

Voices from the frontline: findings from a thematic analysis of a rapid online global survey of maternal and newborn health professionals facing the COVID-19 pandemic

Aline Semaan ^{1,2}, Constance Audet,¹ Elise Huysmans,¹ Bosede Afolabi,³ Bouchra Assarag,⁴ Aduragbemi Banke-Thomas ⁵, Hannah Blencowe,⁶ Séverine Caluwaerts,¹ Oona Maeve Renee Campbell,⁶ Francesca L Cavallaro,⁷ Leonardo Chavane,⁸ Louise Tina Day,⁶ Alexandre Delamou ⁹, Therese Delvaux,¹ Wendy Jane Graham ⁶, Giorgia Gon,⁶ Peter Kascak,¹⁰ Mitsuaki Matsui,¹¹ Sarah Moxon,⁶ Annette Nakimuli,^{12,13} Andrea Pembe,¹⁴ Emma Radovich ⁶, Thomas van den Akker,^{15,16} Lenka Benova¹

To cite: Semaan A, Audet C, Huysmans E, *et al.* Voices from the frontline: findings from a thematic analysis of a rapid online global survey of maternal and newborn health professionals facing the COVID-19 pandemic. *BMJ Global Health* 2020;**5**:e002967. doi:10.1136/bmjgh-2020-002967

Handling editor Seye Abimbola

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bmjgh-2020-002967>).

Received 22 May 2020
Revised 2 June 2020
Accepted 5 June 2020



© Author(s) (or their employer(s)) 2020. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Aline Semaan;
aline.t.semaan@gmail.com

ABSTRACT

Introduction The COVID-19 pandemic has substantially impacted maternity care provision worldwide. Studies based on modelling estimated large indirect effects of the pandemic on services and health outcomes. The objective of this study was to prospectively document experiences of frontline maternal and newborn healthcare providers.

Methods We conducted a global, cross-sectional study of maternal and newborn health professionals via an online survey disseminated through professional networks and social media in 12 languages. Information was collected between 24 March and 10 April 2020 on respondents' background, preparedness for and response to COVID-19 and their experience during the pandemic. An optional module sought information on adaptations to 17 care processes. Descriptive statistics and qualitative thematic analysis were used to analyse responses, disaggregating by low-income and middle-income countries (LMICs) and high-income countries (HICs).

Results We analysed responses from 714 maternal and newborn health professionals. Only one-third received training on COVID-19 from their health facility and nearly all searched for information themselves. Half of respondents in LMICs received updated guidelines for care provision compared with 82% in HICs. Overall, 47% of participants in LMICs and 69% in HICs felt mostly or completely knowledgeable in how to care for COVID-19 maternity patients. Facility-level responses to COVID-19 (signage, screening, testing and isolation rooms) were more common in HICs than LMICs. Globally, 90% of respondents reported somewhat or substantially higher levels of stress. There was a widespread perception of reduced use of routine maternity care services, and of modification in care processes, some of which were not evidence-based practices.

Key questions

What is already known?

- In addition to lack of healthcare worker protection, staffing shortages, heightened risk of nosocomial transmission and decreased healthcare use described in previous infectious disease outbreaks, maternal and newborn care during the COVID-19 pandemic has also been affected by large-scale lockdowns/curfews.
- The two studies assessing the indirect effects of COVID-19 on maternal and child health have used models to estimate mortality impacts.
- Experiences of frontline health professionals providing maternal and newborn care during the COVID-19 pandemic have not been empirically documented to date.

Conclusions Substantial knowledge gaps exist in guidance on management of maternity cases with or without COVID-19. Formal information-sharing channels for providers must be established and mental health support provided. Surveys of maternity care providers can help track the situation, capture innovations and support rapid development of effective responses.

INTRODUCTION

Coronavirus disease (COVID-19) has affected 5.5 million cases as of 28 May 2020 and caused more than 350 000 deaths globally,¹ with an estimated case fatality rate of 2.3%.² This highly infectious disease is transmitted through close contact with

Key questions

What are the new findings?

- Respondents in high-income countries more commonly reported available/updated guidelines, access to COVID-19 testing and dedicated isolation rooms for confirmed/suspected COVID-19 maternity patients.
- Levels of stress increased among health professionals globally, including due to changed working hours, difficulties in reaching health facilities and staff shortages.
- Healthcare providers are worried about the impact of rapidly changing care practices on health outcomes: reduced access to antenatal care, fewer outpatient visits, shorter length of stay in facilities after birth, banning birth companions, separating newborns from COVID-19 positive mothers and postponing routine immunisations.

What do the new findings imply?

- COVID-19 illustrates the susceptibility of maternity care services to emergencies, including by reversing hard-won gains in healthcare utilisation and use of evidence-based practices.
- Maternity care differs from other services, inasmuch as healthy women are being brought into health facilities that are operating suboptimally, and potentially increasing risk of infection, from COVID-19 and other healthcare-associated infections.
- These rapid findings can inform countries of the main issues emerging and help develop effective responses, but similar efforts are needed to understand women's experiences.

infected persons or via contaminated surfaces. Vertical transmission (antenatally or intrapartum) remains a possible concern,^{3 4} and COVID-19 effects during the first and second trimesters of pregnancy are unclear. Breastfeeding continues to be encouraged with appropriate hygiene measures, including wearing face masks.^{5 6} The limited available evidence suggests that pregnant women do not face higher risks of infection and disease severity.⁷⁻⁹ A meta-analysis of 41 pregnant women with COVID-19 showed higher risk of preterm birth, pre-eclampsia and caesarean section.¹⁰ Symptoms among newborns seem to be mild,¹¹ though one study reported a higher perinatal death risk.¹⁰ More data and larger sample sizes must be collected to draw definitive conclusions.¹² It is prudent to protect pregnant women from COVID-19 through both individual-level and population-level measures, considering the increased risk of infection with other respiratory viruses such as influenza, and the increased mortality linked with H1N1.¹⁰ However, recommendations to avoid infection remain similar for pregnant women and the general public.¹³ Some countries, such as the UK, categorised pregnant women as a vulnerable group and issued stricter measures for them.⁷

The pandemic's indirect effects will likely surpass the direct infection effects on women and newborns. Previous outbreaks severely reduced health systems' capacity to provide essential maternal and newborn health (MNH) care, with negative impacts on health outcomes.¹⁴⁻¹⁶ Ebola virus disease (EVD), severe acute respiratory syndrome and Middle East respiratory

syndrome (MERS) outbreaks highlighted challenges in countries' preparedness to face outbreaks, amplified by weak existing systems. These include lack of protection of healthcare workers leading to disruptions in staffing, heightened risk of nosocomial transmission and elevated stress among service providers.^{17 18} Other indirect consequences of outbreaks include limited capacity for public health surveillance and lower use of healthcare.¹⁹⁻²¹ During the COVID-19 pandemic, large disruptions to healthcare provision and utilisation also stem from unprecedented large-scale measures implemented by countries (eg, lockdowns, curfews and transport restrictions). Indirect influences of previous outbreaks persisted long after their containment,²² but much of the evidence available about MNH is modelled or uses secondary data such as population-based surveys and routine health information systems that are originally collected for purposes other than studying the effect of the outbreak on MNH and fail to prospectively document these impacts over time.^{19 23 24}

