




BMJ Open 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

Anna Galle ¹, Gladys Kavira,² Aline Semaan ³, Françoise Malonga Kaj,² Lenka Benova ³, Abel Ntambue²

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For numbered affiliations see end of article.

Correspondence to

Dr Anna Galle;
anna.galle@ugent.be

ABSTRACT

Objectives 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 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 (DRC).

Design This is a cross-sectional study using data collected on a survey of 599 households in Lubumbashi, DRC, using stratified random sampling.

Participants We included 604 women (15–49 years) who were pregnant between March 2020 and May 2021.

Outcome measures 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 One-third (36%) of women who gave birth during the COVID-19 pandemic completed the continuum of maternal healthcare. Factors significantly associated with completing the continuum included higher education (aOR=2.6; p<0.001) and positive attitude towards the COVID-19 vaccination (aOR=1.9; p=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. Addressing the high cost of maternal healthcare and vaccine hesitancy appear essential to improve access to maternal healthcare.

BACKGROUND

Maternal health refers to 'women's health during pregnancy, childbirth and the

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This household study used a large stratified sample during the COVID-19 pandemic, including women from all health zones in Lubumbashi, Democratic Republic of the Congo.
- ⇒ The limited recall period (1 year) for women to report on their healthcare utilisation can also be considered as a strength.
- ⇒ There might be a selection bias because only women living in households, at home during the day, could participate in the study.
- ⇒ Findings of this study should be interpreted within the temporal context of the COVID-19 pandemic and attitudes and practices will most likely evolve over time.

postnatal period (until 6 weeks after childbirth)', according to the 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. Important progress in reducing maternal mortality was made in the last two decades, but still around 295 000 women have died during and following pregnancy and childbirth in 2017. Up to 99% of maternal deaths occur in low-income 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 strategy for improving the health of mothers and newborns.³ The continuum of care in maternal health is defined as '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 healthcare such as sociodemographic 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 1126 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 (eg, 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 utilisation 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 The study shows rates of facility-based childbirth and visits for PNC were not substantially affected, while ANC visits declined with 45%.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 In conclusion, limited reports suggest provision of maternal healthcare mostly continued during COVID-19, but the contextual and individual factors affecting decisions about the actual 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

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 2807 inhabitants per km².²¹ In urban areas, such as Lubumbashi, the health system is characterised by an increasing number of health facilities in the poorly regulated private sector country.^{24,25} 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.²⁶

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.²⁷ 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.²⁷ The maternal mortality ratio is high and estimated at 473/100 000 live births.²⁸ Due to ongoing conflicts, maternal healthcare coverage is unstable and deteriorating in several regions, hampering overall progress in maternal health outcomes in the country.^{24,25}

The first case of COVID-19 in the DRC was identified on the 10 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 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 had notified 4555 cases of COVID-19 of which 109 died (2.39%).²⁹

Design

This study used data collected in a cross-sectional 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 (including women with a miscarriage, abortion, stillbirth, live birth or pregnant at the time of data collection) 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 strategy

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. The sampling strategy was a stratified two-stage sample, with probability of being selected proportional to population size of pregnant women per health zone (detailed sample calculations in online supplemental table 1). The first stage of selection was the health zone, including all zones in Lubumbashi. There are 10 health zones in Lubumbashi, with a total population of just under 3 million people.³⁰ We determined the number of women needing to be included with probability proportional to size of each health zone.

The second stage was the random sample of households within each health zone. To identify households, the investigators subdivided the teams in three groups, which were each assigned one area within the health zone (central zone, middle zone, peripheral zone). For selecting households in the streets, the surveyors estimated the number of households and divided this number by 10 (maximum number of households to be collected on this street). The choice of houses was made by zigzagging across the street, allowing them to obtain an equivalent number on each side of the street, with a maximum of 10% of the estimated households living in that street.

