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
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Trust, Care Avoidance, and Care Experiences among Kenyan Women Who Delivered during the COVID-19 Pandemic

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ABSTRACT

We explore how the COVID-19 pandemic was associated with avoidance of, and challenges with, antenatal, childbirth and postpartum care among women in Kiambu and Nairobi counties, Kenya; and whether this was associated with a report of declined trust in the health system due to the pandemic. Women who delivered between March and November 2020 were invited to participate in a phone survey about their care experiences (n = 1122 respondents). We explored associations between reduced trust and care avoidance, delays and challenges with healthcare seeking, using logistic regression models adjusted for women's characteristics. Approximately half of respondents said their trust in the health care system had declined due to COVID-19 (52.7%, n = 591). Declined trust was associated with higher likelihood of reporting barriers accessing antenatal care (aOR 1.59 [95% CI 1.24, 2.05]), avoiding care for oneself (aOR 2.26 [95% CI 1.59, 3.22]) and for one's infant (aOR 1.77 [95% CI 1.11, 2.83]), and of feeling unsafe accessing care (aOR 1.52 [95% CI 1.19, 1.93]). Since March 2020, emergency services, routine care and immunizations were avoided most often. Primary reported reasons for avoiding care and challenges accessing care were financial barriers and problems accessing the facility. Declined trust in the health care system due to COVID-19 may have affected health care-seeking for women and their children in Kenya, which could have important implications for their health and well-being. Programs and policies should consider targeted special "catch-up" strategies that include trust-building messages and actions for women who deliver during emergencies like the COVID-19 pandemic.

Introduction

Use of health services has declined worldwide during the COVID-19 pandemic.[1–8] Analyses from Africa have found heterogeneous impacts across countries and outcomes: childhood immunizations declined in many countries, although extent, timing and duration of disruptions varied[9]; and there have been mixed results about changes in use of antenatal and childbirth services[10–12]—indicating that more in-depth and context-specific studies are needed.[13]

Studies from Kenya (the setting for this study) have identified a decreased volume of outpatient and inpatient visits compared to pre-pandemic levels,[14] and declines in perinatal service use between March and December 2020 compared to expected service volume, with particular disruption in rural areas.[15] A time trend analysis of Kenyan service utilization data also found that outpatient visits and childhood immunizations saw among the largest declines versus pre-pandemic levels, due both to the pandemic and the associated health

workers strike—although use of antenatal care and facility-based delivery both declined during the strike but rebounded after.[16]

Barriers to the timely use of health services may be especially relevant for maternal and neonatal outcomes, as delayed care-seeking can be associated with increased risk of morbidity and mortality for these groups.[17–21] During the 2014 West African Ebola outbreak, use of maternal and child health care services plummeted and likely resulted in substantial loss of life.[22–24] The impact of the COVID-19 pandemic on maternal and neonatal health outcomes is not yet known: although some studies have suggested that these have worsened due to the pandemic,[25–27] further research is needed to fully understand this relationship as many studies have relied on service-level data so do not capture outcomes that occur in the community,[28] such as related to home births, for example, or avoided and averted care—both of which increased during the COVID-19 pandemic as described above.

There are many reasons why care-seeking may have changed during the COVID-19 pandemic, including: fears of contracting the virus at health facilities (as witnessed during previous Ebola outbreaks in Western Africa[29,30]); stockouts of key health goods due to global supply chain challenges, and consequently, impacts on service provision, including immunization[31] and family planning[32]; and increased economic instability that may cause individuals to defer needed health care.[33,34] Another factor may be decreased trust.[35–38] Trust is a key ingredient for the provision of, and use of, high-quality and effective health care.[39–44] Data from high-income countries has indicated that trust in institutions is associated with COVID-19 vaccine attitudes and uptake[45–48]; and during previous Ebola outbreaks in Africa, people with low institutional trust had lower health care utilization[49]—so trust is thus likely an important determinant of care-seeking, but its role during the COVIC-19 pandemic in Africa has not yet been well-characterized. We conceptualize trust as something that may directly affect care-seeking decisions and experiences, as well as something that may be impacted by—and may affect the impact of—other factors like access barriers. Previous studies have similarly identified trust in the health system as an important determinant of perinatal care utilization in Kenya.[50–52]

The objective of this manuscript is to examine peri-natal care experiences–avoidance of care, and barriers seeking care–for women in two counties of Kenya who delivered between March and November 2020; and factors associated with these experiences including changing trust in the health system during COVID-19. (In March 2020, Kenya instated national movement restrictions and risk mitigation measures.)

Methods

Study Setting

By the end of 2020 (the time of this survey), Kenya had experienced approximately 96,000 cases of COVID-19 and 1670 deaths.[53] There were two pandemic "surges" in Kenya during 2020, one during the months of July and August (peak of new infections at end of July), and another that began in October and subsided at the end of the year (peak of new infections in mid-November).[53] Throughout 2020, Kenya introduced numerous restrictions on movement including curfews, intra- and inter-national transport limitations. From mid- to late-2020, there were frequent health worker strikes in Kenya due to frustrations about workload, burnout and inadequate protection against the virus.[54,55] Kenya adjusted its maternal health care guidelines early during the

COVID-19 pandemic—for example, suggesting that some antenatal visits could occur via phone rather than in-person (although still recommended eight visits)—there were no substantive changes to postpartum care guidance, and the only noteworthy change to immunization services was the cancelation of outreach campaigns (but routine immunization at health facilities was maintained as an essential service).[56]

Sample Selection

This analysis uses data collected from a parent survey (detailed methods information available.[57]) In brief, six facilities were selected in Nairobi and Kiambu counties (three public hospitals, two private hospitals and one health center), and women aged 15–49 years who resided in the catchment areas of these facilities who had delivered a baby since March 2020 were identified by trained community health volunteers, who are assigned to deliver home-based essential maternal and neonatal care in defined geographic areas, so are familiar with the pregnancy status of women in their assigned areas. To be eligible, women needed access to a functional phone, to allow for mobile phone surveying. All women were surveyed between September and December 2020. In total, 2011 women were approached, of whom 233 were ineligible, contact could not be made with 618 (wrong phone number, or no answer), 11 women refused, and 14 began the survey but did not complete it—for a total survey sample size of 1135 women.

Previous analyses from the parent study (see below) found that 99% of women in this area attended antenatal care before COVID-19, and nearly two-thirds received four or more visits.[58] This figure corresponds to the 2014 Demographic and Health Survey (DHS)—i.e., approximately 70% of women with recent births in Nairobi, and 67% in Kiambu county, received four or more antenatal visits—and the DHS also found that over 94% of women who recently delivered in Kiambu county, and over 90% of women who recently delivered in Nairobi county, delivered at a health facility.[59]

Data Collection

Women were contacted by phone to assess eligibility, consent in the study if interested and eligible, and then participate in the survey. Those unavailable to complete the survey at the time of phone contact scheduled a follow-up appointment. Women not able to be contacted received up to nine phone call attempts on varying days of the week and times of day before being classified as unreached or a refusal. Surveys were

conducted by eight experienced, female enumerators and one female supervisor, all of whom participated in an intensive, three-day virtual training, plus one day of pre-testing with 30 women. Verbal consent was obtained and audio-recorded prior to beginning the survey. Women who consented in the study received approximately 1 USD worth of mobile credit to appreciate their participation. The calls for women who completed the survey lasted (median) 32 minutes.

Study Measures

The survey included questions about sociodemographic and health status, health care use and avoidance, and COVID-19 behaviors and attitudes.

All women were asked "In general, has your trust in the healthcare system improved, stayed the same, or declined due to COVID-19?" The main independent variable was dichotomous: did trust decline (yes, or no which included trust improved and trust stayed the same).

Outcome measures about care avoidance and challenge during the perinatal period are shown in Table 1. Some asked specifically about the COVID-19 pandemic while others did not.

Data Analysis

Women whose baby had died between birth and time of the survey were excluded from the analysis (n = 13). We evaluated the characteristics of who avoided care since March 2020, and used adjusted logistic regression models to assess whether women with declined trust had different odds of each outcome variable. We also describe what care was reportedly avoided and by whom, and why care was avoided.