To date, studies assessing potential indirect effects of the COVID-19 pandemic on sexual, reproductive, maternal and child health in low-income and middle-income countries (LMICs) have used modelling approaches. Roberton and colleagues²⁵ modelled three scenarios projecting a decrease in the coverage of basic life-saving interventions. They estimated an increase in maternal deaths between 12 190 and 56 700, and 253 500–1 157 000 additional deaths of children under 5 years. Similar conclusions were drawn by Riley *et al*,²⁶ who projected that a modest decline in the use of sexual and reproductive healthcare services in 132 LMICs will result, over a year, in 48 million additional women with unmet need for modern contraceptives, 15 million additional unwanted pregnancies and over 3 million additional unsafe abortions. It is therefore critical that the precise nature of both direct and indirect impacts of COVID-19, and the adaptations and innovations tested to reduce its impact are prospectively captured and described.²⁷

Health professionals' views and experiences when providing care to women and newborns during this pandemic have not been empirically documented to date, and there is a necessity for prospectively assessing the effects of the COVID-19 pandemic on MNH services. The objective of this paper is to synthesise key themes identified in the first round of a global online survey of health professionals working in MNH along four dimensions: preparedness for COVID-19, response to COVID-19, personal experience in the workplace and changes in care provision and processes. This online survey is part of a larger study seeking to: (1) understand how health professionals and health facilities prepare and respond to COVID-19 in regard to the care provided to women and their babies; and (2) document and analyse the effect of the COVID-19 pandemic on the services available to pregnant, labouring and

postpartum women and their newborns, including as a result of increasing pressures on the healthcare system.

METHODS

Study design, population and sampling

This is a cross-sectional study of health professionals providing MNH care services. The target population was health professionals directly providing maternal (antenatal, intrapartum and/or postnatal) or newborn care, including midwives, nurses, obstetricians/gynaecologists, neonatologists, paediatricians, anaesthetists, general practitioners, medical officers, clinical officers, community health workers, lactation counsellors, paramedics, health technicians and health professionals in training. Due to the unavailability of a global sampling frame for this study population, sampling was non-random and not intended to generate generalisable nationally representative results of either health professionals or facilities. Rather, our intention was to collect and synthesise the voices and experiences of MNH professionals from various countries, contexts, services and facility types at the early stage of the COVID-19 pandemic. An invitation to complete the survey was distributed using personal networks of the multicountry research team members, maternal/newborn platforms and social media (eg, Facebook, Twitter and WhatsApp). Respondents were encouraged to share the survey with other colleagues in an attempt to snowball the sample population. Respondents provided informed consent online by checking a box affirming that they voluntarily agreed to participate in the survey.

Questionnaire

A questionnaire was developed in English by an international team of collaborators including health professionals, experts in health systems, infectious diseases, infection prevention and control, maternal health epidemiologists and public health researchers from various global settings. It was piloted by asking five MNH professionals from different settings to complete the questionnaire and provide feedback, which was used to assess face validity and refine the wording of questions and response options. The final version was translated into 11 languages that were made available consecutively (French and Arabic were available at launch; Italian, Portuguese, Spanish, Japanese, German and Dutch were available within 10 days; Chinese, Russian and Kiswahili were added after 3 weeks). We collected data on respondents' background, preparedness for COVID-19, response to COVID-19 and own work experience during the pandemic. All respondents were invited to participate in an optional module that asked about adaptations to 17 care processes and respondents' perceptions regarding changes in the uptake of care by women and newborns. The questionnaire is provided in online supplementary file 1.

Data processing and analysis

We use responses collected between 24 March and 10 April 2020. We cleaned 798 received responses by removing duplicate submissions (n=49), refusals to participate (n=14) and submissions made by those not directly providing maternal or newborn care (eg, lecturers and public health officials; n=10). Quantitative analysis involved descriptive statistics (frequencies and percentages) using Stata/SE V.14. Responses were stratified by country income levels according to World Bank classification.²⁸ We conducted a qualitative thematic analysis of free-text answers to derive common themes of respondents' experiences and changes in the work environment and care process by country income levels. When possible, we triangulated qualitative and quantitative results to validate emerging themes.

Missing data

From the 725 remaining responses, we dropped from the analysis 11 responses with missing answers on more than 90% of questions. The extent of missingness to closed-ended questions ranged from 0.5% to 6.5% and that to open-ended questions from 16% to 28% of respondents. Missing answers to the 'Country' question were recoded based on the 'Region' answer for 93 responses; for example, a respondent with a missing response for country but region reported as Maharashtra was coded as from India.

RESULTS

Respondents' characteristics

The sample included 714 MNH care professionals, 59% of whom participated in the questionnaires' optional module (n=397). Participants worked in 81 countries and 63% were from high-income countries (HICs; table 1). Online supplementary file 2 includes a map showing respondents' geographic distribution and the total number of confirmed cases as of the midpoint of our data collection period (1 April 2020). Most were obstetricians/gynaecologists or midwives (38% and 35%, respectively), and around 60% worked in public sector facilities. Nearly half of respondents from HICs (49%) reported that their facilities had seen COVID-19 confirmed or suspected maternity patients, compared with 13% of respondents from LMICs.

Knowledge on providing MNH care and COVID-19

Most respondents (90%) received information on COVID-19, including on transmission, treatment, prevention, screening and updated policies, and only one-third attended trainings/drills on the response to COVID-19 (table 2). Several perceived that trainings would make them 'feel better prepared' to respond to women's needs during the outbreak.

Half of LMIC-based respondents received updated guidelines reflecting measures for the outbreak when providing MNH care, compared with 82% of those from HICs (table 2). This was a source of concern for some

Table 1 Background characteristics of maternal and newborn healthcare providers who responded to the survey and optional module

	Survey n=714* (%)	Optional module n=397* (%)
Country income level (World Bank classification)		
Low-income and middle-income countries	263 (37)	136 (35)
High-income countries	444 (63)	256 (65)
Region		
East Asia and Pacific	82 (12)	51 (13)
Europe and Central Asia	249 (35)	131 (33)
Latin America and Caribbean	43 (6)	30 (8)
Middle East and North Africa	53 (7)	29 (7)
North America	87 (12)	53 (14)
South Asia	83 (12)	37 (9)
Sub-Saharan Africa	110 (16)	61 (16)
Cadre		
Midwife	248 (35)	135 (34)
Nurse-midwife	83 (12)	48 (12)
Nurse	22 (3)	14 (4)
Obstetrician/gynaecologist	269 (38)	148 (38)
Neonatologist	6 (1)	3 (1)
Paediatrician	4 (1)	4 (1)
General practitioner	10 (1)	5 (1)
Medical doctor (no specialisation)	15 (2)	10 (3)
Medical student/intern/resident	13 (2)	6 (2)
Community health worker/outreach worker	12 (2)	6 (2)
Other	29 (4)	16 (4)
Position		
Head of facility	60 (9)	34 (9)
Head of department or ward	71 (10)	41 (11)
Head of team	94 (13)	54 (14)
Team member	346 (50)	195 (50)
Locum or interim member	22 (3)	10 (3)
Other†	101 (15)	53 (13)
Type of care provided (multiple responses allowed)		
Outpatient ANC	438 (61)	244 (62)
Home-based childbirth care	77 (11)	47 (12)
Outpatient PNC	316 (44)	176 (45)
Outpatient breastfeeding support	217 (30)	121 (31)
Inpatient ANC	374 (52)	218 (56)
Inpatient childbirth care	437 (61)	249 (64)
Inpatient PNC	350 (49)	193 (50)
Surgical care	213 (30)	115 (29)
Neonatal care (small and sick newborns)	85 (12)	47 (12)
Home visits	131 (18)	78 (20)
Community outreach	105 (15)	69 (18)
Abortion care	157 (22)	86 (22)
Postabortion care	179 (25)	104 (27)
Other	84 (12)	42 (11)
Health facility level		
Referral hospital	250 (36)	144 (37)

