



Experiences of postnatal mothers with quality of care including water, sanitation and hygiene amenities during the outbreak of COVID - 19 in Ghana: An institutional cross-sectional study

Mary Eyram Ashinyo^{a,b,*}, Vida Duti^c, Stephen Dajaan Dubik^d, Kingsley E. Amegah^e, Robert Kaba Alhassan^f

^a Department of Quality Assurance, Institutional Care Division, Ghana Health Service Headquarters, Accra, Ghana

^b Department of Maternal and Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, North Carolina, USA

^c IRC Ghana, Cantonments, Accra, Ghana

^d School of Allied Health Sciences, University for Development Studies, Tamale, Ghana

^e Department of Data Science and Economic Policy, University of Cape Coast, Ghana

^f Centre for Health Policy and Implementation Research, Institute of Health Research, University of Health and Allied Sciences, Ho, Ghana

ARTICLE INFO

Keywords:

COVID-19 pandemic
Quality of healthcare
WASH
Ghana
Maternal and child health
Post-natal care

ABSTRACT

Objective: To investigate the experiences and perceptions of postnatal mothers with quality of healthcare including WASH amenities among postnatal mothers in Ghana during the COVID-19 outbreak.

Study design: The study was an institutional cross-sectional.

Methods: The survey was conducted in six (6) regions across the northern, middle, and coastal belts of Ghana among postnatal mothers (n = 424). Eligible respondents accessed antenatal care (ANC) in 12 healthcare facilities (primary level and secondary level) during the outbreak of COVID-19 pandemic. Univariate ordered logistic regression analysis was conducted to predict determinants of overall perceived quality of healthcare and experiences with WASH amenities in healthcare facilities visited.

Findings: Privacy and confidentiality (mean score = 3.07) were the most highly rated quality indicator while the least rated indicator was dignity and respect of clients (mean score = 2.13). Approximately 50% of postnatal mothers reported paying out-of-pocket for essential ANC medications. Perceived quality of healthcare was positive among those who accessed care at a district/municipal hospital (Coef. = 1.29; 95%CI 0.45, 2.13, p = 0.003); co-habiting with a partner (Coef. = 1.64; 95%CI 0.64, 2.65, p = 0.001), and resident in an urban location (Coef. = 2.30; 95%CI 0.30, 3.30, p = 0.001). Mothers who accessed care at a district or municipal hospital (Coef. = 1.81; 95%CI 0.83, 2.78, p = 0.001); were co-habiting with a partner (Coef. = 1.92; 95%CI 0.76, 3.07, p = 0.001), and had a private health insurance cover (Coef. = 3.18; 95%CI 0.69, 5.67, p = 0.012) were more likely to rank WASH amenities better than their comparators.

Conclusion: Overall perception of postnatal mothers of healthcare quality including WASH amenities after outbreak of COVID-19 was good, but with significant concerns about dignity and respect accorded them during care and having to pay out-of-pocket for some ANC medications. Relevant managers, service providers and regulatory institutions are encouraged to initiate and sustain policy dialogues and stakeholder consultations on the healthcare quality care gaps established in this study. There is the need for more investments in WASH amenities in the health sector as a quality assurance strategy, especially for maternal and child health services.

1. Background

According to the World Health Organization (WHO), quality healthcare is defined as health care that is effective, safe, centered on the

patient's needs and delivered in a timely fashion [1]. Additionally, optimal quality healthcare includes care that is person-centered and ought not be organized mainly around disease or ability to pay (financing) since people and communities are partners in their own

* Corresponding author. Department of Quality Assurance, Institutional Care Division, Ghana Health Service Headquarters, Accra, Ghana.

E-mail address: keyram1@yahoo.co.uk (M.E. Ashinyo).

<https://doi.org/10.1016/j.puhip.2023.100361>

Received 29 October 2022; Received in revised form 3 January 2023; Accepted 10 January 2023

Available online 21 January 2023

2666-5352/© 2023 Published by Elsevier Ltd on behalf of The Royal Society for Public Health. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

healthcare [1]. Mosadeghrad (2012) argued that quality healthcare is a human right issue and that better quality of healthcare promotes client/community satisfaction, induces better organizational performance and decreases cost of operation [2].

