
| Working /studying | 32.3% (30) | 0.785 | 0.462–1.316 | 0.362 | 1.05 | 0.584–1.873 | 0.876 |
| Attitude toward COVID-19 measures | | | | | | | |
| Negative/Neutral | 36.2% (76) | REF | | | REF | | |
| Positive | 35.4% (28) | 0.968 | 0.559–1.653 | 0.906 | 0.91 | 0.501–1.593 | 0.739 |

Bivariate analyses were conducted to assess associations between the different independent variables and the outcome variable (completing care along the continuum) together with descriptive analysis (Table 2). Afterwards a binomial logistic regression model was performed to test the association between all these factors (women's age, newborn's age, education level, occupation, place of living, attitude toward COVID-19 measures, attitude toward the COVID-19 vaccine) and women's use of all services along the continuum of maternal healthcare during the COVID-19 pandemic (Table 2). Place of living was deleted from the model during model selection based on the AIC values. Our model showed that women with higher levels of education had 2.6 times higher adjusted odds of completing the continuum of maternal healthcare services compared to those with low education. The odds of completing the continuum among women with a positive attitude toward the COVID-19 vaccination were 1.9 times higher than those of women with a neutral or negative attitude. Age of the baby, age of the woman, maternal occupation, marital status, and attitude regarding COVID-19 measures were not significantly associated with the outcome.

Discussion

This study is one of the first reporting on maternal healthcare utilization during the COVID-19 pandemic in Lubumbashi, DRC. Triangulating with other sources of estimates, we did not observe signals of a large decline in maternal health care utilization or disruption in provision of services compared to before COVID-19[33, 34]. These findings echo the results of Hategeka et al, who did not find a significant decline in maternal health care utilisation using facility-level data in DRC [17]. Although we observed some COVID-19 related reasons for non-utilisation among women in our study (such as unstable services and fear to be vaccinated against COVID-19), the most important reason for non-utilisation along the continuum was lack of financial access. This is in line with the research of Musau et al (2021), showing that 14% of women did not have enough money to pay for care at the moment of childbirth, often resulting in detention in the facility [35].

A recent report from UNICEF showed that mitigation measures against the spread of COVID-19 had a disproportionate impact on the socio-economic stability of women and girls in the DRC and exacerbate existing inequalities[36]. Globally, there is evidence that the COVID-19 pandemic has increased inequalities and overall affected women more severely [7, 37]. As shown in our study and in line with previous research, maternal healthcare services are expensive in DRC and are almost completely out-of-pocket [38–40]. Considering this high cost, the COVID-19 pandemic will indirectly affect women's ability to pay for services, increasing the likelihood of underutilisation of services and poor maternal and newborn health outcomes. While many of the broader indirect financial and health consequences of the COVID-19 pandemic on women are subtle and difficult to measure, emerging evidence shows that these are clearly affecting the most vulnerable groups and will have a long-term impact[41–43]. More investments in a social security and subsidized maternal care in DRC are highly needed to improve universal health coverage and avoid further deepening of pre-existing socio-economic inequalities[34, 36].

Relying on the reports of women, our study also showed some weakness along the continuum of maternal health when it comes to quality of care and adherence to international recommendations. Most women sought antenatal care but very few (3%) reported receiving care according to the new WHO recommendation of eight contacts [29]. This suggests that the international recommendation might be too ambitious and not contextualized to fit low-resource settings with scarce resources allocated to the health system. On a positive note, most women reported that essential care components (such as blood pressure screening) were performed at least once during their ANC. While skilled birth attendance was high in our sample, PNC check at day 7, day 14 and at 6 weeks seem to have low coverage in Lubumbashi, DRC. Furthermore, results showed that most women (71%) tended to wait until six weeks for their first PNC consultation for the baby. Overall, PNC seemed to be the weak spot along the continuum with late initiation and low utilisation among women in our study, which is in line with evidence from the national estimates on PNC coverage in the DRC [49], as is also the case in other low- and middle- income countries[45, 46].