Continued

Table 1 Continued

	Survey n=714* (%)	Optional module n=397* (%)
District/regional hospital	154 (22)	77 (20)
Health centre	76 (11)	46 (12)
Polyclinic	6 (1)	6 (2)
Clinic	66 (10)	36 (9)
Health post/unit or dispensary	16 (2)	9 (2)
Other‡	116 (17)	68 (18)
Health facility sector		
Public (national)	183 (27)	86 (22)
Public (university or teaching)	138 (20)	81 (21)
Public (district level or below)	80 (12)	61 (16)
Social security	7 (1)	3 (1)
Health insurance or HMO	10 (2)	7 (2)
Private university	25 (4)	10 (3)
Private for profit	95 (14)	57 (15)
Non-governmental	61 (9)	29 (8)
Faith-based or mission	23 (3)	15 (4)
Other	56 (8)	34 (9)
Type of area		
Large city (more than 1 million inhabitants)	273 (40)	151 (39)
Small city (100 000 to 1 million inhabitants)	220 (32)	125 (32)
Town (fewer than 100 000 inhabitants)	106 (16)	61 (16)
Village/rural area	64 (9)	38 (10)
Refugee/displaced persons camp	8 (1)	2 (1)
Other	9 (1)	9 (2)
Facility characteristics		
Caesarean section provision	535 (81)	301 (81)
Accept referrals from other facilities	476 (71)	269 (71)
ICU available	429 (64)	236 (62)
NICU available	398 (59)	226 (59)

*Differential number of missing values across variables.

†Mainly self-practising midwives.

‡Mainly birth centres and private practice.

ANC, antenatal care; HMO, Health maintenance organisation; ICU, intensive care unit; NICU, neonatal intensive care unit; PNC, postnatal care.

respondents from Tanzania, Rwanda, Uganda and India, as remarked by an obstetrician/gynaecologist from Uganda: *'I am worried that no national guidelines [are] rolled out yet regarding care for pregnant women and newborns'*. Some midwives in HICs requested clearer guidelines on home-based midwifery care. Nearly all respondents searched personally for information on COVID-19 (92%) and received informal guidance from colleagues (90%, table 2). Some LMIC-based participants worried about lack of access to/availability of evidence on COVID-19 effects during pregnancy and possible transmission to fetus and/or newborn. Only 19% of participants perceived that they were completely knowledgeable of providing care to COVID-19 maternity patients (table 2).

Personal experiences

Facilities adopted several measures in response to COVID-19. Most HIC-based respondents noted that their

Table 2 Preparedness for COVID-19 among maternal and newborn health professionals, by country income category

	LMIC n=263 (%)	HIC n=444 (%)	Total* n=714 (%)
Institution provided information on how to prepare for COVID-19	217 (86)	403 (93)	620 (90)
Institution provided training on COVID-19	94 (37)	143 (34)	237 (35)
Received updated guidelines for MNH care provision because of COVID-19	118 (47)	347 (82)	465 (69)
Personally searched for guidance and information to prepare for COVID-19	242 (95)	387 (90)	629 (92)
Received information related to COVID-19 informally through colleagues	230 (91)	386 (89)	616 (90)
Facility published materials covering COVID-19 targeted towards pregnant, labouring or postnatal women	98 (38)	194 (46)	292 (43)
Perception that patients' questions were adequately answered at facility	145 (57)	267 (64)	412 (61)
Level of knowing how to provide care for a woman with COVID-19			
Not at all clear	16 (6)	6 (1)	22 (3)
Some points clear but not confident in what to do	59 (24)	43 (10)	102 (15)
Somewhat clear but major issues remain	56 (23)	84 (20)	140 (21)
Mostly clear but some areas of concern remain	80 (32)	203 (48)	283 (42)
Very clear	38 (15)	90 (21)	128 (19)

*Differential number of missing values across variables.

HICs, high-income countries; LMICs, low-income and middle-income countries; MNH, maternal and newborn health.

facilities set up a sign-posted entrance and screening area (75%) and reserved isolation rooms for COVID-19 suspected cases (83%), compared with 37% and 57% of LMIC-based respondents, respectively (table 3). Most

facilities (62%) reportedly designated a COVID-19 liaison person/team. Screening for COVID-19 symptoms among maternity patients was more commonly reported by respondents from HICs (76%). For example, antenatal

Table 3 Response to COVID-19 among maternal and newborn health professionals and their workplaces, by country income category

	LMIC n=263 (%)	HIC n=444 (%)	Total* n=714 (%)
Sign-posted area for screening of COVID-19 suspected cases in facility			
No	38 (15)	32 (8)	70 (11)
Some measures taken	106 (42)	65 (16)	171 (26)
Yes	95 (37)	298 (72)	393 (59)
Reserved isolation rooms for suspected cases	143 (57)	341 (83)	484 (73)
Screening for COVID-19 symptoms among maternity patients	117 (47)	320 (76)	437 (75)
Possible to order a test for COVID-19 for maternity patients	58 (23)	258 (61)	316 (47)
Sufficient PPE items			
Gloves	174 (70)	399 (92)	578 (84)
Masks	117 (47)	224 (52)	345 (50)
Aprons	88 (36)	260 (61)	352 (52)
All three types	79 (32)	188 (44)	267 (40)
Respondents' work affected by COVID-19	177 (71)	372 (86)	549 (81)
Respondents' stress levels			
Same as usual	21 (8)	47 (11)	68 (10)
Somewhat higher than usual	136 (54)	215 (50)	351 (52)
Substantially higher than usual	93 (37)	167 (39)	260 (38)

*Differential number of missing values by variables.

HICs, high-income countries; LMICs, low-income and middle-income countries; PPE, personal protective equipment.

care (ANC) outpatients and inpatients were screened either in person or over the phone before appointments/admission. The ability to test maternity patients for COVID-19 was limited in LMICs (23%), rural areas (9% in LMICs; 28% in HICs) and completely unavailable in refugee and/or displaced persons camps (n=6, data not shown).