Covariates were selected as those potentially associated with care avoidance and its hypothesized relationship with trust: woman's age, marital status (married or partnered, versus single, widowed or divorced), parity (first birth yes/no), educational attainment (completed secondary/attended college or university, versus some secondary or below), employment status (employed yes/no), self-reported health (excellent, very good or good, versus fair, poor or very poor), and month of childbirth. Models about postpartum care also included variables to capture previous care experiences during pregnancy and childbirth as these may influence trust[60] and future care behaviors[61]: number of antenatal care visits (continuous); and a score representing person-centered maternity care, using a validated 30-item scale that measures women's dignity and respect, communication and autonomy, and supportive care during maternity care[57,61–63] (continuous). Postpartum care models also included presence of birth complications (yes/no), and infant postpartum care models included whether the birth was full-term (completed 37 weeks' gestation or more, yes/no), as these may impact the need to subsequently seek care. All analyses were conducted using Stata v17.0.

Table 1. Outcome measures based on survey questions.

Survey question	Operationalization for this analysis
How did COVID-19 affect your ability to access antenatal care or attend antenatal care appointments?	Antenatal care barriers: *0: No impacts* *1: Any reported impact(s)*
For your most recent delivery, where did you give birth? Was this where you preferred or intended to give birth?	Did not deliver at preferred location: *0: Was where I preferred/intended* *1: Was not where I preferred/intended*
Have you experienced any issues when trying to receive or obtain a family planning method since COVID (mid-March)?	Family planning barriers: *0: No* *1: Yes*
Since your delivery, have you needed care but avoided using or were otherwise unable to use health services or visit health care providers?[†]	Avoided postpartum mother care: *0: No* *1: Yes*
Since your delivery, have/had you avoided or delayed taking your baby to visit health care providers or use health care services? [†]	Avoided postpartum infant care: *0: No* *1: Yes*
Did you ever have to miss or present late to any immunizations or recommended clinic visit for any of the following reasons? [†]	Delayed infant care: *0: Never missed or presented late* *1: Any reported reason(s)*
To what extent do you agree or disagree with: I feel unsafe going to a health center because of the COVID-19 outbreak. [†]	Feel unsafe accessing care: *0: Strongly disagree or disagree* *1: Strongly agree or agree*

[†]also included in sensitivity analysis; rather than "Since your delivery . . . " these questions asked "Since mid-March . . . "

Ethical Review

Ethical clearance was received from the Kenya Medical Research Institute (KEMRI), Scientific and Ethics Review Unit (NON-KEMRI 702) and from the University of California Institutional Review Board (IRB #20-001421). A research permit was obtained from the government of Kenya through the National Commission for Science, Technology & Innovation (NACOSTI). Verbal consent was obtained from all the study participants.

Results

A total of 1122 participants contributed data to this analysis. Their characteristics are shown in Table 2; women were 27.4 years on average, most were married or partnered (n = 760, 67.7%) and only 27.6% (n = 310) were nulliparous. Just under half of respondents had completed secondary school or attended college/university (n = 514, 45.8%). Approximately three-quarters of women were not working (n = 855, 77.7%), and most felt they were in excellent, very good or good health (n = 698, 62.2%). The average infant had been born 141 days prior (median: 141 days, 25th percentile 89 days, 75th percentile 199 days).

Slightly over half of respondents said that their trust in the health care system had declined due to COVID-19 (52.7%, n = 591). Approximately one-quarter of women said their trust had improved (26.7%, n = 299) and one-fifth said it had stayed the same (20.7%, n = 232). Reports of declined trust, versus staying the same or improving, were significantly more common (55.8%, n = 339) among those with less than secondary education compared to those with higher education (49.0%, n = 252) (Appendix Table A1) but there were no other significant differences by respondent characteristic.

Care Avoidance and Reported Access Barriers

The majority of women reported at least one type of care avoidance or barrier: only 138 women (12.3% of the sample) said they faced no such problem (Figure 1). The most common issues reported were: feeling unsafe accessing care (51.2% of women, n = 574), barriers accessing antenatal care (48.3% of women, n = 542), and not delivering in one's preferred location (43.3% of women, n = 486). (In this sample, 95% of women delivered at a health facility: only 48 women delivered at their or someone else's home, and 12 delivered while en route to the hospital. Nearly all [95%] of the women who delivered at home or en route said it was not their preferred location, as did 42% of those who delivered at a health facility.) Overall, 8.4% reported avoiding postpartum infant care, 17.0% reported avoiding care for themselves.

Among those who reported needing but avoiding care for themselves or their infant since March 2020 (n = 191 and n = 94 respectively), women were asked which services they had avoided (Table 3). Approximately half of women who reported avoiding care for themselves said they had avoided postpartum emergency care; whereas the most common types of care avoided for infants were immunizations and routine care/checkup visits (each was reported by just under half of women who said they had avoided care for their infant since March 2020).

Reasons for Care Avoidance

Women were asked why they had avoided services (Table 4). Sixty-one percent of women reporting an antenatal care access barrier, 46% of women who said they delayed immunizations or routine care for their infant, approximately 30% of women who reported that they did not deliver at their preferred location,

Table 2. Characteristics of the sample (n = 1122).

|	n (%)
Age, average (median)	27.4 (27)
Married or partnered: Yes	760 (67.7%)
Not married/partnered (single, widowed, divorced)	362 (32.3%)
First birth: Yes	310 (27.6%)
> 1 parity	812 (72.4%)
Educational attainment: Some secondary or below	608 (54.2%)
Completed secondary, attended college or university	514 (45.8%)
Employed (full or part time, formal or informal sector): No	855 (77.7%)
Yes	246 (22.3%)
Self-reported health: Fair, Poor, or Very poor	424 (37.8%)
Excellent, Very good, or Good	698 (62.2%)
Age of child at time of survey, average (median) weeks	20.2 (20.1)
Trust in the health system: Declined due to COVID-19	591 (52.7%)
Stayed the same	232 (20.7%)
Improved	299 (26.7%)
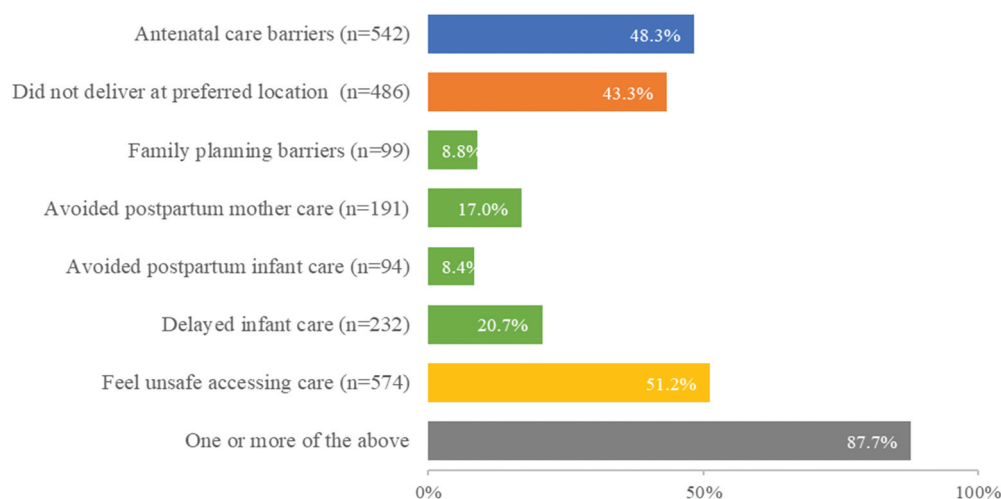
Figure 1. Percentage of women who reported care avoidance and barriers (n = 1122).

Table 3. What services were avoided since March 2020?