Sample size

Sample size calculation was done based on our main objective of measuring utilisation of maternal healthcare services in Lubumbashi, DRC. A minimum sample size of 600 women that had been pregnant during COVID-19 was needed for measuring uptake of maternal healthcare services with a conservative estimate of 50% (for example for uptake of 4 ANC visits), a 95% CI, a 4% margin of error, with a population size of 74 980.

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 can be found in online supplemental file 1; the questions used for this analysis are highlighted in blue. 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 healthcare with different denominators for each section. Complete care was defined as all women with a live birth 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 eight ANC contacts since 2016,³¹ we decided to keep the previous recommendation of four ANC consultations 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.³² Women who reported they received an outpatient PNC consultation for themselves and their baby (regardless of the timing) were defined as 'receiving PNC'. Women who had a child younger than 2 weeks at the time of the survey were excluded from the estimates of outpatient PNC and the continuum of care analysis, because they might not yet have been able to present themselves at an outpatient PNC consultation.

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 (online supplemental file 1). 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) were mutually exclusive. The same approach was used for handling the data from the question regarding women's attitude towards 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 is only for business, it is 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 were recoded as 'no opinion'.

Analysis

The data were exported to SPSS version 28, and checked for completeness, cleaned, coded and analysed. Descriptive statistics (percentages and their associated 95% CIs, means and SD) 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. Predictors were selected based on previous studies examining factors associated with completing the maternal healthcare continuum.^{33–35} The Akaike information criterion (AIC) was used for selecting the best fitted model.³⁶ Associated factors included women's sociodemographic characteristics (mother's age, newborn's age, marital status, education level, occupation, health zone, number of childbirths) 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 vs 4 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 a significant association between the outcome and the explanatory variables.

Missing data

Due to the automated skip-patterns and required answers in KoboToolbox, missing data were 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 live birth were excluded from all analyses regarding completing the maternal healthcare continuum due to missing data regarding ANC, skilled birth attendance or PNC consultations for mother and baby.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research. The authors intend to disseminate this research to the public through social media, press releases, and media departments and websites of authors' institutions.

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 (flow chart in online supplemental figure 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 1 year of secondary education and 11.4% had higher education (table 1). The average age of respondents was 27 years (SD 8.3) and the majority of women (82.9%) were currently married or cohabiting. Average number of childbirths per woman was 1.5 (SD 1.6), ranging from 0 to 11. The average age at the first childbirth was 20 years (SD 3.6), ranging from 13 to 35.

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).

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 4 sets of twins) and 249 were still pregnant at the time of the interview.

Antenatal care

Only women who already had given birth at the time of survey (n=327, including live birth or stillbirth) were

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
35 and older	73	12.1
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

Continued

Table 1 Continued

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

included in further analysis on continuum of maternal healthcare utilisation. Ten per cent (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 (figure 1). Of those who used ANC (n=295), the number of consultations ranged from 1 to 10 with an average of 4; 35.6% (n=105) of women reported fewer than 4 ANC consultations, 61.4% (n=181) had 4 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 per cent (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. Overall, 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 CF16 873 (US\$8.40) and ranged from CF0 to CF640 320 (=US\$320).

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, 5 delivered at home without a health professional, 3 at home with a health professional, 4r on the way to the health facility, 1 in the forest and 1 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 CF0 and CF700 350 CF (US\$0–US\$350) for the care; mean of CF39 305 (=US\$19.5) (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