The topic on healthcare quality has become critical in the wake of the novel coronavirus disease (COVID-19) which has devastated health systems and economies of countries across the globe and impinged negatively on access to basic quality healthcare. To address the COVID-19 pandemic, many countries [3,4], including Ghana [5,6], have instituted preventive measures that have resulted in spill over effects, thus, disrupting healthcare systems. These disruptions have consequently affected quality of healthcare including maternal and child health services, in well-resourced countries [7–10] and developing countries alike such as Ghana [11–13]. The outbreak of the COVID-19 pandemic has therefore put intense pressure on national and local health systems especially for antenatal and postnatal care services in many countries of which Ghana is not spared.

Indeed, the evidential ongoing impact of COVID-19 on health systems is an indication that the pandemic is a stress test on the resilience of health systems particularly in the case of already fragile systems with limited human and material resources. Reversal of gains made over several years by the pandemic therefore poses a threat to attainment of the Sustainable Development Goal (SDG) three (3) and realising the “Leaving no one behind” mantra as emphasized by its target 3.8 to ‘achieve universal health coverage, including financial risk protection, access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all’ [14].

Even though not much empirical evidence has been reported on the effect of COVID-19 on health services utilization in Ghana particularly in respect of maternal and child health services, some available empirical evidence suggests that the pandemic has reduced utilization of health services in low- and middle-income countries (LMICs) [11,15,16]. Moreover, availability of the requisite Water Sanitation and Hygiene (WASH) facilities in hospitals is essential to meeting quality of healthcare standards and mitigating nosocomial infections rate in these facilities through cross-infections.

At the time of writing this paper, there was no known publication on the impact of the COVID-19 on perceived quality of healthcare including WASH amenities by postnatal mothers who utilized health services in Ghana during the pandemic. This institutional-based study therefore investigated the perspectives of postnatal mothers on the impact of COVID-19 on quality of client-centered care and WASH amenities in six regions across the coastal, middle and northern belts of Ghana.

2. Methods

2.1. Study design and setting

The study was an institutional-based cross-sectional survey conducted in six (6) purposively selected administrative regions across the coastal, middle and northern belts of Ghana. The regions were Volta,

Northern, Upper West, Western, Eastern and Ahafo. In each region a regional hospital and a municipal/district hospital were selected purposively making a total of twelve (12) study health facilities. For anonymity purposes, the names of health facilities are withheld. These cadre of health facilities were selected because they managed COVID-19 cases per their mandate at the time of conducting this study. Fig. 1 shows the study design and health facilities selection criteria.

2.2. Study population and sampling

The study population was postnatal mothers who visited the 12 purposively selected hospitals for antenatal care, delivery and post-natal services during the COVID-19 outbreak.

2.3. Inclusion and exclusion criteria

Adult females who attended antenatal care (ANC) and delivered during the COVID-19 pandemic outbreak qualified to participate in the study. Conversely, mothers who visited the ANC or delivered before the first confirmed case of COVID-19 on 12th March 2020 were excluded since the first case of COVID-19 was officially confirmed in Ghana on this date. Also, women who were critically sick and could not tolerate activities of daily living (ADL) were excluded. Likewise, minors (i.e. women below the age of 18 years) and persons who refused voluntary consent were exempted from the study.

2.4. Sampling procedure

Multistage sampling technique was used for this study. First, simple random sampling was used to select the six (6) regions from the 16 regions without replacement. Next, in each of the sampled regions, one regional hospital and one municipal/district hospital were purposively (maximum variation sampling) selected to allow for appropriate reflection of levels of health care in Ghana’s health system. At the level of the respondents, quota sampling technique was used to proportionally allocate the sample sizes to each of the 12 regions. The proxy indicators of health service utilization, population of monthly outpatient and inpatient visits per health facility were used as proxies.