Our study showed that women with higher levels of education were more likely to complete the continuum of care. These findings seem to confirm the importance of education and socio-economic status in maternal healthcare utilisation in SSA, and potentially on health outcomes as described by previous research in the region[47–49]. Importantly, our study also showed that a negative attitude toward COVID-19 vaccination was negatively associated with the complete use of maternal health services along the continuum of care. In parallel, this vaccination hesitancy towards the COVID-19 vaccine was mentioned several times as reason for non-utilisation of maternal healthcare services (for both institutional childbirth and PNC) by women in our study. Overall, most women seem to have a negative attitude towards the vaccine with a high proportion of women believing in different conspiracy theories. This is in line with a recent five-country study, showing that six out of 10 citizens in Benin, Liberia, Niger, Senegal and Togo were hesitant to get vaccinated[50]. This vaccine scepticism should be further examined as a barrier to (maternal) healthcare use by mixed method approaches and longitudinal data as perceptions might evolve over time[50]. Also in light of a national COVID-19 vaccination roll-out in DRC in the future, vaccine hesitancy should be examined more in depth. Overall better health education and promotion seem to be essential for improving uptake of essential health services and mitigating the direct and indirect effects of the COVID-19 pandemic in Lubumbashi, DRC.

Strengths And Limitations

This study is one of the first household surveys being conducted in DRC during the COVID-19 pandemic. Strengths of the study include the high participation rate among women and relatively low levels of missingness in the variables. The limited recall period (one year) for women to report on their healthcare utilisation can also be considered as a strength. A limitation is that we might have missed women that were not mentioned by the household as eligible for the interview. Furthermore, we did not include women not living in households in this study, such as women presently in the hospital or at shelter homes. In addition, women currently working or studying might be underrepresented as the data-collection took

place during the day on weekdays. Lastly, we did not stratify our analysis according to mode of childbirth, explaining the high range in amount of payment for childbirth care.

Conclusion

This study shows that the COVID-19 pandemic in Lubumbashi did not contribute to large-scale interruptions in care provision as service unavailability was never reported by our respondents. Rather, the pandemic affected maternal healthcare seeking behaviours through community perceptions towards the mitigation measures, fear of COVID-19 itself, and even more critically, COVID-19 vaccination hesitancy. Our study highlights that factors that prevented women from seeking care along the continuum were grounded in structural determinants of health and included education level, poverty and unaffordability of care services. By disproportionately affecting women and vulnerable populations, the COVID-19 pandemic could be exacerbating pre-existing financial barriers to maternal healthcare utilization. Investments in subsidised maternal healthcare in DRC, and advocacy against vaccine hesitancy are highly needed to improve universal health coverage, and avoid further deepening of pre-existing socio-economic inequalities.

List Of Abbreviations

| | |
|--------------|---|
| WHO | World Health Organization |
| LMIC | Low- and middle-income countries |
| SSA | Sub Saharan Africa |
| ANC | Antenatal Care |
| PNC | Postnatal Care |
| DRC | Democratic Republic of Congo |
| HGR | Hospital General de Reference |
| FOSA | Formations Sanitaires |
| CS | Centre de Santé |
| MoPHP | Ministry of Public Health, Hygiene and Prevention |
| BCZS | Bureau Central des Zones de Santé |
| ZS | Zone de Santé |
| AIC | Akaike Information Criterium |

Declarations

Funding

This study was funded by the Belgian Directorate-General for Development Cooperation and Humanitarian Aid (DGD) through the CREDO Plus project (grant number FA4 2017-2021 DGD-ITM 901004/480). The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. LB is funded in part by the Research Foundation – Flanders (Fonds Wetenschappelijk Onderzoek) as part of her Senior Postdoctoral Fellowship (award number 1234820N).

Availability of data and material

The dataset of the current study is available from the corresponding author upon reasonable request.

Authors' contributions

LB, AN and MK conceptualised the study and obtained funding. LB and AN constructed the data collection instrument, AS programmed the digital data collection tool and GK supervised data collection. AG, GK and AS analysed the data. AG wrote the original draft of the manuscript. All authors contributed to the development of the manuscript, and read and approved the final version.

Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

This study received ethical approval from the Institutional Review Board at the Institute of Tropical Medicine in Belgium (1474/21) and from the Université de Lubumbashi Comité d'Ethique Médicale (UNILU/CEM/044/2021). All methods were performed in accordance with the relevant guidelines and regulations. All participants gave their consent by signing the informed consent form.

Acknowledgements

We would like to thank all women who took time to respond to this survey during the challenging times of the COVID-19 pandemic. We thank all enumerators, study collaborators, translators and colleagues who contributed to the study and provided suggestions on the questionnaire.