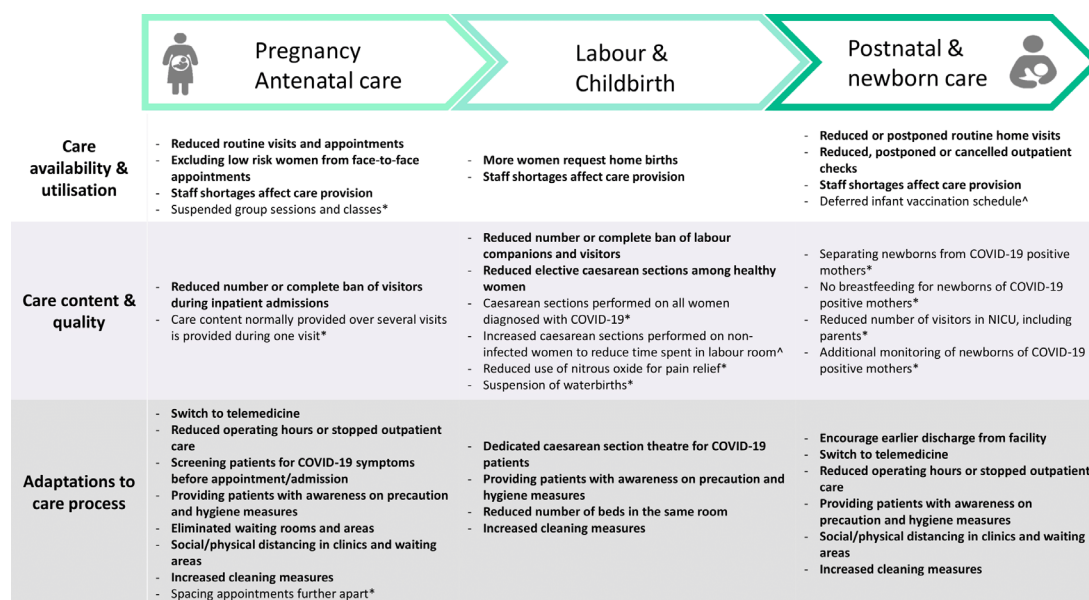
Healthcare workers reported various concerns regarding care provision during the outbreak. Respondents perceived the lack of COVID-19 symptom screening and testing as threats to staff and patient safety. A midwife from Canada wrote, 'I'm worried about being infected by someone who is asymptomatic, and then being a vector to others'. Personal protective equipment (PPE) deficiencies also compromised patients' and healthcare providers' safety across all settings but more prominently in LMICs (table 3). A midwife from the UK pleaded, 'let midwives who are in close contact with women wear masks. Please let us use masks for all'. Respondents advocated for clear and unified protocols regarding PPE use. A nurse-midwife from the USA wrote, 'we are not allowed to wear masks and goggles unless delivering a patient, we're told to « take the mask off or go home », that we're scaring the patients'. Despite the need to feel protected, respondents described wearing additional PPE as time-consuming and worried about delays in providing emergency care because of donning and doffing PPE. There were additional concerns that PPE disrupts clear communication with patients; a midwife from Denmark remarked that '[i]t can be hard to connect with people through masks and [goggles], facial expressions are harder to read'.

Most respondents noted that COVID-19 affected their work (81%) and that their stress levels were higher than usual (90%, table 3). An obstetrician from Mozambique described, 'My stress level is immeasurable. Every time a pregnant

woman with flu-like symptoms [visits the health facility], I feel almost completely lost. I need to be equally protected and I don't feel any protection from whoever [is responsible of protecting me]'. Challenges included shortage of qualified staff, either because of symptoms, self-isolation after potential exposure, or inability to reach their workplace, as a midwife in Uganda described: '[t]ransport to work is a big challenge due to lockdown; many staff live far away from the hospital. Staff who manage to come to work hurry to leave early to observe the curfew time of 7.00p.m.'. This shortage led to an increase in workload and frequent changes in schedules. Certain healthcare facilities increasingly relied on locum workers and students to fill staffing shortages. Some respondents requested more support from management as exhaustion increased. A department head in Uganda reported, '[t]here are no more clear work schedules as I get to attend many unscheduled/emergency meetings. Staff are very anxious and panicky and need talking to all the time, which is exhausting'. Some participants from LMICs such as India, Bangladesh, Bolivia and Syria expressed concerns regarding 'patients and relatives not following instructions given by staff members', such as social/physical distancing and hygiene. A nurse from Syria attributed this to a 'lack of awareness and knowledge, and indifference among beneficiaries'.

Changes to care provided to women and newborns

Figure 1 displays major reported changes in service provision and utilisation, care content and quality, and care processes across the continuum of care. In all settings and across the continuum of care, participants saw fewer patients at facilities, due to transportation restrictions or fear of nosocomial transmission. A nurse-midwife from Kenya wrote, '[a]ccessing inpatient antenatal care [is] minimal. Women fear [getting] infected with COVID-19 if [they are] in hospitals. Most of them keep off from hospital even when



Items in **bold** were commonly mentioned by respondents from a range of settings, including LMICs and HICs. *Reported in high income countries. ^Reported in low- and middle-income countries.

Figure 1 Reported changes to service provision across the continuum of maternal and newborn care. HICs, high-income countries; LMICs, low-income and middle-income countries; NICU, neonatal intensive care unit.

they are sick'. Most respondents noted shorter visiting hours and fewer allowed visitors, while others reported screening visitors for symptoms or banning visits altogether. The number of labour companions was limited to one person (also allowed to accompany the mother after birth), or none at all. An obstetrician from the Czech Republic remarked that: '*[the] Gynaecological and Obstetrical Society recommended to ban partners and doulas from accompanying a woman at birth - outrageous!!!*'.

Among the reported changes, some facilities implemented social/physical distancing in waiting areas and in hospital rooms by reducing the number of beds. However, this was difficult to achieve in small facilities; an obstetrician/gynaecologist from India noted: '*[It is] not practically possible [to place each patient in a separate birthing room] in our set up*'. Non-essential services including elective gynaecological procedures and infertility treatments were postponed or cancelled. Several facilities restricted routine ANC to the management of high-risk patients. A respondent from New York reported a '*significant decrease in number of ANC visits*', whereby new policies recommended reducing face-to-face visits during pregnancy '*from 10 to 12 [visits], to four [visits]*'. Other changes include eliminating waiting areas, spacing appointments to reduce contact between patients and cancelling group activities such as health education sessions.

The pandemic entailed adaptations to care process and content, subsequently affecting quality. ANC and postnatal care (PNC) provision and breastfeeding counselling shifted to telemedicine. Participants in LMICs acknowledged that women's inadequate access to communication infrastructure prevents equitable health-care provision. Respondents were concerned over uncertain impacts of reduced contacts on the quality of care. A midwife from the UK wrote: '*[w]hilst I completely see the need to restrict face-to-face care to protect staff and patients, my heart just breaks for women and families who we won't be able to offer the full range of midwifery support to... that is, breastfeeding support, daily visits, and just generally our time*'. Across all settings, the demand for home births increased and new practices aimed to reduce labour inductions. In certain HICs, induction of labour was discouraged before 41 weeks of gestation, using nitrous oxide for pain relief diminished to reduce risk of transmission through aerosols, and waterbirths were suspended. Caesarean sections were commonly performed among women diagnosed with COVID-19 and some facilities dedicated theatres specifically for this purpose. Elective caesarean sections decreased among 'healthy' maternity patients. However, some facilities aimed to reduce labour duration and time spent in the labour room by augmentation. Respondents speculated about a potential rise in caesarean section rates in their facilities, as noted by an obstetrician/gynaecologist from India: '*We will not allow as much time in second stage [of labour], this is likely to push up our caesarean rate*'.

Respondents frequently mentioned shortened length of stay in facilities after childbirth; for example, a reduction '*to 6–8 from 24 or more [hours]*' (midwife from Canada).

A midwife from the UK wrote, '*[the] lack of time and staff will lead to mothers and babies going home with very little feeding support or knowledge which will have a short and long term impact on their health and ability to deal with infections*'. Routine postnatal checks were postponed or substituted with telemedicine in some cases as reported by a nurse-midwife from the USA, '*[w]e are postponing the routine postpartum visit until 12 weeks postpartum, and are prescribing most contraceptives over the phone and breastfeeding support is all done virtually*'. Changes to newborn PNC were infrequent and included monitoring and isolating babies of mothers with COVID-19. Three respondents from India noted that vaccination schedules were disrupted or postponed. MNH professionals feared that changes in standards of care would lead to poor health outcomes among women and newborns and subsequently to the loss of achieved progress. '*I am worried about the implications of policies that call for separating newborns from COVID-19 positive mothers immediately after birth, without allowing for skin-to-skin or delayed cord clamping*', wrote a nurse-midwife from the USA.