Final selection of respondents to answer the structured questionnaire was based on convenience. Thus, only postnatal mothers with an experience of care during COVID-19 outbreak were sampled and interviewed based on availability and voluntary consent to participate.

2.5. Sample size determination

The sample size was determined using the single proportion formula as follows:

$$N = \frac{z^2 \times p(1 - p)}{d^2} * DEFF$$

where.

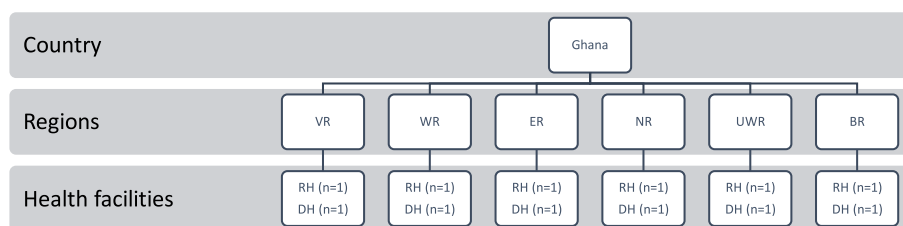


Fig. 1. Study design and setting.

Legend: VR (Volta region); WR (Western region); ER (Eastern region); NR (Northern region); UWR (Upper west region); BR (Bono region); Note: earmarked responses from Northern region participants were incomplete for meaningful analysis, hence dropped from the subsequent analysis.

Source: Designed by authors (2021);

N = the desired sample size

Z = is the critical value of confidence level at 95%, which is 1.96

P = perceived quality of antenatal/postnatal care and perception of WASH services assumed to be 50% (0.5)

d = level of precision (0.05)

$$n = \frac{(1.96)^2 \times 0.50 \times (1 - 0.50)}{(0.05)^2} = 384$$

After adjusting for a 10% non-response rate, the sample size obtained was 424. Thus, the total sample size for the study was 424 postnatal mothers. Participants were recruited at the various participating hospitals and interviewed after voluntarily consenting to participate.

2.6. Data collection instrument

The study tool consisted of structured questionnaire adapted from previous studies [17,18]. The questionnaire comprised of sections on sociodemographic characteristics of respondents, experiences with health care delivery value chain during antenatal and postnatal care and perceptions of clients of WASH amenities in the healthcare facilities. We migrated the questions onto an online RedCap software for data collection and trained research assistants on it. Internal consistency and scale reliability of the Likert scale items was tested using the Cronbach's Alpha and the average scale reliability was found to be greater than the 0.70 rule of thumb [19].

2.7. Data collection

Field data collection was institution-based and the tool was administered face-to-face by the trained research assistants. Due to the COVID-19 pandemic, all safety protocols were adhered to by wearing face masks, observing social distancing and using alcohol-based hand-sanitisers or hand washing with soap under running water throughout the data collection period between each interview. Data collection was done concurrently in the six (6) regions by two research assistants in each region to avoid the possibility of sensitising respondents to the study tool content before they are due to interview. To promote data quality assurance (DQA), daily supervisions were done by supervisors and the project Principal Investigator via phone calls and WhatsApp chats. Additionally, random vetting of answered questions was done via the RedCap software. The data collection lasted from 19th July 2021 to 28th July 2021.

2.8. Data analysis

The data was collected with the RedCap software and later exported to STATA (version 16.0) statistical analysis software for descriptive and inferential statistical analysis. Descriptive statistics was used to present respondents' background characteristics such as age, gender, religion, marital status, educational and insurance status in frequency and percentage distributions. Likewise, pregnancy history of respondents and perceptions on WASH conditions were presented in frequency and percentage distributions.