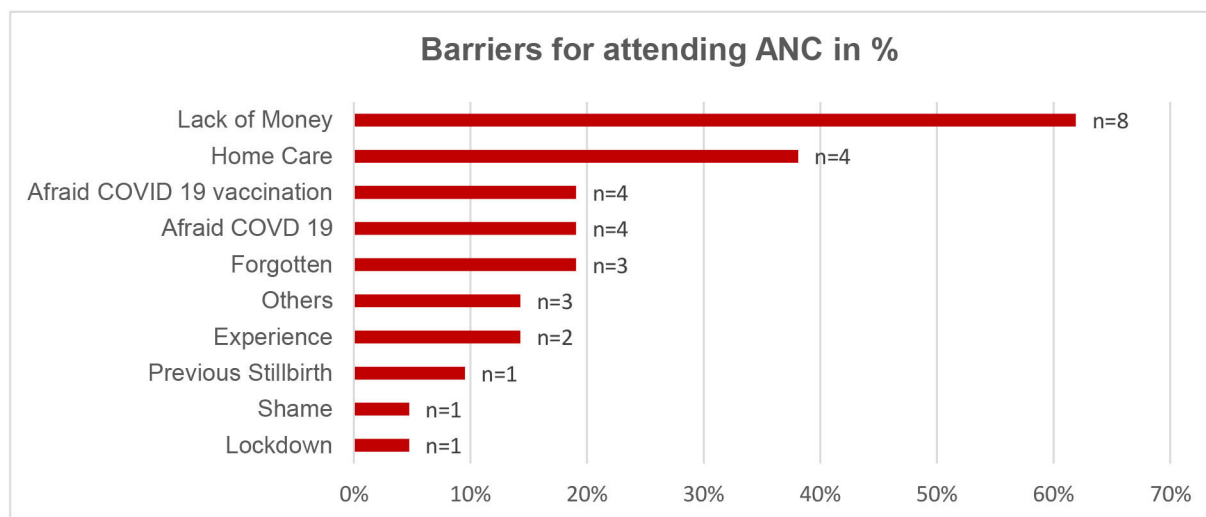


Figure 1 Reasons for not attending ANC among women who gave birth during the COVID-19 pandemic (n=21), multiple responses were allowed. ANC, antenatal care.

3.9) in the health facility after delivery, ranging from 1 hour to 8 weeks.

Postnatal care

Of the 327 women who gave birth, 12 had a baby younger than 2 weeks and 10 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 not seek PNC because the baby died during or shortly after childbirth and three women (1%) could not remember if they received PNC.

Among women with a baby younger than 6 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 (figure 2). Among women with a baby older than 6 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 (figure 2).

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 baby of at least 2 weeks old and non-missing data about maternal healthcare utilisation