DISCUSSION

This paper uses a rapid collection of data from health professionals providing care to women and newborns globally during initial stages of the COVID-19 pandemic. We describe preparedness for COVID-19, response to COVID-19, personal experience in the workplace and changes in care provision and processes.

Preparedness

Healthcare providers commonly resort to personal searches and informal networks to fulfil information needs.²⁹ Accessing unreliable information related to COVID-19 is likely, particularly on social media.^{30–31} Facility-specific creation and distribution of guidelines for managing maternity patients is somewhat lagging behind despite frequent updates by Ministries of Health and professional associations.^{32–38} Information sharing channels must be established to secure providers' timely access to accurate information.^{39–41} Midwives supporting pregnant and labouring women during the pandemic,^{42–43} particularly independent practitioners, need clear guidelines for providing home-based care.⁴⁴

Response

Sharp discrepancies in facility-level responses to COVID-19 between HICs and LMICs could stem from the differential progression of the outbreak (online supplementary file 2) or be partly attributed to limited health system capacities and resources in some countries.⁴⁵ An attenuated outbreak is speculated in Africa, yet it is equally possible that trends similar to those witnessed in Europe will occur.^{46–47} This indicates an urgent need to mobilise resources, improve testing capacities and upgrade responses, with the needs and complexities of MNH care provision in mind. Absence of testing in refugee and/or displaced persons camps raises concerns.

Overcrowding and inadequate water and sanitation in underserved settlements are barriers to basic infection prevention measures.^{47–50} Displaced women's and newborns' access to MNH services is suboptimal, and they experienced poor outcomes before the pandemic-induced disruptions of essential care.^{51–54} Efforts should ensure that displaced populations are protected, with adequate access to testing, treatment and quality MNH care to halt anticipated exacerbations of negative health outcomes.^{26 49}

Personal experiences

MNH care workers during the pandemic experience increased stress and anxiety, consistently with experiences from previous outbreaks.^{18 41} Stress levels in LMICs were comparable with those in HICs, although countries were battling different outbreak stages (online supplementary file 2). This might be due to uniformly reported shortages in skilled workforce leading to higher workloads and staff burnout.^{45 55} Wilson *et al*⁴¹ suggest measures to prevent burnout among maternity care providers along prioritising adequate emotional, social and mental health support, including from managers.^{18 56} As our findings show, this adds burdens to management staff, a group that deserves special focus during this outbreak.⁴¹ Reliance on students increases their vulnerability to stressors considering their lack of experience, and senior colleagues should actively advocate for their well-being.⁴¹ Future research should explore the availability and effectiveness of mental and social support to MNH care providers during the pandemic.⁵⁷

Insufficient PPE intensifies the fear of nosocomial transmission. In some facilities, PPE supplies are prioritised for departments treating COVID-19 cases and do not reach maternity wards. MNH care workers and patients could experience uneven risks of nosocomial infection during outbreaks.^{58 59} In some countries, obstetricians/gynaecologists commonly work in multiple facilities, and their risk of exposure might be exacerbated by the higher number of contacts they experience in this dual practice.⁶⁰ Although PPE are essential, their rational use is recommended by the WHO given universal shortage.⁶¹ These guidelines must be clearly communicated to MNH care providers and patients.⁴¹ Health workers caring for women around the time of birth might be used to wearing some PPE; yet, it can make them feel dehumanised, and the donning and doffing of PPE might delay emergency service provision.^{18 62}

Changes in care provision and processes

Care practices are rapidly changing and their consequences on health outcomes are uncertain. Our findings support narratives told by healthcare providers,⁶³ and align with disruptions witnessed during previous outbreaks,^{55 64–66} which have increased maternal and neonatal mortality.^{19 67} Currently, there are signs of similar trends in two maternity hospitals in Uganda.⁶⁸ Our knowledge of the impact of these changes is

restricted to predictions resulting from modelling, which strongly suggest a threat to achieved improvements in LMICs.^{25 26} The actual impact is yet to be quantified,²⁵ and the effect in HICs remains unclear. Prioritising measures depending on contextual needs can mitigate the pandemic's indirect consequences.^{25 27}

Previous outbreaks of infectious diseases such as EVD in West Africa and MERS in South Korea have imposed barriers to healthcare access and utilisation, including fear of nosocomial transmission, healthcare facilities' closure and loss of trust in the healthcare workforce.^{55 66 69} Our findings show that in the case of COVID-19, fear of disease spread was perceived to reduce healthcare use, and unprecedented societal measures such as lockdowns, curfews and transport restrictions emerge as new challenges to healthcare provision and utilisation.

Although some changes to care content and process matched updated guidelines,^{37 70 71} other modifications diverge from available evidence. These include eliminating birth companions,^{72 73} banning visitors, performing caesarean section on all COVID-19 positive women,^{73 74} augmenting labour or performing unindicated caesarean sections to control timing of deliveries, separating newborns from COVID-19 positive mothers, not allowing breast feeding⁷⁵ and reducing length of stay with fewer home-based follow-ups.⁴⁴ Such practices deny women's access to quality care and jeopardise their well-being and that of their babies.⁷⁶ Unlike curative services, maternity care provides holistic support to women going through a normal physiological process; both overintervention and underintervention can result in a massive preventable burden. Additionally, and although only reported in India in our survey, alarming disruptions or delays in routine immunisation are also implemented in other LMICs.⁷⁷ During EVD outbreak, vaccination activities were similarly disrupted for safety purposes, leading to substantial declines in immunisation coverage.⁵⁵ Catch-up campaigns should be prioritised following the relaxation of preventive measures.^{77 78} Introducing new models of care such as telehealth guidance^{26 70} was described as a 'virtually perfect solution' to continuing care provision.⁷⁹ However, this model is not compatible with all healthcare services and providers dread its impact on care quality.⁴⁴

Patient and community resistance to outbreak control measures and mutual incomprehension between patients and providers could shape the impact of COVID-19 on MNH care. Health-seeking behaviours rely on provider–patient relationships and common cultural, economic and social understanding of health and hygiene.^{80–83} Hierarchical issues may affect MNH care quality as shown in West African urban areas and Malagasy hospitals.^{80 81 84} Understanding social and cultural responses to epidemics is essential to mitigate disasters⁸⁵ and avoid a top-down management of outbreak guidelines that may miss the mark of pre-existing factors.⁸⁶

Limitations

The lack of representativeness and related sample bias are limitations of this sampling approach. Our sample might over-represent higher qualified cadres of health professionals in settings with limited use of technology among lower cadres of staff, and under-represent overstretched staff, or those with limited or no access to internet connection, as we received few responses from professionals working in lower level facilities, particularly in LMICs. Some cadres were less represented (eg, neonatologists and paediatricians). The sample's representativeness is affected by the availability of the survey in three languages (English, French and Arabic) for a longer time than the remaining nine languages. The questionnaire asks about facilities where respondents work, which is not relevant to independently practising professionals, especially midwives; this might have discouraged some of them from completing the survey. Finally, data were collected across countries going through different stages of the outbreak; in some countries, responding to such surveys is discouraged or forbidden by authorities (eg, China).

CONCLUSION

This is the first study describing the preparedness for, response to, and effect of the COVID-19 pandemic on MNH care provision. The multicountry survey creates an innovative platform for lessons to be documented and shared. Our findings, ideally combined with an understanding of women's perspectives, hold enormous potential for establishing a timely, evidence-based decision-making platform. Continued collection, rapid synthesis and timely dissemination of health workers' voices to planners, programmers and policymakers is crucial to guide the development and implementation of contextually relevant guidance.