Univariate ordered logistic regression analysis was conducted to predict factors associated with overall perceived quality of healthcare and experiences with WASH conditions in the pertinent health facility they visited during the COVID-19 pandemic. The main outcome variables of interest were "overall perceived quality of care" and "overall perception of WASH conditions" in health facilities. These outcome variables were generated as a summated score of factor-analysed variables (un-rotated) on perceived client-centered care and WASH conditions as indices for quality care and WASH amenities in the study facilities. The Likert scale ranged from 1 = "Not at all" to 4 = "All the time" in terms of client routine experience with service components or availability of WASH amenities.

The independent variables fitted into the model were facility unit,

region, cadre of health facility, age, ethnicity, marital status, religion, level of education, occupation, type of family, rural-urban location and insurance status. Multi-collinearity diagnostics was conducted and independent variables with Variance Inflation Factors (VIFs) above 10 were dropped from the regression models. Statistical significance of all tests was set at 95% confidence level.

3. Findings

3.1. Background information of respondents

Approximately 90% response rate with complete responses was recorded out of the 424 target respondents. Results show that most of the respondents (44%) were interviewed from the Eastern region while respondents from Ahafo region constituted the least (nearly 7%). Responses from the Northern region were incomplete for meaningful analysis, hence dropped from the subsequently data analysis, as reported in the various statistical tables. The average age of respondents was 31 ± 7.2 . Majority (68%) of the respondents were interviewed in either a municipal or district hospital while respondents interviewed from a health centre constituted barely 2%; in terms of ethnicity, the Akan ethnic group dominated with 38% and Mande were 2 (0.52%). Most of the postnatal mothers (73%) indicated they were married and of the Christian religious affiliation (77%). Literacy rate among the postnatal mothers was high with nearly 80% of them indicated they had formal education. The most common type of occupation was being a trader or shop attendant (40%). Spousal literacy rate was also high with approximately 69% of them indicating their spouse had formal education; 78% of the women indicated they lived in a nuclear family while nearly 80% of them resided in either an urban or peri-urban area. Health insurance coverage was 88% among the postnatal mothers; those who had an insurance cover mostly registered with the National Health Insurance Scheme (NHIS) (99%) largely had an NHIS card that was unexpired. See Table 1 for details.

3.2. Pregnancy history of respondents

With respect to history of respondents' pregnancy, it was observed that 79% reported that their pregnancy was planned; the average number of children per women was 2 ± 1 while number of months of pregnancy before first ANC visit was reported to be 2.8 ± 1 . Nearly 89% of the respondents said they had no history of miscarriage/abortion/stillbirth and approximately 82% of the women delivered per vaginal. Delivery was mostly done in a district or municipal hospital (65%) predominantly by a midwife (80%), and the persons who conducted deliveries were largely females (70%) (see Table 2).

3.3. Perceived quality of care

A verbal autopsy of antenatal care service experience was done as proxies for quality care measures using a four (4) point Likert scale mentioned earlier. The results found that more than 70% of the respondents reported they received the required antenatal care services with respect to measurement of their height, given injection to prevent tetanus, iron tablet/syrup, anti-malarial drugs, told the signs of pregnancy, complications and where to go during complications. Similarly, over 90% of the respondents indicated they were told preparations towards labour, health eating habits and counselled on breastfeeding. However, it was found that 52% of the women said they bought iron tablet/syrup and another 41% bought drugs for intestinal worms (see Table 3).

Additionally, a Likert scale items was used to ascertain clients' satisfaction with non-technical quality care indicators. As shown in Fig. 2, privacy and confidentiality (mean = 3.07) was the most highly rated satisfaction indicator followed by facility environment (mean = 3.00) and communication (mean = 2.95). The least rated indicator was

Table 1
Socio-demographic characteristics of respondents.