Consent for publication

Not applicable

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Figures

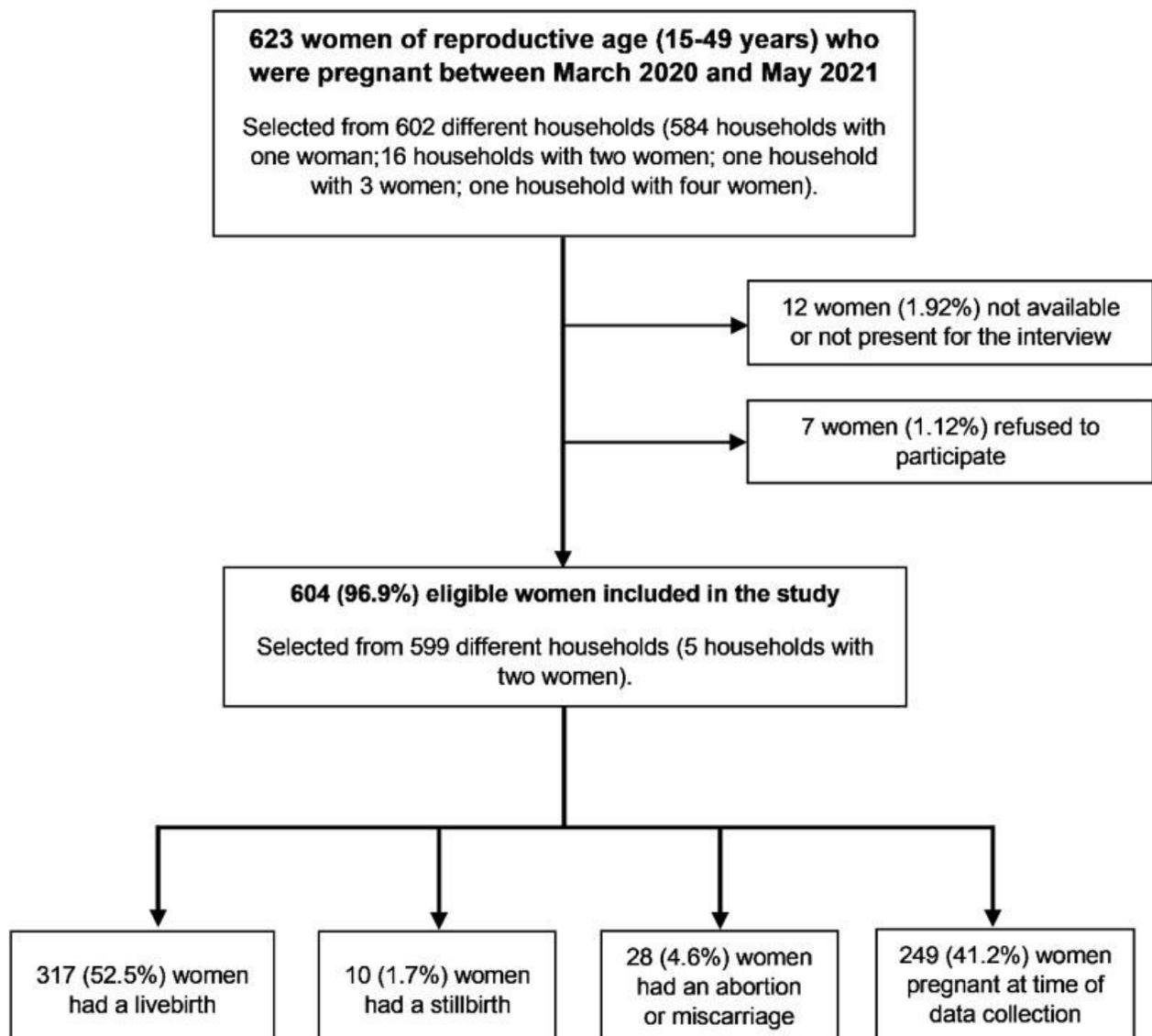


Figure 1

Flowchart of the study sample of women

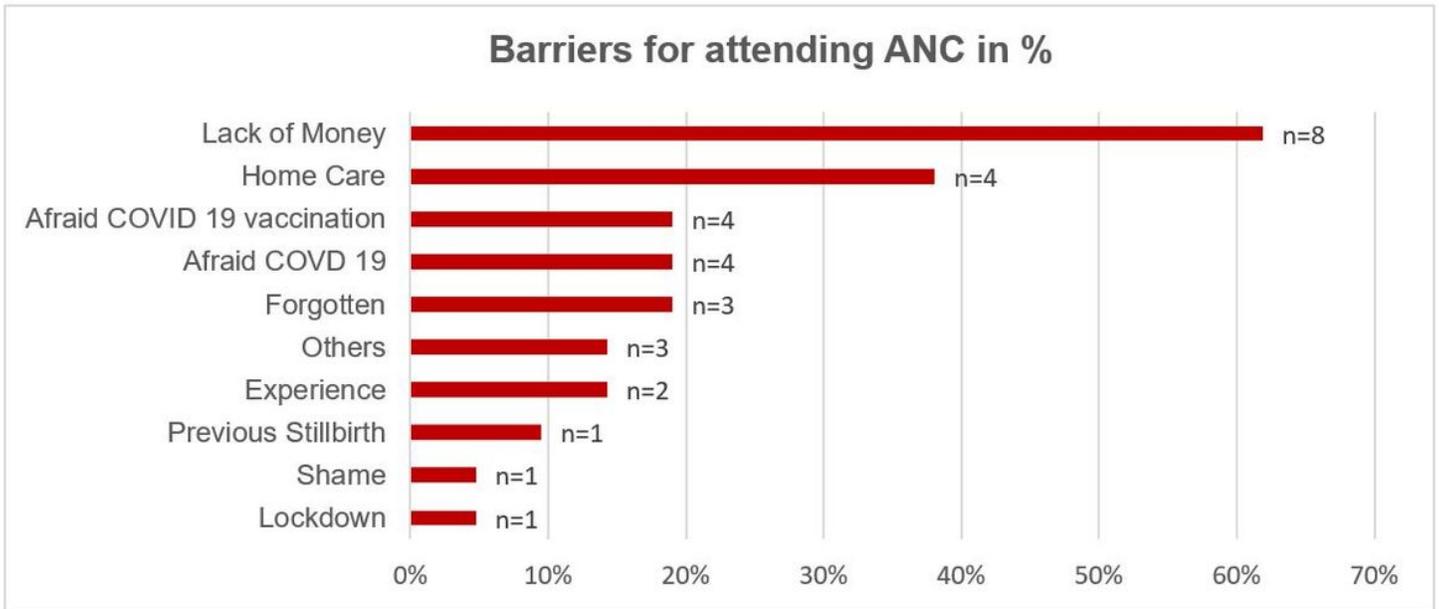


Figure 2