	Avoided postpartum mother care (n = 191)	Avoided postpartum infant care (n = 94)
Emergency care	95 (49.7%)	29 (30.9%)
Routine care/ checkup	32 (16.8%)	42 (44.7%)
Immunizations	n/a	41 (43.6%)
Acute care	19 (10.0%)	4 (2.3%)
Family planning	16 (8.4%)	n/a
COVID-19 test	9 (4.7%)	n/a
Dental care	4 (2.1%)	n/a
Pharmacy	3 (1.6%)	n/a
Postnatal care	4 (4.2%)	n/a

and approximately 30% of women who avoided infant care said that facility access was a challenge–e.g., facilities being too busy, facilities being closed, or health workers being unavailable. The most common challenge with family planning access was a stockout of supplies/ commodities (reported by approximately half of women who had a problem with this service). Financial barriers —i.e., not being able to afford care—was the most frequently-reported challenge for women who avoided postpartum care for themselves and their infants (reported by 41% and 29% of these women, respectively) and was also reported by approximately 20% of women who faced antenatal care barriers and who faced family planning care barriers.

Across all types of services, the most common reason for care avoidance or care barrier was related to facility access (reported by approximately half of women reporting any avoidance or of problem with care). Approximately one-quarter of women who avoided care or had an access challenge said this had been due to a financial challenge, 17.5% attributed this to fear of COVID-19 contagion, and 13.7% said it was because of

Table 4. Reasons for avoiding each type of care (n = 1122) (percentage is among those women reporting that type of challenge/ avoidance).

	Antenatal care barriers (n = 542)	Did not deliver at preferred location (n = 486)	Family planning barriers (n = 99)	Avoided postpartum mother care (n = 191)	Avoided postpartum infant care (n = 94)	Delayed infant care (n = 232)
COVID-19 contagion fears	122 (22.5%)	14 (2.9%)		48 (25.1%)	12 (12.8%)	8 (3.4%)
Financial barriers	98 (18.1%)	71 (14.6%)	21 (21.2%)	79 (41.4%)	27 (28.7%)	19 (8.2%)
Facility access barriers	331 (61.1%)	143 (29.4%)	22 (22.2%)	38 (19.9%)	31 (33.0%)	107 (46.1%)
COVID-related restrictions (PPE, curfews, etc.)	68 (12.%)	63 (13.0%)		4 (2.1%)	7 (7.4%)	
Lack of transport	2 (0.4%)	21 (4.3%)		4 (2.1%)		8 (3.4%)
Felt ill	1 (0.2%)			5 (2.6%)	2 (2.1%)	19 (8.2%)
COVID-related stigma (fear of testing)				5 (2.6%)		
Referred elsewhere by health care worker		111 (22.8%)				
Emergency birth, went to nearest facility		82 (16.9%)				
Stockouts/shortages			50 (50.5%)			28 (12.1%)
No time to go				6 (3.1%)	14 (14.9%)	21 (9.1%)
Other	21 (3.9%)	17 (3.5%)	14 (14.1%)	17 (8.9%)	4 (4.3%)	36 (15.5%)

Women could cite more than 1 reason for each care type.

a COVID-related restriction like curfew or need to purchase personal protective equipment. Nearly every reason was more commonly reported by women who said their trust in the health system had declined due to COVID-19 (compared to women who said their trust had remained the same or improved), but these differences were mostly small and not statistically significant, except financial barriers and COVID-related restrictions which were reported significantly more often by women who said their trust had declined (Appendix Table A2).

Correlates of Care Avoidance/Barriers

Married women and women with below-secondary education were less likely to report having faced problems accessing antenatal care and feeling unsafe accessing care, and women with better self-reported health less commonly faced antenatal or family planning barriers, as well as avoidance of postpartum care for themselves (Appendix Table A3). No other demographic characteristics were associated with these outcomes.

Declining trust was strongly associated with care avoidance (Table 5). In models including all covariates, those who reported that their trust in the health system had declined due to COVID-19 had 58% higher odds of reporting antenatal care barriers, 124% higher odds of reporting avoidance of postpartum mother care, 73%

Table 5. Adjusted odds of reporting care barriers or care avoidance for those whose trust in the health system declined due to COVID-19, compared to those whose trust remained the same or improved (n = 1122).

	aOR (95% CI)
Antenatal care barriers	1.58***
	(1.23, 2.02)
Did not deliver at preferred location	1.20
	(0.94, 1.53)
Family planning barriers	1.39
	(0.90, 2.16)
Avoided postpartum mother care	2.24***
	(1.57, 3.19)
Avoided postpartum infant care	1.73*
	(1.09, 2.75)
Delayed infant care	1.35
	(0.98, 1.84)
Feel unsafe accessing care	1.50**
	(1.18, 1.92)

One row represents one model.
Includes covariates: age (continuous), marital status (single/widowed/divorced, or married/partnered), parity (> 1, or first birth), educational attainment (completed secondary/attended college or university, or some secondary or below), employment status (employed full or part time, formal or informal sector, Yes or no), self-reported health (fair/poor/very poor, or Excellent/very good/good), and delivery month. Avoided postpartum care (mother and infant) and delayed infant care models also include number of ANC visits (less than 4, 4–7, 8+); avoidance of postpartum maternal care includes person-centered maternity care score (continuous) and presence of delivery complications (yes or no); avoidance of postpartum infant care and delayed infant care include full-term delivery (yes [weeks 38+], or no [< 38 weeks]).
*p < .05, **p < .01, ***p < .001.

higher odds of reporting avoidance of postpartum infant care, and 50% higher odds of reporting feeling unsafe accessing medical care. Appendix Table A4 presents all coefficients for all variables (explanatory and covariates) in the model fit for each outcome.

Discussion

Nearly all respondents in this study of women in Nairobi and Kiambu counties (Kenya) who delivered during 2020 reported a challenge with care-seeking or reported care avoidance during the perinatal period. In addition, approximately half of women in the study reported that their trust in the health system had declined due to COVID-19, and this was associated with avoidance of care, and with reporting of barriers and challenges in accessing care. Declining trust may be a cause of care avoidance or care challenges, or may be a consequence of it—but in either case, efforts to improve trust in healthcare systems are needed particularly in response to the COVID-19 pandemic and other pandemics.

Trust is an ingredient of health services decision-making that merits urgent attention: in a global survey, only a quarter of respondents indicated that they had a lot of trust in their government, and trust was associated with trust in health and medical advice.[64] Despite its importance and a growing literature from high-income countries during the COVID-19 pandemic,[45–48,65–67] the relationship between trust and health behaviors (and, ultimately, outcomes) remains relatively under-investigated in the African context. This paper contributes to filling that gap.

Women commonly reported challenges accessing antenatal care; a previous survey among pregnant women in Kenya found that 21% of them planned to avoid antenatal care visits[68] but our finding may be higher because it reflects actual—in addition to anticipated—care avoidance. In addition, over 43% of women in this survey did not deliver at their preferred location. Nearly all women in the study sample delivered at a health facility (95% of those surveyed)—which matches an overall trend in Kenya of increased facility delivery[69,70]; it is therefore possible that women wanted a facility-based delivery but the exact location did not match their preference. Although many women said they did not deliver at their preferred location due to clinical reasons (emergency delivery, or referral from doctor), many women cited facility-level factors of closures, being at capacity, and health worker strike.[71]

Avoidance of care during the postpartum period was less common—but among those who reported this, approximately half of women said they had avoided emergency care, and just under half said

they had avoided routine infant care/checkups and immunizations. These findings correspond with other research from across Africa: perinatal healthcare access has been disrupted during the COVID-19 pandemic.[10,11,13,15,58,72–78]

The most common challenges and reasons for care avoidance were facility access barriers and financial constraints. Facility access took the form of concerns about facility closures, provider strikes and being turned away from care. Financial constraints included inability to afford care and pay for transportation to the facility. Access to health services in Kenya was challenging for women and infants even prior to 2020,[79–81] but many of these factors have been exacerbated by the pandemic. This mix of patient- and system-side factors has parallels in studies on HIV services in Kenya during the COVID-19 pandemic, which were affected by financial constraints (exacerbated by unemployment due to the pandemic), health workers diverted to other services, and curfews leading to limited facility hours of operation.[82,83] In a multi-national study, respondents in Africa were much more likely to attribute foregone medical care during COVID-19 to financial concerns (rather than COVID-19, access or other reasons) than respondents from other regions.[84] There were also stockouts of key medical commodities, which impacted care-seeking—both in our study and in previous studies from Kenya.[85] The pandemic has also had catastrophic effects on women's livelihoods, including those in precarious and informal sectors,[86] which is likely to be particularly acute for pregnant and postpartum women who may not have paid parental leave or employment security following childbirth. Postpartum women contend with hospital fees related to the pandemic—such as being required to pay a fee to cover the cost of PPE during intrapartum and postpartum visits, which exacerbates employment-related impacts of the pandemic and household experiences of food insecurity, and is likely to influence healthcare seeking.[87] A qualitative study with Kenyan people living in slum communities similarly found that financial barriers due to COVID-19—including the cost of acquiring PPE and lost wages that increase economic precarity—deterred care-seeking.[85] Health worker strikes at public-sector facilities in Kenya may also have had a particularly severe impact on lower-income women. Future studies might seek to assess how financial challenges and burden interact with access to health services to affect care avoidance and experiences during emergencies.