Category of respondents	Statistics	
	Freq. (f)	Percent (%)
OPD	6	1.42
Inpatient	7	1.65
Postnatal	411	96.93
Total	424	100
Region of respondent		
Volta	48	11.32
Upper West	66	15.57
Eastern	187	44.10
Western	54	12.74
Northern region	41	9.67
Ahafo	28	6.60
Total	424	100
Level of care		
Regional Hospital	114	29.77
District/Municipal Hospital	262	68.41
Health Centre	7	1.83
Total	383	100.00
Ethnic group		
Akan	145	37.86
Ga-Dangme	34	8.88
Ewe	95	24.8
Guan	3	0.78
Mole-Dagbani	58	15.14
Grusi	11	2.87
Mande	2	0.52
All others	35	9.14
Total	383	100
Marital status		
Married	281	73.37
Single	61	15.93
Separated/divorced	7	1.83
Living together/cohabitation	33	8.62
Widowed	1	0.26
Total	383	100
Age (Obs; Mean, SD, Min – Max)	(31.26; 7.23, 15–54)	
Religion		
Islam	86	22.45
Christianity	294	76.76
Traditionalist	1	0.26
Others (specify)	2	0.52
Total	383	100
Educational status		
Illiterate	76	20.11
Literate	302	79.89
Total	378	100
Highest level of education		
Basic education	27	8.94
JHS/JSS	75	24.83
SHS/SSSS	101	33.44
Vocational/Technical (NVTI)	36	11.92
Tertiary (University/college)	63	20.86
Total	302	100
Occupation		
Unemployed	63	16.45
Farmer	52	13.58
Trader/Shop Assistant	153	39.95
Professional	51	13.32
Housewife	14	3.66
Student	11	2.87
Unskilled Labourer	2	0.52
Retired	4	1.04
Others	33	8.62
Total	383	100
Partner's level of education		
Illiterate or no formal education	59	15.4
Literate	264	68.93
Not applicable	60	15.67

Table 1 (continued)

Category of respondents	Statistics	
	Freq. (f)	Percent (%)
Total	383	100
Partner's highest education		
Basic education	6	2.27
JHS/JSS	35	13.26
SHS/SSSS	77	29.17
Vocational/Technical (NVTI)	37	14.02
Tertiary (University/college)	109	41.29
Total	264	100
Family arrangement		
Nuclear family	299	78.07
Extended family	84	21.93
Total	383	100
Place of residence		
Rural	78	20.37
Peri-urban	100	26.11
Urban	205	53.52
Total	383	100
Insurance status		
Uninsured	46	12.01
Insured	337	87.99
Total	383	100
Type of insurance		
NHIS	332	98.52
Private Health Insurance	5	1.48
Total	337	100
Insurance card validity		
Expired	15	4.49
Unexpired	319	95.51
Total	334	100

Data source: Field Data (2021); Note: earmarked responses from Northern region participants were incomplete for meaningful analysis, hence dropped from the subsequent analysis.

dignity and respect of clients (mean = 2.13).

3.4. Determinants of postnatal mothers' perception of health care quality

As a follow-up to the descriptive analysis, univariate ordered logistic regression was conducted to isolate the predictors of clients' perception of service quality after the COVID-19 outbreak. The output of the regression analysis shows that women who visited the health facility primarily to access postnatal care services had a higher likelihood of rating service quality higher than their counterparts who visited mainly for OPD services or other forms of services (Coef. = 4.98; 95%CI 1.35, 8.60, $p = 0.007$); additionally it was observed that postnatal mothers who accessed care after the COVID-19 pandemic in the Upper West (Coef. = -2.44; 95%CI -4.03, 0.85, $p = 0.007$) and Western (Coef. = -2.52; 95%CI -3.76, -1.28, $p = 0.000$) regions were less likely to rate client-centered quality care high on the Likert scale relative to clients in other regions.

Clients' experiences with service quality were relatively positive among those who accessed care at a district or municipal hospital compared to the other cadre of health facilities (Coef. = 1.29; 95%CI 0.45, 2.13, $p = 0.003$). Postnatal mothers whose ethnicity was Ga-Dangme were more likely to rate service quality higher relative to the other ethnic groups (Coef. = 1.18; 95%CI 0.21, 2.16, $p = 0.018$). Other significant positive predictors of client-centered quality are marital status, "Living together" (Coef. = 1.64; 95%CI 0.64, 2.65, $p = 0.001$) and resident in an urban location (Coef. = 2.30; 95%CI 0.30, 3.30, $p = 0.001$) (see Table 4).