Reasons for not attending ANC among women who gave birth during the COVID-19 pandemic (n=21), multiple responses were allowed.

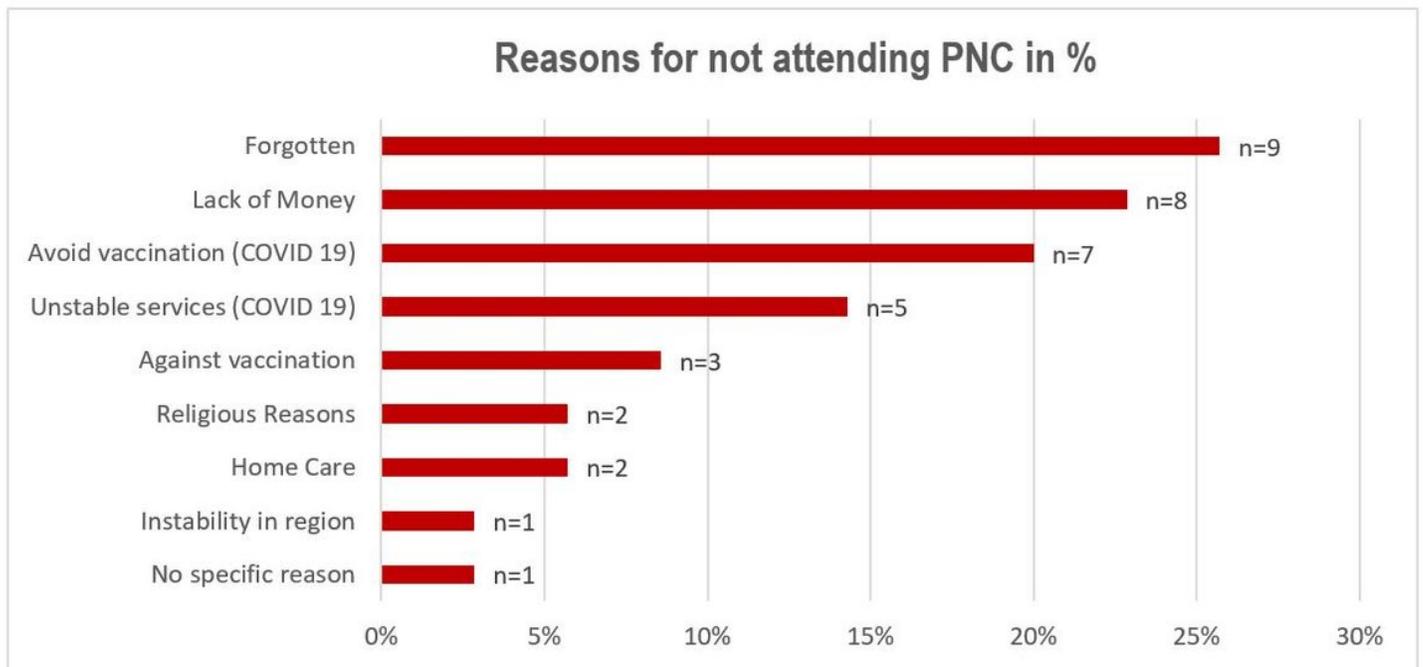


Figure 3

Reasons for not attending a PNC consultations at 6 weeks after birth during the COVID-19 pandemic (n=33), multiple responses were allowed.