This study has limitations that should be noted. First, the measure of decline in trust is limited as we only asked one question. Future studies should include validated multi-dimensional measures of trust to comprehensively examine how trust in healthcare system is associated with care avoidance. Second, the main sample of women had infants ranging from 0 to 36 weeks old. Some women were therefore reporting on antenatal or childbirth care that had only recently occurred, while others were recalling over a longer period. Additionally, women who delivered earlier had a longer "exposure" period, i.e., could report on more opportunities for care avoidance during the postpartum period. Third, we could not disentangle the period and cohort effects. It is possible that women with younger, or older, infants make different decisions and would be affected by the COVID-19 pandemic in different ways; and it is possible that negative pandemic-related experiences accumulate over time. Similarly, the effects of the COVID-19 pandemic may be felt in waves, as emerging variants cause burden to fluctuate dramatically, and as policies such as movement restrictions and masking requirements can change over time.[33] Lastly, these results should be generalized with caution as the women surveyed may differ from other populations in key ways including mobile phone ownership and universal awareness of the COVID-19 pandemic.

The study has a number of policy and practice implications. In line with Kenya's community health strategy 2020–2025,[88] local governments may work to strengthen community health and volunteer (CHV) networks, and leverage them particularly during emergencies.[89] CHVs make home visits, deliver health information and education, and treat common illnesses.[90] CHVs are supervised monthly by government employees, known as Community Health Extension Workers, who serve to link households to health facilities.[90] Community health volunteers are potentially an important conduit between health facilities and communities, but were underutilized in Kenya at the time of this study. Investments in community-based healthcare has the potential to rebuild trust by engaging women and their newborns who may have missed or delayed healthcare.[91–93] However, studies from Africa have found that trust in CHVs is variable, and that factors like health worker support (or, conversely, rejection) of CHV credibility significantly influenced women's trust in CHVs.[94] Further research on how to leverage community health workers, and special considerations for this during emergencies, is urgently needed. Future studies should examine trust in CHVs, and its correlates, using validated measures.[95] Additionally, healthcare facilities have an important role to play in rebuilding trust and providing updated information on COVID-19 to improve the health of mothers and newborns. For example, providers and healthcare staff should be trained on person-centered maternity care to provide care that is respectful

of and responsive to women's and their families' preferences, needs, and values—including attention to how these may change during an emergency (like the COVID-19 pandemic). This includes training providers on calling women by their names, introducing themselves, and ensuring women have autonomy during their care.[96] Additionally, interventions that center supportive care throughout the process of labor and delivery may improve respectful care.[97] Particularly during emergency situations, person-centered care needs to extend health facility walls to ensure continuity of care from, and to, communities. The inclusion of community health volunteers, or using technology to link women to the health system, should be explored as approaches that may meet women's needs and preferences. Global surveys have found that health works who provide perinatal care are experiencing negative psychological impacts, including due to increased workload and stress[98]; and consequently are finding it harder to provide respectful maternity care during the COVID-19 pandemic than before.[99] This suggests the importance of also supporting health workers' needs during emergencies so they can offer the highest possible quality of care to women.

Conclusions

The perinatal period is a critical and vulnerable time for women and their children, and it is a period when many women engage consistently and frequently with the health system. During pandemics and other emergencies, dedicated efforts are needed to ensure that pregnant and postpartum women remain engaged in care. Building and maintaining trust in the health system is essential for reaching this key group, and should be accompanied by other interventions as suggested by this study—such as clear communication about facility operating hours when these are changed, strong linkages and referrals across facilities when women are turned away, greater use of community-based care to reduce congestion at health facilities and to lessen the economic burden of transport for care-seeking, and ensuring strong supply chains of commodities during emergencies.

Author contributions

The overall study was conceived and designed by MS; the approach for this analysis was designed by CM and MS. Data collection was led by JM and GG. CM and MS led data analysis and interpretation, with inputs from all coauthors. CM led the drafting of this manuscript with key inputs from JM, DN, GG, MG and MS. All authors provided critical revisions to the manuscript and gave their final approval of the version to be submitted.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Ethical approval

Ethical clearance was received from the Kenya Medical Research Institute (KEMRI), Scientific and Ethics Review Unit (NON-KEMRI 702) and from the University of California Institutional Review Board (IRB #20-001421).

Informed consent from participants

Verbal consent was obtained from all the study participants.

Data availability statement

The data underlying this article will be shared on reasonable request to the corresponding author.

References

1. Chen RC, Haynes K, Du S, Barron J, Katz AJ. Association of cancer screening deficit in the United States with the COVID-19 pandemic. JAMA oncol. 2021;7(6):878–84. doi:10.1001/jamaoncol.2021.0884.
2. Whaley CM, Pera MF, Cantor J, Chang J, Velasco J, Hagg HK, Sood N, Bravata DM. Changes in health services use among commercially insured US populations during the COVID-19 pandemic. JAMA Netw

Open. 2020;3(11):e2024984. doi:10.1001/jamanetworko
pen.2020.24984.

3. Maringe C, Spicer J, Morris M, Purushotham A, Nolte E, Sullivan R, Rachet B, Aggarwal A. The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study. Lancet Oncol. 2020;21(8):1023–34. doi:10.1016/S1470-2045(20) 30388-0.

4. McDonald HI, Tessier E, White JM, Woodruff M, Knowles C, Bates C, Parry J, Walker JL, Scott JA, Smeeth L, et al. Early impact of the coronavirus disease (COVID-19) pandemic and physical distancing measures on routine childhood vaccinations in England, January to April 2020. Eurosurveillance. 2020; 25(19):2000848. doi:10.2807/1560-7917.ES.2020.25.19. 2000848.

5. Santoli JM. Effects of the COVID-19 pandemic on routine pediatric vaccine ordering and administration— United States, 2020. MMWR Morb Mortal Wkly Rep. 2020;69.

6. Ackerson BK, Sy LS, Glenn SC, Qian L, Park CH, Riewerts RJ, Jacobsen SJ. Pediatric vaccination during the COVID-19 pandemic. Pediatrics. 2021;148(1): e2020047092. doi:10.1542/peds.2020-047092.

7. Daniels V, Saxena K, Roberts C, Kothari S, Corman S, Yao L, Niccolai L. Impact of reduced human papillomavirus vaccination coverage rates due to COVID-19 in the United States: a model based analysis. Vaccine. 2021 May 12;39(20):2731–35. doi:10.1016/j.vaccine.2021.04. 003.

8. Pley CM, McNaughton AL, Matthews PC, Lourenço J. The global impact of the COVID-19 pandemic on the prevention, diagnosis and treatment of hepatitis B virus (HBV) infection. BMJ Glob Health. 2021;6(1):e004275. doi:10.1136/bmjgh-2020-004275.

9. Connolly E, Boley EJ, Fejfar DL, Varney PF, Aron MB, Fulcher IR, Lambert W, Ndayizigiye M, Law MR, Mugunga JC, et al. Childhood immunization during the COVID-19 pandemic: experiences in Haiti, Lesotho, Liberia and Malawi. Bull World Health Organ. 2022;100(2):115.

10. Shapira G, Ahmed T, Drouard SHP, Amor Fernandez P, Kandpal E, Nzelu C, Wesseh CS, Mohamud NA, Smart F, Mwansambo C, et al. Disruptions in maternal and child health service utilization during COVID-19: analysis from eight sub-Saharan African countries. Health Policy Plan. 2021;36(7):1140–51. doi:10.1093/ heapol/czab064.