3.5. Perspectives on WASH amenities in health facilities

Postnatal mothers' perception of WASH amenities in the health

Table 2
Pregnancy history of respondents.

Variables	Statistics	
	Freq. (f)	Percent (%)
Wanted/planned pregnancy		
No	79	20.63
Yes	304	79.37
Total	383	100
Number of children (Obs; Mean, SD, Min – Max)	(379; 2.24, 1.30, 0–9)	
Months of pregnancy before first ANC visit	(43; 2.67, 1.32, 1–7)	
History of miscarriage/abortion/stillbirth		
No	340	88.77
Yes	43	11.23
Total	383	100
Mode of delivery		
Vaginal delivery	313	81.72
Caesarean section	70	18.28
Total	383	100
Place of delivery		
Teaching hospital	3	0.78
Regional hospital	104	27.15
District/municipal hospital	248	64.75
Polyclinic	3	0.78
Health centre	22	5.74
Maternity home	1	0.26
Clinic	2	0.52
Total	383	100
Cadre of staff who assisted delivery		
Doctor	64	16.71
Midwife	307	80.16
Nurse	11	2.87
TBA	1	0.26
Total	383	100
Sex of birth attendant		
Male	114	29.77
Female	269	70.23
Total	383	100

Data source: Field Data (2021)

facility visited was explored. The results show that clients who said they a toilet was available, over 70% of them said it was clean and suitable latrines for pregnant women and the disabled. Over 80% of the respondents said water, soap, tissue and handwashing facilities were available at the health facility visited. However, less than 60% of the mothers agreed that there was safe and potable water in the health facility they visited (see Table 5).

3.6. Predictors of postnatal mothers' perceptions of WASH facilities

A follow-up univariate ordered logistic regression analysis found that region of resident, category of health facility visited, marital status, and type of health insurance cover significantly predict perceptions on availability of WASH amenities in the pertinent health facility visited at 95% confidence level (see Table 6).

For instance, there was a higher likelihood ranking WASH amenities high among residents of Upper West (Coef. = 2.44; 95%CI 0.51, 4.38, $p = 0.013$), Eastern (Coef. = 2.03; 95%CI 0.82, 3.23 $p = 0.001$) and Ahafo (Coef. = 5.30; 95%CI -3.67, 6.92, $p = 0.001$) regions, relative to other regions. Similarly, postnatal mothers who visited a district or municipal hospital had a higher likelihood of ranking WASH amenities high compared to their counterparts who visited other categories of health facilities (Coef. = 1.81; 95%CI 0.83, 2.78, $p = 0.000$). Likewise, women who are co-habiting with their partners demonstrated greater likelihood of ranking WASH amenities high relative to other forms of marital arrangements (Coef. = 1.92; 95%CI 0.76, 3.07, $p = 0.001$). Finally, women who had a private health insurance cover were more likely rank WASH amenities high compared to those with an NHIS card (Coef. =

Table 3
Perception of quality of antenatal care based on verbal autopsy.

Quality care proxies	Statistics	
	Freq. (f)	Percent (%)
Height measured		
No	85	23.55
Yes	276	76.45
Total	361	100
Given injection to prevent tetanus		
No	29	8.01
Yes	333	91.99
Total	362	100.00
Given iron tablet/syrup		
No	56	15.47
Yes	306	84.53
Total	362	100
Bought iron tablet/syrup		
No	172	47.51
Yes	190	52.49
Total	362	100
Given drug for intestinal worms		
No	121	33.43
Yes	241	66.57
Total	362	100
Bought drug for intestinal worms		
No	212	58.56
Yes	150	41.44
Total	362	100
Given drug to prevent malaria		
No	17	4.7
Yes	345	95.3
Total	362	100
Told signs of pregnancy		
No	17	4.7
Yes	345	95.3
Total	362	100
Told where to go during complications		
No	23	6.35
Yes	339	93.65
Total	362	100
Told what to expect during pregnancy		
No	19	5.25
Yes	343	94.75
Total	362	100
Told prior arrangements before labour		
No	18	4.97
Yes	344	95.03
Total	362	100
Told how to eat well		
No	19	5.25
Yes	343	94.75
Total	362	100
Counselled on breastfeeding		
No	21	5.8
Yes	341	94.2
Total	362	100

Data source: Field Data (2021)

3.18; 95%CI 0.69, 5.67, $p = 0.012$) after controlling the effect of co-variates (see Table 6).