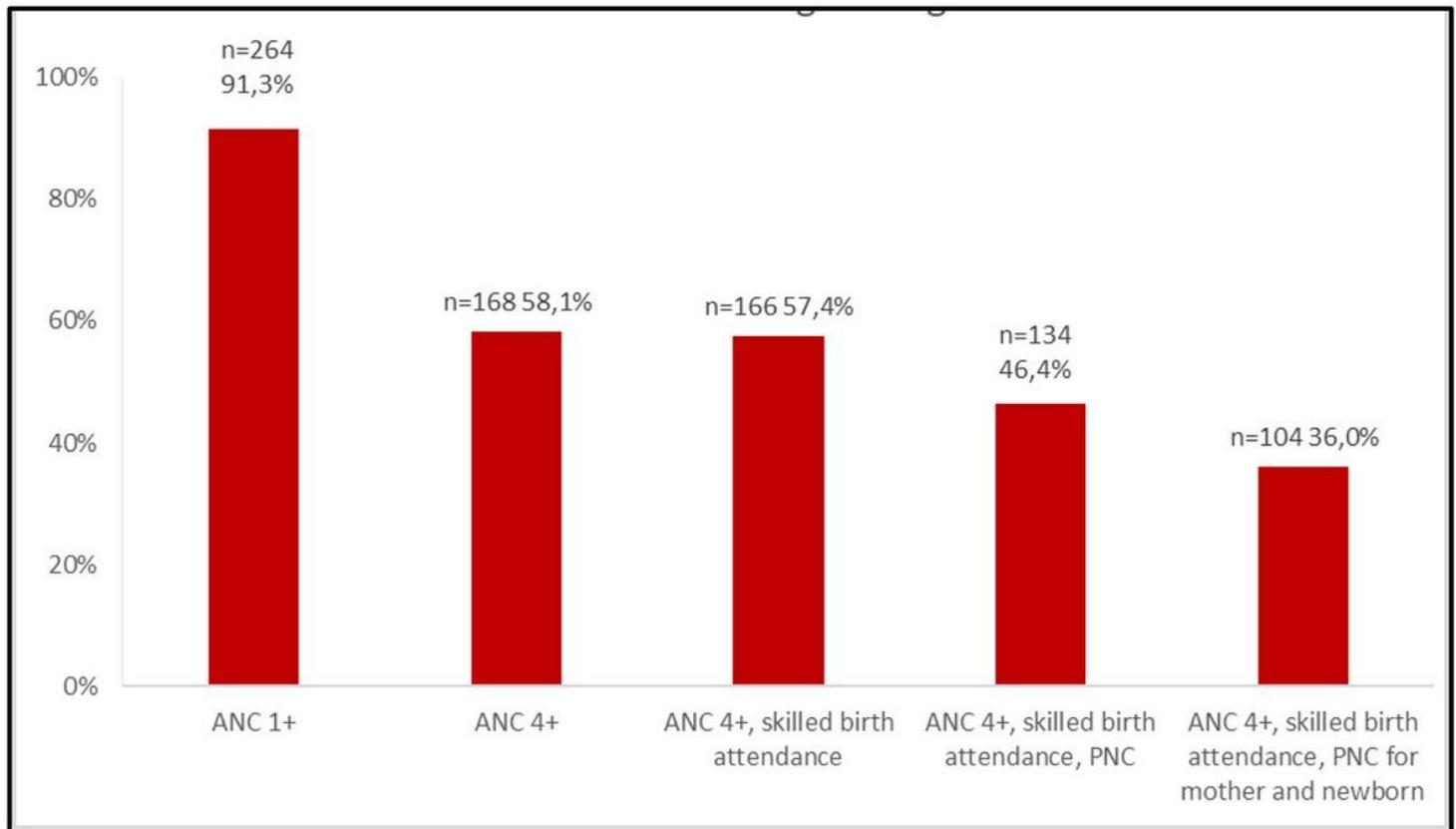


Figure 4

Percentage of women using the different services along the continuum (ANC, ANC 4+ consultations, skilled attendance at birth, PNC), n=289.

Supplementary Files

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