11. Aranda Z, Binde T, Tashman K, Tadikonda A, Mawindo B, Maweu D, Boley EJ, Mphande I, Dumbuya I, Montaño M, et al. Disruptions in maternal health service use during the COVID-19 pandemic in 2020: experiences from 37 health facilities in low-income and middle-income countries. BMJ Glob Health. 2022;7(1):e007247. doi:10.1136/bmjgh-2021-007247.

12. Arsenault C, Gage A, Kim MK, Kapoor NR, Akweongo P, Amponsah F, Aryal A, Asai D, Awoonor-Williams JK, Ayele W, et al. COVID-19 and resilience of healthcare systems in ten countries. Nat Med. 2022:1–11.

13. Ahmed T, Rahman AE, Amole TG, Galadanci H, Matjila M, Soma-Pillay P, Gillespie BM, El Arifeen S, Anumba DOC. The effect of COVID-19 on maternal newborn and child health (MNCH) services in Bangladesh, Nigeria and South Africa: call for a contextualised pandemic response in LMICs. Int J Equity Health. 2021;20(1):1–6. doi:10.1186/ s12939-021-01414-5.

14. Bayani DB, Krubiner C, Barasa E, Biribawa C, Broadbent A, Casas L, Chalkidou K, Chi YL, Combrink H, Denis OO, et al. The indirect health effects of COVID-19: emerging findings from Kenya, the Philippines, South Africa, and Uganda; 2021.

15. Amouzou A, Maïga A, Faye CM, Chakwera S, Melesse DY, Mutua MK, Thiam S, Abdoulaye IB, Afagbedzi SK, Ag Iknane A, et al. Health service utilisation during the COVID-19 pandemic in sub-Saharan Africa in 2020: a multicountry empirical assessment with a focus on maternal, newborn and child health services. BMJ Glob Health. 2022;7(5):e008069. doi:10. 1136/bmjgh-2021-008069.

16. Kiarie H, Temmerman M, Nyamai M, Liku N, Thuo W, Oramisi V, Nyaga L, Karimi J, Wamalwa P, Gatheca G, et al. The COVID-19 pandemic and disruptions to essential health services in Kenya: a retrospective time-series analysis. Lancet Glob Health. 2022;10(9): e1257–67. doi:10.1016/S2214-109X(22)00285-6.

17. Serbanescu F, Clark TA, Goodwin MM, Nelson LJ, Boyd MA, Kekitiinwa AR, Kaharuza F, Picho B, Morof D, Blanton C, et al. Impact of the saving mothers, giving life approach on decreasing maternal and perinatal deaths in Uganda and Zambia. Glob Health Sci Pract. 2019;7(Suppl 1):S27–47. doi:10.9745/GHSP-D-18-00428.

18. Pacagnella RC, Cecatti JG, Osis MJ, Souza JP. The role of delays in severe maternal morbidity and mortality: expanding the conceptual framework. Reprod Health Matters. 2012;20(39):155–63. doi:10.1016/S0968-8080(12)39601-8.

19. Carvalho OMC, Junior ABV, Augusto MCC, Leite ÁJM, Nobre RA, Bessa OAAC, de Castro ECM, Lopes FNB, Carvalho FHC. Delays in obstetric care increase the risk of neonatal near-miss morbidity events and death: a case-control study. BMC Pregnancy Childbirth. 2020;20(1):1–10. doi:10.1186/s12884-020-03128-y.

20. Lassi ZS, Middleton PF, Bhutta ZA, Crowther C. Strategies for improving health care seeking for maternal and newborn illnesses in low-and middle-income countries: a systematic review and meta-analysis. Glob Health Action. 2016;9(1):31408. doi:10.3402/gha.v9.31408.

21. Ronsmans C, Graham WJ. Maternal mortality: who, when, where, and why. Lancet. 2006;368(9542):1189–200. doi:10.1016/S0140-6736(06)69380-X.

22. Delamou A, El Ayadi AM, Sidibe S, Delvaux T, Camara BS, Sandouno SD, Beavogui AH, Rutherford GW, Okumura J, Zhang W-H, et al. Effect of Ebola virus disease on maternal and child health services in Guinea: a retrospective observational cohort study. Lancet Glob Health. 2017;5(4):e448–57. doi:10. 1016/S2214-109X(17)30078-5.

23. Brolin Ribacke KJ, Saulnier DD, Eriksson A, Von Schreeb J. Effects of the West Africa Ebola virus disease

on health-care utilization–a systematic review. Front Public Health. 2016;4:222. doi:10.3389/fpubh.2016.00222.

24. Wilhelm JA, Helleringer S. Utilization of non-Ebola health care services during Ebola outbreaks: a systematic review and meta-analysis. J Glob Health. 2019;9(1). doi:10.7189/jogh.09.010406.

25. Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, Gurol-Urganci I, O'Brien P, Morris E, Draycott T, Thangaratinam S, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. Lancet Glob Health. 2021.

26. Molina RL, Tsai TC, Dai D, Soto M, Rosenthal N, Orav EJ, Figueroa JF. Comparison of pregnancy and birth outcomes before vs during the COVID-19 pandemic. JAMA Netw Open. 2022;5(8):e2226531. doi:10.1001/jamanetworkopen.2022.26531.

27. Naqvi S, Naqvi F, Saleem S, Thorsten VR, Figueroa L, Mazariegos M, Garces A, Patel A, Das P, Kavi A, et al. Health care in pregnancy during the COVID-19 pandemic and pregnancy outcomes in six low-and-middle-income countries: evidence from a prospective, observational registry of the global network for women's and children's health. BJOG: Int J Obstet Gynaecol. 2022.

28. Calvert C, John J, Nzvere FP, Cresswell JA, Fawcus S, Fottrell E, Say L, Graham WJ. Maternal mortality in the covid-19 pandemic: findings from a rapid systematic review. Glob Health Action. 2021;14(sup1):1974677. doi:10.1080/16549716.2021.1974677.

29. Ly J, Sathananthan V, Griffiths T, Kanjee Z, Kenny A, Gordon N, Basu G, Battistoli D, Dorr L, Lorenzen B, et al. Facility-based delivery during the Ebola virus disease epidemic in rural Liberia: analysis from a cross-sectional, population-based household survey. PLoS Med. 2016;13(8):e1002096. doi:10.1371/journal.pmed.1002096.

30. Jones S, Sam B, Bull F, Pieh SB, Lambert J, Mgawadere F, Gopalakrishnan S, Ameh CA, van den Broek N. 'Even when you are afraid, you stay': provision of maternity care during the Ebola virus epidemic: a qualitative study. Midwifery. 2017;52:19–26. doi:10.1016/j.midw.2017.05.009.

31. Shet A, Carr K, Danovaro-Holliday MC, Sodha SV, Prosperi C, Wunderlich J, Wonodi C, Reynolds HW, Mirza I, Gacic-Dobo M, et al. Impact of the SARS-CoV-2 pandemic on routine immunisation services: evidence of disruption and recovery from 170 countries and territories. Lancet Glob Health. 2022;10(2):e186–94. doi:10.1016/S2214-109X(21)00512-X.

32. Dasgupta A, Kantorová V, Ueffing P. The impact of the COVID-19 crisis on meeting needs for family planning: a global scenario by contraceptive methods used. Gates Open Res. 2020;4.

33. Haider N, Osman AY, Gadzekpo A, Akipede GO, Asogun D, Ansumana R, Lessells RJ, Khan P, Hamid MMA, Yeboah-Manu D, et al. Lockdown measures in response to COVID-19 in nine sub-Saharan African countries. BMJ Glob Health. 2020;5(10):e003319. doi:10.1136/bmjgh-2020-003319.

34. Campbell LS, Masquillier C, Knight L, Delport A, Sematlane N, Dube LT, Wouters E. Stay-at-home: the impact of the COVID-19 lockdown on household functioning and ART adherence for people living with HIV in three sub-districts of Cape Town, South Africa. AIDS Behav. 2022;26(6):1905–22. doi:10.1007/s10461-021-03541-0.

35. Woskie LR, Fallah MP. Overcoming distrust to deliver universal health coverage: lessons from Ebola. BMJ. 2019;366:l5482. doi:10.1136/bmj.l5482.