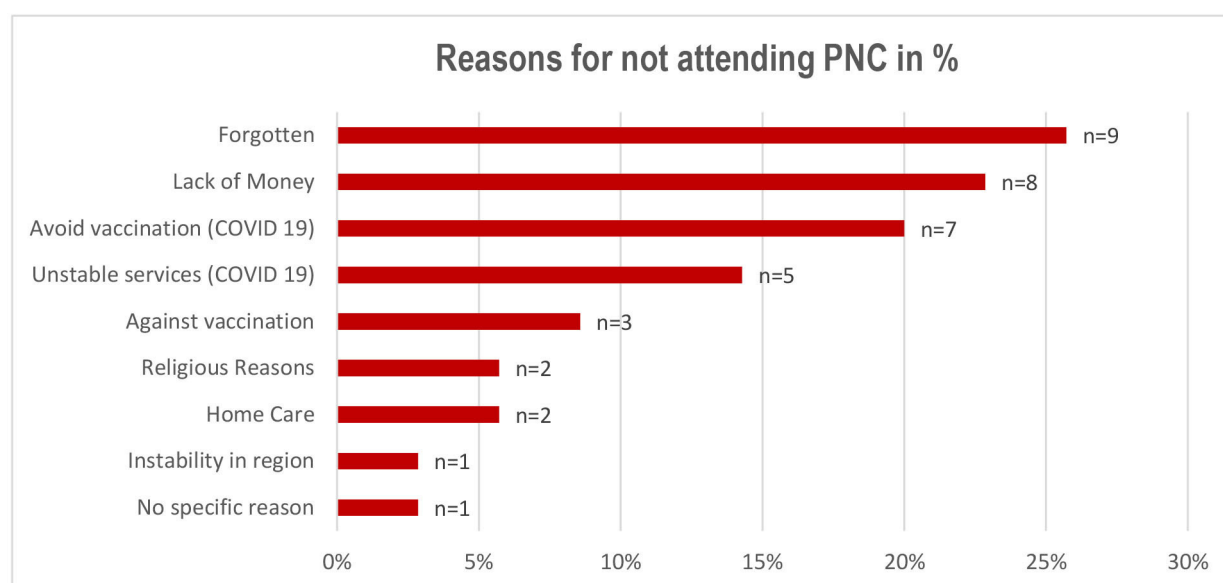


Figure 2 Reasons for not attending a PNC consultations at 6 weeks after birth during the COVID-19 pandemic (n=33), multiple responses were allowed. PNC, postnatal care.

(n=289). This subset (n=289) was used for each analysis of the maternal continuum of care. 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 (figure 3).

Determinants of completing the maternal continuum of care

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. 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, number of childbirths, attitude towards COVID-19 measures, attitude towards 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 2.65 times higher adjusted odds of completing the continuum of maternal healthcare services compared with those with low education. The odds of completing the continuum among women with a positive attitude towards the COVID-19 vaccination were 1.97 times higher than those of women with a neutral or negative attitude. Age of the baby, age of the woman, number of childbirths, 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 utilisation 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 healthcare utilisation or disruption in provision of services compared with before COVID-19.³⁷ These findings echo the results of Hategeka *et al*, who did not find a significant decline in maternal healthcare 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 means. This is line with the research of Angèle *et al*, 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.³⁸

A recent report from UNICEF showed that mitigation measures against the spread of COVID-19 had a disproportionate impact on the socioeconomic stability of women and girls in the DRC and exacerbate existing inequalities.³⁹ Globally, there is evidence that the COVID-19 pandemic has increased inequalities and overall affected women more severely.^{40 41} 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 42} 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.⁴³ More investments in a social security and subsidised maternal care in DRC are highly needed to improve universal health coverage and avoid further deepening of pre-existing socioeconomic inequalities.^{38 42}

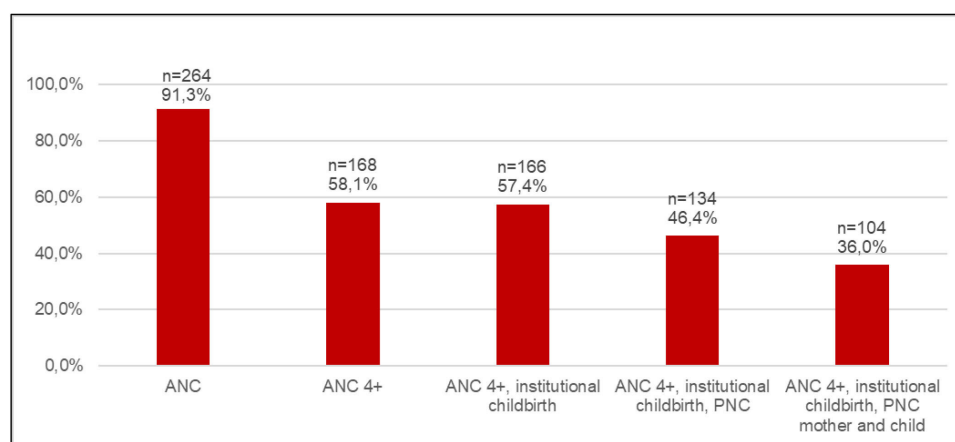


Figure 3 Utilisation of the different services along the continuum of care among women with a baby >2 weeks of age (ANC, ANC 4+ consultations, skilled attendance at birth, PNC), n=289. ANC, antenatal care; PNC, postnatal care.