The COVID-19 pandemic illustrates a susceptibility to emergencies, which is not restricted to healthcare systems in LMICs. This crisis is challenging health systems and providers and disrupting access to basic services worldwide. Health system preparedness might have been equally inadequate in LMICs and HICs in some aspects, such as shortage in skilled staff, training provision and PPE sufficiency. However, it is likely that HICs were able to respond more effectively due to better health system resilience such as existing coordination systems to develop and implement changes to protocols.⁸⁷ Findings from this study will be useful in supporting the development of effective responses to main identified issues, during various stages of the COVID-19 pandemic and more broadly during future health system shocks.

Author affiliations

¹Department of Public Health, Institute of Tropical Medicine, Antwerpen, Belgium

²Center for Research on Population and Health, American University of Beirut Faculty of Health Sciences, Beirut, Lebanon

³Department of Obstetrics and Gynaecology, College of Medicine, University of Lagos, Lagos, Nigeria

⁴National School of Public Health, Ministry of Health, Rabat, Morocco

⁵LSE Health, London School of Economics and Political Science, London, UK

⁶Faculty of Epidemiology and Population Health, London School of Hygiene & Tropical Medicine, London, UK

⁷Institute of Child Health, University College London, London, UK

⁸Department of Community Health, Faculty of Medicine, Eduardo Mondlane University, Maputo, Mozambique

⁹Africa Centre of Excellence for Prevention and Control of Transmissible Diseases (CEA-PCMT), Université Gamal Abdel Nasser de Conakry, Conakry, Guinea

¹⁰Department of Obstetrics and Gynaecology, General Hospital Trencin, Trencin, Slovakia

¹¹Department of Global Health, Nagasaki University School of Tropical Medicine and Global Health, Nagasaki, Japan

¹²Department of Obstetrics & Gynaecology, Makerere University, Kampala, Uganda

¹³Department of Obstetrics and Gynaecology, Mulago Specialized Women and Neonatal Hospital, Kampala, Uganda

¹⁴Department of Obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, United Republic of Tanzania

¹⁵Department of Obstetrics and Gynaecology, Leiden University Medical Centre, Vrije Universiteit Amsterdam, The Netherlands

¹⁶Department of Obstetrics and Gynaecology, VU Amsterdam Athena Institute, Vrije Universiteit Amsterdam, The Netherlands

Twitter Aduragbemi Banke-Thomas @abankethomas, Wendy Jane Graham @profwendygraham and Lenka Benova @lenkabenova

Acknowledgements We would like to thank the study participants who took time to respond to this survey despite the difficult circumstances and increased workload. We acknowledge the Institutional Review Committee at the Institute of Tropical Medicine for providing helpful suggestions on this study protocol and for the expedited review of this study. We would like to thank all study collaborators and colleagues who distributed the invitation for this survey and provided suggestions on the questionnaire, including the coauthors of this paper, Dr Susannah Woodd and Dr Jean-Paul Dossou. We are immensely grateful to all those who volunteered to translate the survey, including Dr Francesca L Cavallaro, Dr Bouchra Assarag, Dr Karima Khalil, Dr Jose Penalvo, Dr Sonia Menon, Dr Claudia Nieto Sanchez, Virginia Castellano Pleguezelo, Dr Werner Soors, Verónica Blanco Gutiérrez, Dr Raffaella Ravinetto, Dr Manuela Straneo, Francesca Palestra, Dr Stacy Saha, Dr Shirajum Munira, Dr Mitsuaki Matsui, Wnurinham Silva, Dr Leonardo Chavane, Dr Enny S. Paixao, Min Dai, Dr Li Na, Dr Marc Snel, Dr Anna Larionova, Dr Vladimir Gordeev, Dr Christiane Schwarz, Evelyn Lesta, Elibariki Mkumbo, Dr Amani Kikula, Dr Elly Mertens and Hilde Cortier.

Contributors LB conceptualised the study and obtained funding. All authors contributed to the design of the study and development of the survey tool. AS analysed the data. CA, LB, EH and AS wrote the original draft of the manuscript. All authors contributed to the development of the manuscript and read and approved the final version. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. AS is the guarantor.

Funding This study was funded by the Institute of Tropical Medicine's COVID-19 Pump Priming fund supported by the Flemish Government, Science & Innovation. LB is funded in part by the Research Foundation – Flanders (FWO) as part of her Senior Postdoctoral Fellowship.

Disclaimer The funder had no role in the study design, data collection, analysis and interpretation of data or in writing the manuscript. Researchers are independent from funders, and all authors, external and internal, had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data, and the accuracy of the data analysis is also required.

Competing interests None declared.

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.

Patient consent for publication Not required.

Ethics approval This study was approved by the Institutional Review Committee at the Institute of Tropical Medicine (Antwerp, Belgium) on 20 March 2020 (approval reference 1372/20).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Anonymised data analysed in the current study will be made available from the corresponding author on reasonable request.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which

permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

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

Aduragbemi Banke-Thomas <http://orcid.org/0000-0002-4449-0131>

Alexandre Delamou <http://orcid.org/0000-0002-9397-7106>

Wendy Jane Graham <http://orcid.org/0000-0003-1473-5342>

Emma Radovich <http://orcid.org/0000-0002-8975-8015>

REFERENCES

- World Health Organization. Coronavirus disease (COVID-19) situation Report-129, 2020. Available: https://www.who.int/docs/default-source/coronavirus/situation-reports/20200528-covid-19-sitrep-129.pdf?sfvrsn=5b154880_2 [Accessed 29 May 2020].
- Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese center for disease control and prevention. *JAMA* 2020. [Epub ahead of print: 24 Feb 2020].
- Zeng H, Xu C, Fan J, *et al*. Antibodies in infants born to mothers with COVID-19 pneumonia. *JAMA* 2020. doi:10.1001/jama.2020.4861. [Epub ahead of print: 26 Mar 2020].
- Amoroux A, Attie-Bitach T, Martinovic J. Evidence for and against vertical transmission for SARS-CoV-2 (COVID-19). *Am J Obstet Gynecol*.
- World Health Organization. FAQ breastfeeding and COVID-19. Available: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-on-covid-19-and-breastfeeding>
- Salvatori G, De Rose DU, Concato C, *et al*. Managing COVID-19-Positive Maternal-Infant dyads: an Italian experience. *Breastfeed Med* 2020;15:347-8.
- Royal College of Obstetricians & Gynaecologists. Coronavirus (COVID-19) infection in pregnancy; 2020. <https://www.rcog.org.uk/en/guidelines-research-services/guidelines/coronavirus-pregnancy/covid-19-virus-infection-and-pregnancy/>
- Breslin N, Baptiste C, Gyamfi-Bannerman C, *et al*. COVID-19 infection among asymptomatic and symptomatic pregnant women: two weeks of confirmed presentations to an affiliated pair of New York City hospitals. *Am J Obstet Gynecol MFM* 2020;100118.
- Yu N, Li W, Kang Q, *et al*. Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study. *Lancet Infect Dis* 2020;20:559-64.
- Di Mascio D, Khalil A, Saccone G, *et al*. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. *Am J Obstet Gynecol MFM* 2020;100107.
- Zeng L, Xia S, Yuan W, *et al*. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. *JAMA Pediatr* 2020;23:2-4.
- Buekens P, Alger J, Bréart G, *et al*. A call for action for COVID-19 surveillance and research during pregnancy. *Lancet Glob Health* 2020:S2214-109X.
- World Health Organization. Q&A on COVID-19, pregnancy and childbirth, 2020. Available: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-on-covid-19-pregnancy-and-childbirth>
- Leno NN, Delamou A, Koita Y, *et al*. Ebola virus disease outbreak in guinea: what effects on prevention of mother-to-child transmission of HIV services? *Reprod Health* 2018;15:60.
- World Health Organisation. Operational guidance for maintaining essential health services during an outbreak, 2020. Available: https://apps.who.int/iris/bitstream/handle/10665/331561/WHO-2019-nCoV-essential_health_services-2020.1-eng.pdf?sequence=1&isAllowed=y
- Delamou A, Ayadi AME, Sidibe S, *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:e448-57.
- Cipriano PF. 100 years on: the Spanish flu, pandemics and keeping nurses safe. *Int Nurs Rev* 2018;65:305-6.
- McMahon SA, Ho LS, Brown H, *et al*. Healthcare providers on the frontlines: a qualitative investigation of the social and emotional impact of delivering health services during Sierra Leone's Ebola epidemic. *Health Policy Plan* 2016;31:1232-9.
- Sochas L, Channon AA, Nam S. Counting indirect crisis-related deaths in the context of a low-resilience health system: the case of maternal and neonatal health during the Ebola epidemic in Sierra Leone. *Health Policy Plan* 2017;32:iii32-9.
- Nuzzo JB, Meyer D, Snyder M, *et al*. What makes health systems resilient against infectious disease outbreaks and natural hazards? results from a scoping review. *BMC Public Health* 2019;19:1-9.
- Oppenheim B, Gallivan M, Madhav NK, *et al*. Assessing global preparedness for the next pandemic: development and application of an epidemic preparedness index. *BMJ Glob Health* 2019;4:1-9.
- Camara BS, Delamou A, Diro E, *et al*. Effect of the 2014/2015 Ebola outbreak on reproductive health services in a rural district of Guinea: an ecological study. *Trans R Soc Trop Med Hyg* 2017;111:22-9.
- Bietsch K, Williamson J, Reeves M. Family planning during and after the West African Ebola crisis. *Stud Fam Plann* 2020;51:71-86.
- Stein D, Ward K, Cantelmo C. Estimating the potential impact of COVID-19 on mothers and newborns in low- and middle-income countries. *Heal Policy Plus* 2020.
- Roberton T, Carter ED, Chou VB, *et al*. 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;0. doi:10.1016/S2214-109X(20)30229-1. [Epub ahead of print: 12 May 2020].
- Riley T, Sully E, Ahmed Z, *et al*. Estimates of the potential impact of the COVID-19 pandemic on sexual and reproductive health in low- and middle-income countries. *Int Perspect Sex Reprod Health* 2020;46:73-6.
- Graham WJ, Afolabi B, Benova L, *et al*. Protecting hard-won gains for mothers and newborns in low-income and middle-income countries in the face of COVID-19: call for a service safety net. *BMJ Glob Health* 2020;5:e002754.
- The World Bank. World bank country and lending groups, 2020. Available: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- Liverman CT, Ingalls CE, Fulco CE, *et al*. Understanding the information needs of health professionals. In: *Toxicology and environmental health information resources: the role of the National library of medicine*. US: National Academies Press, 1997.
- Li HO-Y, Bailey A, Huynh D, *et al*. Youtube as a source of information on COVID-19: a pandemic of misinformation? *BMJ Glob Health* 2020;5:e002604.
- Cinelli M, Quattrociocchi W, Galeazzi A, *et al*. The COVID-19 social media Infodemic. Available: <http://arxiv.org/abs/2003.05004> [Accessed 6 May 2020].
- Ministry of Health - Kenya. A Kenya practical guide for continuity of reproductive, maternal, newborn and family planning care and services in the background of COVID-19 pandemic, 2020. Available: <https://www.health.go.ke/wp-content/uploads/2020/04/KENYA-COVID19-RMNH.pdf.pdf>
- The National Health Service. Clinical guide for the temporary reorganisation of intrapartum maternity care during the coronavirus pandemic, 2020. Available: <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0241-specialty-guide-intrapartum-maternity-care-9-april-2020.pdf>
- Chawla D, Chirla D, Dalwai S, *et al*. Perinatal-Neonatal Management of COVID-19 Infection - Guidelines of the Federation of Obstetric and Gynecological Societies of India (FOGSI), National Neonatology Forum of India (NNF), and Indian Academy of Pediatrics (IAP). *Indian Pediatr* 2020. [Epub ahead of print: 01 Apr 2020].
- Federal Ministry of Health - Nigeria, Nigeria Centre for Disease Control. COVID-19 Guidelines for Pregnant Women and Nursing Mothers - Nigeria, 2020. Available: <https://reliefweb.int/report/nigeria/covid-19-guidelines-pregnant-women-and-nursing-mothers> [Accessed 6 May 2020].
- New York State Department of Health. Health Advisory: COVID-19 guidance for hospital operators regarding visitation updated guidance regarding obstetrical and pediatric settings, 2020. Available: https://opwdd.ny.gov/system/files/documents/2020/04/doh_covid19_hospitalvisitation_4.10.20.pdf
- Royal College of Obstetricians & Gynaecologists, The Royal College of Midwives. Guidance for provision of midwife-led settings and home birth in the evolving coronavirus (COVID-19) pandemic, 2020. Available: <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-04-09-guidance-for-provision-of-midwife-led-settings-and-home-birth-in-the-evolving-coronavirus-covid-19-pandemic.pdf>
- Royal College of Obstetricians & Gynaecologists. Guidance for deployment of obstetrics and gynaecology staff during the COVID-19 pandemic, 2020. Available: <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-05-01-guidance-for-deployment-of-obstetrics-and-gynaecology-staff-during-the-covid-19-pandemic.pdf>