36. Kittelsen SK, Keating VC. Rational trust in resilient health systems. Health Policy Plan. 2019;34(7):553–57. doi:10.1093/heapol/czz066.

37. Simas C, Penn-Kekana L, Kuper H, Lyra TM, Moreira MEL, De albuquerque MDSV, de Araújo TVB, de Melo APL, Figueira Mendes CH, Nunes Moreira MC, et al. Hope and trust in times of Zika: the views of caregivers and healthcare workers at the forefront of the epidemic in Brazil. Health Policy Plan. 2020;35(8):953–61. doi:10.1093/heapol/czaa042.

38. Peprah D, Palmer JJ, Rubin GJ, Abubakar A, Costa A, Martin S, Perea W, Larson HJ. Perceptions of oral cholera vaccine and reasons for full, partial and non-acceptance during a humanitarian crisis in South Sudan. Vaccine. 2016;34(33):3823–27. doi:10.1016/j.vaccine.2016.05.038.

39. Gilson L. Trust and the development of health care as a social institution. Soc Sci Med. 2003;56(7):1453–68. doi:10.1016/S0277-9536(02)00142-9.

40. Ozawa S, Sripad P. How do you measure trust in the health system? A systematic review of the literature. Soc Sci Med. 2013;91:10–14. doi:10.1016/j.socscimed.2013.05.005.

41. Hyde J. Health system reform and social capital. Development. 1999;42(4):49–53. doi:10.1057/palgrave.development.1110083.

42. LaVeist TA, Isaac LA, Williams KP. Mistrust of health care organizations is associated with underutilization of health services. Health Serv Res. 2009;44(6):2093–105. doi:10.1111/j.1475-6773.2009.01017.x.

43. Hammond WP, Matthews D, Mohottige D, Agyemang A, Corbie-Smith G. Masculinity, medical mistrust, and preventive health services delays among community-dwelling African-American men. J Gen Intern Med. 2010;25(12):1300–08. doi:10.1007/s11606-010-1481-z.

44. Ackatia-Armah NM, Addy NA, Ghosh S, Dubé L. Fostering reflective trust between mothers and community health nurses to improve the effectiveness of health and nutrition efforts: an ethnographic study in Ghana, West Africa. Soc Sci Med. 2016;158:96–104. doi:10.1016/j.socscimed.2016.03.038.

45. Latkin CA, Dayton L, Yi G, Konstantopoulos A, Boodram B. Trust in a COVID-19 vaccine in the US: a social-ecological perspective. Soc Sci Med. 2021;270:113684. doi:10.1016/j.socscimed.2021.113684.

46. Schernhammer E, Weitzer J, Laubichler MD, Birmann BM, Bertau M, Zenk L, Caniglia G, Jäger CC, Steiner G, et al. Correlates of COVID-19 vaccine hesitancy in Austria: trust and the government. J Public Health. 2021.

47. Freeman D, Loe BS, Chadwick A, Vaccari C, Waite F, Rosebrock L, Jenner L, Petit A, Lewandowsky S, Vanderslott S, et al. COVID-19 vaccine hesitancy in

the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. Psychol Med. 2020:1–15. doi:10.1017/S0033291720005188.

48. Szilagyi PG, Thomas K, Shah MD, Vizueta N, Cui Y, Vangala S, Fox C, Kapteyn A. The role of trust in the likelihood of receiving a COVID-19 vaccine: results from a national survey. Prev Med. 2021;153:106727. doi:10.1016/j.ypmed.2021.106727.

49. Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018–19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. Lancet Infect Dis. 2019;19(5):529–36. doi:10.1016/S1473-3099(19)30063-5.

50. Nganga SW, Otieno NA, Adero M, Mehra S, LeFevre AE, Pak SE, Shaikh S, Christian P, Labrique AB. Patient and provider perspectives on how trust influences maternal vaccine acceptance among pregnant women in Kenya. BMC Health Serv Res. 2019;19(1):1–13. doi:10.1186/s12913-019-4537-8.

51. Sripad P, Ozawa S, Merritt MW, Jennings L, Kerrigan D, Ndwiga C, Abuya T, Warren CE. Exploring meaning and types of trust in maternity care in peri-urban Kenya: a qualitative cross-perspective analysis. Qual Health Res. 2018;28 (2):305–20. doi:10.1177/1049732317723585.

52. Scanlon ML, Maldonado LY, Ikemeri JE, Jumah A, Anusu G, Chelagat S, Keter JC, Songok J, Ruhl LJ, Christoffersen-Deb A, et al. 'It was hell in the community': a qualitative study of maternal and child health care during health care worker strikes in Kenya. Int J Equity Health. 2021;20(1):1–12. doi:10.1186/s12939-021-01549-5.

53. Center for Systems Science and Engineering. COVID-19 dashboard; 2020.

54. Yusuf M. Kenyan doctors strike over pay, working conditions. VOA; 2020.

55. Latif Dahir A. Kenya's health workers. Unprotected and falling ill. Walk off job. New York Times. 2020;21.

56. Plotkin MK, Williams KM, Mbinda A, Oficiano VN, Nyauchi B, Walugembe P, Keyes E, Rawlins B, McCarraher D, Chabikuli ON, et al. Keeping essential reproductive, maternal and child health services available during COVID-19 in Kenya, Mozambique, Uganda and Zimbabwe: analysis of early-pandemic policy guidelines. BMC Public Health. 2022;22(1):1–20. doi:10.1186/s12889-022-12851-4.

57. Sudhinaraset M, Landrian A, Golub GM, Cotter SY, Afulani PA. Person-centered maternity care and postnatal health: associations with maternal and newborn health outcomes. AJOG Global Rep. 2021;1(1):100005. doi:10.1016/j.xagr.2021.100005.

58. Landrian A, Mboya J, Golub G, Moucheraud C, Kepha S, Sudhinaraset M. Effects of the COVID-19 pandemic on antenatal care utilisation in Kenya: a cross-sectional study. BMJ open. 2022;12(4):e060185. doi:10.1136/bmjopen-2021-060185.

59. Kenya National Bureau of Statistics, Ministry of Health Kenya, National AIDS Control Council Kenya, Kenya Medical Research Institute, National Council for Population Development Kenya. Kenya demographic and health survey 2014. Rockville (MD); 2015.

60. Sripad P, Merritt MW, Kerrigan D, Abuya T, Ndwiga C, Warren CE. Determining a trusting environment for maternity care: a framework based on perspectives of women, communities, service providers, and managers in Peri-Urban Kenya. Front Glob Womens Health. 2022;41.

61. Sudhinaraset M, Afulani P, Diamond-Smith N, Bhattacharyya S, Donnay F, Montagu D. Advancing a conceptual model to improve maternal health quality: the person-centered care framework for reproductive health equity. Gates Open Res. 2017;1:1. doi:10.12688/gatesopenres.12756.1.

62. Afulani PA, Diamond-Smith N, Golub G, Sudhinaraset M. Development of a tool to measure person-centered maternity care in developing settings: validation in a rural and urban Kenyan population. Reprod Health. 2017;14(1):1–18. doi:10.1186/s12978-017-0381-7.

63. Afulani PA, Feeser K, Sudhinaraset M, Aborigo R, Montagu D, Chakraborty N. Toward the development of a short multi-country person-centered maternity care scale. Int J Gynecol Obstet. 2019;146(1):80–87. doi:10.1002/ijgo.12827.

64. Moucheraud C, Guo H, Macinko J. Trust in governments and health workers low globally, influencing attitudes toward health information, vaccines. Health Aff. 2021;40(8):1215–24. doi:10.1377/hlthaff.2020.02006.

65. Gratz KL, Richmond JR, Woods SE, Dixon-Gordon KL, Scamaldo KM, Rose JP, Tull MT. Adherence to social distancing guidelines throughout the COVID-19 pandemic: the roles of pseudoscientific beliefs, trust, political party affiliation, and risk perceptions. Ann Behav Med. 2021;55(5):399–412. doi:10.1093/abm/kaab024.

66. Bodas M, Peleg K. Pandemic fatigue: the effects of the COVID-19 crisis on public trust and compliance with regulations in Israel. Health Aff. 2021;40(8):1225–33. doi:10.1377/hlthaff.2021.00171.