Table 2 Descriptive statistics, bivariate and multivariable analyses of completing the continuum of maternal healthcare services among women with a baby >2 weeks of age (n=289)

	Using not all services along the continuum	Using all services along the continuum	Bivariate analysis			Multivariable analysis		
	% (n)	% (n)	OR	95% CI	P value	OR	95% CI	P value
Maternal education								
Low	74.4 (86)	24.6 (28)	REF			REF		
High	56.6 (99)	43.4 (76)	2.358	1.413 to 4.013	0.001	2.65	1.498 to 4.685	<0.001
Attitude towards COVID-19 vaccination								
Negative/neutral	66.5 (155)	33.5 (78)	REF			REF		
Positive	53.6 (30)	46.4 (26)	1.722	0.950 to 3.113	0.072	1.974	1.045 to 3.729	0.036
Marital status								
Married/cohabiting	62.0 (158)	38.0 (97)	REF			REF		
Single/widowed/divorced	79.4 (27)	20.6 (7)	0.422	0.164 to 0.957	0.052	0.491	0.198 to 1.216	0.124
Occupation								
Currently unemployed/housewife	62.2 (122)	37.8 (74)	REF			REF		
Working/studying	67.7 (63)	32.3 (30)	0.785	0.462 to 1.316	0.362	1.06	0.593 to 1.902	0.839
Attitude towards COVID-19 measures								
Negative/neutral	63.8 (134)	36.2 (76)	REF			REF		
Positive	64.4 (51)	35.4 (28)	0.968	0.559 to 1.653	0.906	0.92	0.519 to 1.631	0.775
Age of woman (in years)	–	–	0.988	0.948 to 1.031	0.582	0.997	0.953 to 1.045	0.915
Age of baby (in days)	–	–	1.001	0.998 to 1.003	0.690	0.999	0.996 to 1.002	0.546
Parity (no of childbirths)	–	–	1.022	0.973 to 1.073	0.389	1.016	0.969 to 1.065	0.523

Based 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 ANC but very few (3%) reported receiving care according to the new WHO recommendation of eight contacts.³¹ This suggests that the international recommendation might be too ambitious and not contextualised 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 checks at day 7, day 14 and at 6 weeks had low coverage in our study. Furthermore, results showed that most women (71%) tended to wait until 6 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,⁴⁴ as is also the case in other LMICs.⁴⁵

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 socioeconomic status in maternal health-care utilisation in SSA, and potentially on health outcomes as described by previous research in the region.^{46–48} Importantly, our study also showed that a negative attitude towards 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 5-country study, showing that 6 out of 10 citizens in Benin, Liberia, Niger, Senegal and Togo were hesitant to get vaccinated. 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.⁴⁹ 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 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 (1 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, women not living in households, such as women presently in the hospital or at shelter homes. In addition, women currently working or studying might be under-represented as the data collection took place during the day on weekdays. We also relied on women's reports only, which might not fully capture supply side factors (eg, overworked staff or closed health facilities) hindering access to high quality care. Lastly, findings of this cross-sectional study should be interpreted within the temporal context of the COVID-19 pandemic and attitudes and practices will most likely evolve over time.

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 utilisation. 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 socioeconomic inequalities.

Author affiliations

¹Public Health and Primary Care, Ghent University, Gent, Belgium

²Department of Epidemiology and Maternal and Child Health, Université de Lubumbashi, École de Santé Publique, Unité d'Epidémiologie et de Santé de la Mère, du Nouveau-né et de l'enfant, Lubumbashi, Congo (the Democratic Republic of the)

³Department of Public Health, Institute of Tropical Medicine, Antwerpen, Belgium

Twitter Anna Galle @AnnaGalle6 and Lenka Benova @lenkabenova

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Author note LB and AN are joint last authors.

ORCID iDs

Anna Galle <http://orcid.org/0000-0003-1427-5067>

Aline Semaan <http://orcid.org/0000-0001-8348-1206>

Lenka Benova <http://orcid.org/0000-0001-8595-365X>

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