- 39 World Health Organization. Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health, 2020. Available: [https://www.who.int/publications-detail/coronavirus-disease-\(covid-19\)-outbreak-rights-roles-and-responsibilities-of-health-workers-including-key-considerations-for-occupational-safety-and-health](https://www.who.int/publications-detail/coronavirus-disease-(covid-19)-outbreak-rights-roles-and-responsibilities-of-health-workers-including-key-considerations-for-occupational-safety-and-health)
- 40 Tran NT, Tappis H, Spilotros N, *et al.* Not a luxury: a call to maintain sexual and reproductive health in humanitarian and fragile settings during the COVID-19 pandemic. *Lancet Glob Heal*.
- 41 Wilson AN, Ravalid C, Scoullar MJL, *et al.* Caring for the carers: ensuring the provision of quality maternity care during a global pandemic. *Women Birth* 2020. doi:10.1016/j.wombi.2020.03.011. [Epub ahead of print: 08 Apr 2020].
- 42 Brussels U. Midwives step up to support pregnant women during pandemic, 2020. Available: <https://www.un.org/en/pregnant-women-are-worried-about-giving-birth-during-pandemic>
- 43 Ossola A. The challenges of supporting pregnant women during Covid-19, from a midwife, 2020. Available: <https://qz.com/1847930/covid-19-is-transforming-the-role-of-midwives-during-childbirth/>
- 44 Audet C. Giving birth amid a pandemic in Belgium: the challenges faced by mothers and midwives. *BMJ Glob Heal blog* 2020.
- 45 Hussein J. COVID-19: what implications for sexual and reproductive health and rights globally? *Sex Reprod Health Matters* 2020;28:1746065.
- 46 Martinez-Alvarez M, Jarde A, Usuf E, *et al.* COVID-19 pandemic in West Africa. *Lancet Glob Health* 2020;8:e631–2.
- 47 Hopman J, Allegranzi B, Mehtar S. Managing COVID-19 in low- and middle-income countries. *JAMA* 2020. doi:10.1001/jama.2020.4169. [Epub ahead of print: 16 Mar 2020].
- 48 Gharibah M, Mehchy Z. COVID-19 pandemic: Syria's response and healthcare capacity; 2020.
- 49 Lau LS, Samari G, Moresky RT, *et al.* COVID-19 in humanitarian settings and lessons learned from past epidemics. *Nat Med* 2020;26:647–8.
- 50 Vince G. The world's largest refugee camp prepares for COVID-19. *BMJ* 2020;368:m1205.
- 51 DeJong J, Ghattas H, Bashour H, *et al.* Reproductive, maternal, neonatal and child health in conflict: a case study on Syria using countdown indicators. *BMJ Glob Health* 2017;2:e000302.
- 52 Islam MM, Nuzhath T. Health risks of Rohingya refugee population in Bangladesh: a call for global attention. *J Glob Health* 2018;8.
- 53 Hynes M, Sakani O, Spiegel P, *et al.* A study of refugee maternal mortality in 10 countries, 2008–2010. *Int Perspect Sex Reprod Health* 2012;38:205–13.
- 54 Gibson-Helm M, Boyle J, Cheng I-H, *et al.* Maternal health and pregnancy outcomes among women of refugee background from Asian countries. *Int J Gynaecol Obstet* 2015;129:146–51.
- 55 Elston JWT, Moosa AJ, Moses F, *et al.* Impact of the Ebola outbreak on health systems and population health in Sierra Leone. *J Public Health*
- 56 World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak. Available: https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf?sfvrsn=6d3578af_2 [Accessed 4 May 2020].
- 57 Kisely S, Warren N, McMahon L, *et al.* Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: rapid review and meta-analysis. *BMJ* 2020;369:m1642.
- 58 Strong AE. Causes and effects of occupational risk for healthcare workers on the maternity ward of a Tanzanian Hospital. *Hum Organ* 2018;77:273–86.
- 59 Dunn AC, Walker TA, Redd J, *et al.* Nosocomial transmission of Ebola virus disease on pediatric and maternity wards: Bombali and Tonkolili, Sierra Leone, 2014. *Am J Infect Control* 2016;44:269–72.
- 60 Moghri J, Rashidian A, Arab M, *et al.* Implications of dual practice among health workers: a systematic review. *Iran J Public Health* 2017;46:153–64.
- 61 World Health Organization. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19), 2020. Available: https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPE_use-2020.1-eng.pdf
- 62 Liu Q, Yang J, Liu Q, *et al.* The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Lancet Glob Heal* 2020.
- 63 Penn-Kekana L. COVID-19 and MNCH: beyond the models, what are we hearing from countries? 2020. Available: <https://www.harpernet.org/blog/covid-19-and-mch-beyond-the-models-what-are-we-hearing-from-countries/>
- 64 Elston JWT, Cartwright C, Ndumbi P, *et al.* The health impact of the 2014–15 Ebola outbreak. *Public Health* 2017;143:60–70.
- 65 Brolin Ribacke KJ, Saulnier DD, Eriksson A, *et al.* Effects of the West Africa Ebola virus disease on health-care utilization – a systematic review. *Front Public Health* 2016;4:222.
- 66 McQuilkin PA, Udhayashankar K, Niescierenko M, *et al.* Health-Care access during the Ebola virus epidemic in Liberia. *Am J Trop Med Hyg* 2017;97:931–6.
- 67 Jones SA, Gopalakrishnan S, Ameh CA, *et al.* 'Women and babies are dying but not of Ebola': the effect of the Ebola virus epidemic on the availability, uptake and outcomes of maternal and newborn health services in Sierra Leone. *BMJ Glob Heal* 2016;1:e000065.
- 68 Wanduru P, Tetui M, Waiswa P. COVID-19 response in Uganda: notes and reflections. *BMJ Glob Heal blogs* 2020.
- 69 Lee H, Park JH. Changes in health care utilization during the MERS epidemic. *Int J Infect Dis* 2018;73:187.
- 70 UNFPA. COVID-19 technical brief for maternity services, 2020. Available: <https://www.unfpa.org/resources/covid-19-technical-brief-maternity-services>
- 71 International Confederation of Midwives. Women's Rights in Childbirth Must be Upheld During the Coronavirus Pandemic, 2020. Available: <https://www.internationalmidwives.org/icm-news/women%E2%80%99s-rights-in-childbirth-must-be-upheld-during-the-coronavirus-pandemic.html>
- 72 Bobrow E. A chaotic week for pregnant women in New York City, 2020. Available: <https://www.newyorker.com/science/medical-dispatch/a-chaotic-week-for-pregnant-women-in-new-york-city>
- 73 Lowe NK. Reflections on COVID-19. *J Obstet Gynecol Neonatal Nurs* 2020;49:223–4.
- 74 Ferrazzi E, Frigerio L, Savasi V, *et al.* Vaginal delivery in SARS-CoV-2-infected pregnant women in northern Italy: a retrospective analysis. *BJOG* 2020. doi:10.1111/1471-0528.16278. [Epub ahead of print: 27 Apr 2020].
- 75 Petit G, Huet N. Coronavirus: baby blues as some mothers in France separated from newborn amid COVID-19 fears, 2020. Available: <https://www.euronews.com/2020/03/31/coronavirus-baby-blues-as-some-mothers-in-france-separated-from-newborn-amid-covid-19-fear> [Accessed 6 May 2020].
- 76 Campbell OMR, Calvert C, Testa A, *et al.* The scale, scope, coverage, and capability of childbirth care. *Lancet* 2016;388:2193–208.
- 77 Nelson R. COVID-19 disrupts vaccine delivery. *Lancet Infect Dis* 2020;20:546.
- 78 World Health Organization. Guiding principles for immunization activities during the COVID-19 pandemic, 2020. Available: <https://apps.who.int/iris/handle/10665/331590>
- 79 Hollander JE, Carr BG. Virtually perfect? telemedicine for Covid-19. *N Engl J Med* 2020;382:1679–81.
- 80 Jaffré Y, Olivier de Sardan J-P. Les difficiles relations entre soignants et soignés dans cinq capitales d'Afrique de l'Ouest. *Bull Amades* 2003;1–466.
- 81 Pourette D. *Femmes, enfants et santé Madagascar – Approches anthropologiques comparées*. Paris: Éditions L'Harmattan, 2018.
- 82 Nganga SW, Otieno NA, Adero M, *et al.* Patient and provider perspectives on how trust influences maternal vaccine acceptance among pregnant women in Kenya. *BMC Health Serv Res* 2019;19:1–13.
- 83 Gilson L. Trust in health care: theoretical perspectives and research needs. *J Health Organ Manag* 2006;20:359–75.
- 84 Mestre C. *Maladies et violences ordinaires dans un hôpital malgache*, 2014.
- 85 Fairhead J. Understanding social resistance to the Ebola response in the forest region of the Republic of guinea: an anthropological perspective. *Afr Stud Rev* 2016;59:7–31.
- 86 Ronse M. Biology and culture are inseparable – considerations for the "exit strategy" expert group from the field of medical anthropology, 2020. Available: https://07323a85-0336-4ddc-87e4-29e3b506f20c.filesusr.com/ugd/3cbdf6_f9ef1e533ce54fd4844a76a805aa084e.pdf
- 87 Kruk ME, Myers M, Varpilah ST, *et al.* What is a resilient health system? lessons from Ebola. *The Lancet* 2015;385:1910–2.