67. Nivette A, Ribeaud D, Murray A, Steinhoff A, Bechtiger L, Hepp U, Shanahan L, Eisner M. Non-compliance with COVID-19-related public health measures among young adults in Switzerland: insights from a longitudinal cohort study. Soc Sci Med. 2021;268:113370. doi:10.1016/j.socscimed.2020.113370.

68. Naqvi F, Naqvi S, Billah SM, Saleem S, Fogleman E, Peres-da-Silva N, Figueroa L, Mazariegos M, Garces AL, Patel A, et al. Knowledge, attitude and practices of pregnant women related to COVID-19 infection: a cross-sectional survey in seven countries from the global network for women's and children's health. BJOG: Int J Obstet Gynaecol. 2022.

69. Gitobu CM, Gichangi PB, Mwanda WO. The effect of Kenya's free maternal health care policy on the utilization of health facility delivery services and maternal and neonatal mortality in public health facilities. BMC Pregnancy Childbirth. 2018;18(1):1–11. doi:10.1186/s12884-018-1708-2.

70. Oluoch-Aridi J, Afulani P, Guzman D, Makanga C, Miller-Graff L. Exploring women's childbirth experiences and perceptions of delivery care in peri-urban settings in Nairobi, Kenya. Reprod Health. 2021;18(1):1–14. doi:10.1186/s12978-021-01129-4.

71. Mohiddin A, Langat E, Orwa J, Naanyu V, Temmerman M. Exploring the impact of health worker strikes on maternal and child health in a Kenyan county. BMC Health Serv Res. 2022;22(1):1–9. doi:10.1186/s12913-022-08493-2.

72. Lusambili AM, Martini M, Abdirahman F, Asante A, Ochieng S, Guni JN, Maina R, Luchters S. "We have a lot of home deliveries" A qualitative study on the impact of COVID-19 on access to and utilization of reproductive, maternal, newborn and child health care among refugee women in urban Eastleigh, Kenya. J Migr Health. 2020;1:100025. doi:10.1016/j.jmh.2020.100025.

73. UNICEF. Immunization services begin slow recovery from COVID-19 disruptions, though millions of children remain at risk from deadly diseases WHO U, Gavi ed; 2021.

74. Abbas K, Procter SR, van Zandvoort K, Clark A, Funk S, Mengistu T, Hogan D, Dansereau E, Jit M, Flasche S, et al. Routine childhood immunisation during the COVID-19 pandemic in Africa: a benefit–risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. Lancet Glob Health. 2020 Oct 1;8(10): e1264–72. doi:10.1016/S2214-109X(20)30308-9.

75. Roberton T, Carter ED, Chou VB, Stegmuller AR, Jackson BD, Tam Y, Sawadogo-Lewis T, Walker N. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. Lancet Glob Health. 2020 July 1;8(7):e901–08. doi:10.1016/S2214-109X(20)30229-1.

76. Dinleyici EC, Borrow R, Safadi MAP, van Damme P, Munoz FM. Vaccines and routine immunization strategies during the COVID-19 pandemic. Hum Vaccin Immunother. 2021 Feb 1;17(2):400–07. doi:10.1080/21645515.2020.1804776.

77. Masresha BG, Luce R, Shibeshi ME, Ntsama B, N'Diaye A, Chakauya J, Poy A, Mihigo R. The performance of routine immunization in selected African countries during the first six months of the COVID-19 pandemic. Pan Afr Med J. 2020;37(Suppl 1). doi:10.11604/pamj.supp.2020.37.1.26107.

78. Burt JF, Ouma J, Lubyayi L, Amone A, Aol L, Sekikubo M, Nakimuli A, Nakabembe E, Mboizi R, Musoke P, et al. Indirect effects of COVID-19 on maternal, neonatal, child, sexual and reproductive health services in Kampala, Uganda. BMJ Glob Health. 2021;6(8): e006102. doi:10.1136/bmjgh-2021-006102.

79. Keats EC, Macharia W, Singh NS, Akseer N, Ravishankar N, Ngugi AK, Rizvi A, Khaemba EN, Tole J, Bhutta ZA. Accelerating Kenya's progress to 2030: understanding the determinants of under-five mortality from 1990 to 2015. BMJ Glob Health. 2018; 3(3):e000655.

80. Keats EC, Ngugi A, Macharia W, Akseer N, Khaemba EN, Bhatti Z, Rizvi A, Tole J, Bhutta ZA. Progress and priorities for reproductive, maternal, newborn, and child health in Kenya: a countdown to 2015 country case study. Lancet Glob Health. 2017;5(8): e782–95. doi:10.1016/S2214-109X(17)30246-2.

81. Keats EC, Akseer N, Bhatti Z, Macharia W, Ngugi A, Rizvi A, Bhutta ZA. Assessment of inequalities in

coverage of essential reproductive, maternal, newborn, child, and adolescent health interventions in Kenya. JAMA Netw Open. 2018;1(8):e185152.

82. Lagat H, Sharma M, Kariithi E, Otieno G, Katz D, Masyuko S, Mugambi M, Wamuti B, Weiner B, Farquhar C. Impact of the COVID-19 pandemic on HIV testing and assisted partner notification services, Western Kenya. AIDS Behav. 2020;24:3010–13.

83. Odinga MM, Kuria S, Muindi O, Mwakazi P, Njraini M, Melon M, Kombo B, Kaosa S, Kioko J, Musimbi J, et al. HIV testing amid COVID-19: community efforts to reach men who have sex with men in three Kenyan counties. Gates Open Res. 2020:4.

84. Kakietek JJ, Eberwein JD, Stacey N, Newhouse D, Yoshida N. Foregone healthcare during the COVID-19 pandemic: early survey estimates from 39 low-and middle-income countries. Health Policy Plan. 2022.

85. Ahmed SAS, Ajisola M, Azeem K, Bakibinga P, Chen YF, Choudhury NN, Fayehun O, Griffiths F, Harris B, Kibe P, et al. Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and *Pakistan*: results of pre-COVID and COVID-19 lockdown stakeholder engagements. BMJ Glob Health. 2020;5(8):e003042.

86. Burki T. The indirect impact of COVID-19 on women. Lancet Infect Dis. 2020;20(8):904–05.

87. Sudhinaraset M, Landrian A, Mboya J, Golub G. The economic toll of COVID-19: a cohort study of prevalence and economic factors associated with postpartum depression in Kenya. Int J Gynecol Obstet. 2022.

88. Kenya Ministry of Health. Kenya community health strategy 2020 - 2025. Nairobi (Kenya); 2021.

89. Kimani RW, Maina R, Shumba C, Shaibu S. Maternal and newborn care during the COVID-19 pandemic in Kenya: re-contextualising the community midwifery model. Hum Resour Health. 2020;18:1–5.

90. Njiraini R, Hussein S. Kenya's community health volunteer program; 2020. https://chwcentral.org/kenyas-community-health-volunteer-program/#:~:text=Kenya's%20Community%20Health%20Strategy%20aims,and%20Newborn%20Health%2C%20among%20others.

91. Kowitt SD, Emmerling D, Fisher EB, Tanasugarn C. Community health workers as agents of health promotion: analyzing Thailand's village health volunteer program. J Community Health. 2015;40:780–88.

92. Mohajer N, Singh D. Factors enabling community health workers and volunteers to overcome socio-cultural barriers to behaviour change: meta-synthesis using the concept of social capital. Hum Resour Health. 2018;16:1–9.

93. Burnett-Zieman B, Abuya T, Mwanga D, Wanyugu J, Warren CE, Sripad P. Community-based postnatal care services for women and newborns in Kenya: an opportunity to improve quality and access? J Glob Health. 2021;11.

94. Grant M, Wilford A, Haskins L, Phakathi S, Mntambo N, Horwood CM. Trust of community health workers influences the acceptance of community-based maternal and child health services. Afr J Prim Health Care Fam Med. 2017;9:1–8.

95. Sripad P, McClair TL, Casseus A, Hossain S, Abuya T, Gottert A. Measuring client trust in community health workers: a multi-country validation study. J Glob Health. 2021;11.

96. Afulani PA, Aborigo RA, Walker D, Moyer CA, Cohen S, Williams J. Can an integrated obstetric emergency simulation training improve respectful maternity care? Results from a pilot study in Ghana. Birth. 2019;46:523–32.

97. Rubashkin N, Warnock R, Diamond-Smith N. A systematic review of person-centered care interventions to improve quality of facility-based delivery. Reprod Health. 2018;15:1–22.

98. Kolié D, Semaan A, Day L-T, Delvaux T, Delamou A, Benova L. Maternal and newborn healthcare providers' work-related experiences during the COVID-19 pandemic, and their physical, psychological, and economic impacts: findings from a global online survey. PLOS Global Public Health. 2022;2:e0000602.

99. Asefa A, Semaan A, Delvaux T, Huysmans E, Galle A, Sacks E, Bohren M.A, Morgan A, Sadler M, Vedam S, et al. The impact of COVID-19 on the provision of respectful maternity care: findings from a global survey of health workers. Women Birth. 2022;35(4):378–86.

Appendix

Table A1. Whose trust has declined.

	Trust improved or stayed same	Trust declined	p-val on chi2
Age: <25	186 (47.3%)	207 (52.7%)	.99
Age 25+	345 (47.3%)	384 (52.7%)	
Married or cohabitating/partnered: Yes	359 (47.2%)	401 (52.8%)	.93
Not married (single, widowed, divorced)	172 (47.5%)	190 (52.5%)	
First birth: Yes	156 (50.3%)	154 (49.7%)	.21
> 1 parity	375 (46.2%)	437 (53.8%)	
Educational attainment: Some secondary or below	269 (44.2%)	339 (55.8%)	.02
Completed secondary, attended college or university	262 (51.0%)	252 (49.0%)	
Employed (full or part time, formal or informal sector): No	394 (46.1%)	461 (53.9%)	.19
Yes	125 (50.8%)	121 (49.2%)	
Self-reported health: Fair, Poor, or Very poor	185 (43.6%)	239 (56.4%)	.053
Excellent, Very good, or Good	346 (49.6%)	352 (50.4%)	

Table A2. Among women reporting any negative care experience (n = 984), those reporting each reason for challenge/avoidance, and association with reported trust.

	Full sample	Among those who said that their trust same/improved	Among those who said that their trust declined	p-val (chi2)
Facility access barriers	499 (50.7%)	217 (48.4%)	282 (52.6%)	.19
Financial barriers	229 (23.3%)	88 (19.6%)	141 (26.4%)	.01
COVID-19 contagion fears	172 (17.5%)	75 (16.7%)	97 (18.2%)	.56
COVID-related restrictions (PPE, curfews, etc.)	135 (13.7%)	45 (10.0%)	90 (17.0%)	.002
Stockouts/shortages	77 (7.8%)	33 (7.4%)	44 (8.2%)	.62
Lack of transport	34 (3.5%)	17 (3.8%)	17 (3.2%)	.59
No time to go	29 (3.0%)	12 (2.7%)	17 (3.2%)	.65
Felt ill	23 (2.3%)	7 (1.6%)	16 (3.0%)	.14

Women could cite more than one problem.
p-value based on chi-square test comparing those who said their trust in the health system declined due to COVID-19 compared to those who said their trust improved or stayed the same.

Table A3. Who avoided and faced barriers, by characteristic, unadjusted odds ratios (standard errors).

	Antenatal care barriers	Did not deliver at preferred location	Family planning barriers	Avoided postpartum mother care	Avoided postpartum infant care	Delayed infant care	Feel unsafe accessing care
Age 25+ (ref)							
Age <25	1.12	0.81	1.23	1.00	0.91	0.88	1.08
	(0.14)	(0.10)	(0.27)	(0.17)	(0.21)	(0.14)	(0.14)
Not married (single, widowed, divorced) (ref)							
Married or cohabitating/partnered	0.72*	0.92	1.30	0.88	1.07	0.76	0.77*
	(0.09)	(0.12)	(0.31)	(0.15)	(0.25)	(0.12)	(0.10)
Parity > 1 (ref)							
First birth	1.04	1.30*	0.78	1.07	1.00	1.05	1.25
	(0.14)	(0.17)	(0.19)	(0.19)	(0.24)	(0.17)	(0.17)
Educational attainment: Completed secondary, attended college or university (ref)							
Some secondary or below	0.62***	0.90	1.22	0.96	0.96	0.92	0.78*
	(0.08)	(0.11)	(0.26)	(0.15)	(0.21)	(0.14)	(0.09)
Employed (full or part time, formal or informal sector): No (ref)							
Yes	0.93	0.96	1.21	0.79	1.29	1.31	0.98
	(0.13)	(0.14)	(0.30)	(0.16)	(0.32)	(0.22)	(0.14)
Self-reported health: Fair, Poor, or Very poor (ref)							
Excellent, Very good, or Good	0.53***	0.92	0.41***	0.45***	0.70	0.79	0.88
	(0.07)	(0.11)	(0.09)	(0.07)	(0.15)	(0.12)	(0.11)

*p < .05, ** p < .01, *** p < .001.

Table A4. Full model details, adjusted odds ratio (95% CI).

	Antenatal care barriers	Did not deliver at preferred location	Family planning barriers	Avoided postpartum mother care	Avoided postpartum infant care	Delayed infant care	Feel unsafe accessing care
Trust declined (vs., trust stayed same or increased)	1.58*** (1.23, 2.02)	1.20 (0.94, 1.53)	1.39 (0.90, 2.16)	2.24*** (1.57, 3.19)	1.73* (1.10, 2.75)	1.34 (0.98, 1.84)	1.50** (1.18, 1.92)
Age (continuous)	0.99 (0.96, 1.01)	1.04** (1.01, 1.06)	0.97 (0.93, 1.02)	1.00 (0.96, 1.03)	1.03 (0.98, 1.07)	1.01 (0.98, 1.04)	1.00 (0.98, 1.03)
Married/cohabitating/partnered (vs., single/widowed/divorced)	0.67** (0.51, 0.88)	0.97 (0.74, 1.27)	1.48 (0.86, 2.48)	0.98 (0.67, 1.43)	1.18 (0.72, 1.96)	0.81 (0.57, 1.13)	0.74* (0.57, 0.98)
First birth (vs., parity > 1)	0.81 (0.58, 1.14)	1.58** (1.13, 2.21)	0.80 (0.45, 1.40)	1.00 (0.64, 1.58)	1.15 (0.62, 2.12)	1.02 (0.67, 1.57)	1.17 (0.84, 1.64)
Some secondary education or below (vs., completed secondary/attended college or university)	0.53*** (0.41, 0.69)	0.97 (0.75, 1.25)	1.18 (0.75, 1.87)	0.89 (0.62, 1.25)	1.02 (0.62, 1.68)	0.87 (0.63, 1.22)	0.79 (0.61, 1.02)
Employed (full or part time, formal or informal sector) (vs., not employed)	0.92 (0.67, 1.25)	0.94 (0.69, 1.29)	1.28 (0.73, 2.23)	0.73 (0.47, 1.15)	1.02 (0.60, 1.73)	1.16 (0.79, 1.69)	0.94 (0.69, 1.28)
Self-reported health excellent/very good/good (vs., fair/poor/very poor)	0.53*** (0.41, 0.68)	0.90 (0.70, 1.17)	0.42*** (0.27, 0.65)	0.46*** (0.33, 0.65)	0.75 (0.47, 1.19)	0.88 (0.64, 1.22)	0.93 (0.72, 1.20)
4-7 ANC visits (vs., less than 4)	Not included	Not included	Not included	0.98 (0.68, 1.41)	0.78 (0.48, 1.26)	0.82 (0.58, 1.14)	Not included
8+ ANC visits (vs., less than 4)	Not included	Not included	Not included	1.48 (0.66, 3.28)	0.77 (0.28, 2.12)	0.95 (0.44, 2.06)	Not included
PCMC score (continuous)	Not included	Not included	Not included	0.99 (0.97, 1.01)	1.02 (0.99, 1.05)	0.98 (0.96, 1.00)	Not included
Full-term delivery (vs., < 38 weeks)	Not included	Not included	Not included	Not included	0.51** (0.31, 0.82)	0.83 (0.57, 1.19)	Not included