4. Discussion

Pandemics are generally not new to humanity and whenever they occurred, the impact on lives and livelihood has always been dire. Fragile health systems in resource limited countries often bear the brunt of these pandemics and the COVID-19 pandemic is no exception.

Ghana like many lower-middle income countries (LMICs) has already suffered from the pandemic in terms of the devastating effect on health services organization, provision, and access, particularly in respect of

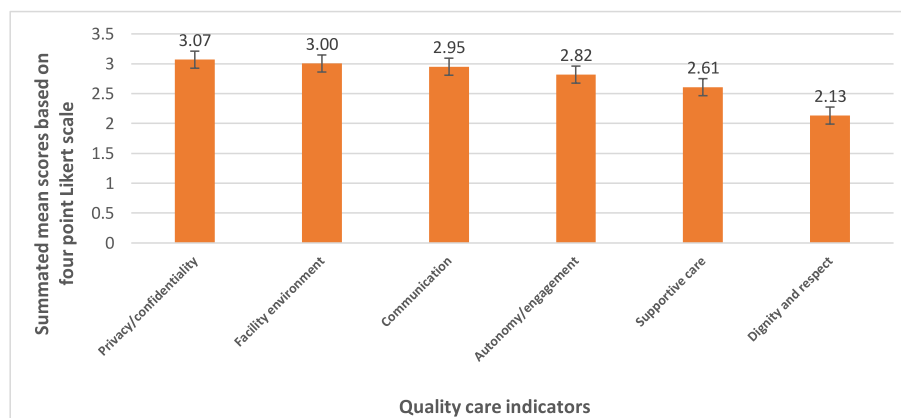


Fig. 2. Summated mean scores on client-centered care indicators.

Data source: Field Data (2021);

maternal healthcare [5,11–13]. Even though not much empirical evidence exists yet on the real direct impact of COVID-19 on accessibility and utilization of healthcare, the available evidence, stated *supra* [11, 15,16], suggests a huge negative impact on general outpatient and inpatient service utilization in many parts of Ghana after the outbreak of the pandemic.

This institutional survey in six (6) selected administrative regions thus set out to investigate experiences of postnatal mothers with antenatal care services and WASH amenities availability in the pertinent health facilities after outbreak of COVID-19. It was observed from the results that the fundamental antenatal care requirements were perceived by clients to have been adhered in the health facilities visited. The positive ratings in these service areas by clients is comparable to previous patient satisfaction surveys conducted in Ghana [20,21]. These previous studies will however not suffice for direct comparison with the current study because they were not conducted during the COVID-19 pandemic period.

Nonetheless, the findings elucidate concerns expressed by quality care experts on sole use of patients' verbal autopsies to measure quality care situation in health care facilities. Alhassan et al. (2015) observed like other studies [22–25] that patient satisfaction surveys conducted within the health facility premises predisposes the study to social desirability responses. Even though it is not conclusive that the current study results are a manifestation of socially desirable responses, the authors accept this potential limitation of the study since many typical observational studies are characterized by this limitation.

Another interesting revelation was the significant percentage of postnatal mothers (over 40%) who confided that they paid out-of-pocket (OOP) for intestinal worm drugs and another 52% paid out-of-pocket (OOP) for iron tablets/syrup. This observation corroborates the existing evidence that financial accessibility to health care by clients remains a challenge in Ghana [21,25,26]. The challenge is compounded by illegal co-payments in health facilities by clients who have active National Health Insurance Scheme (NHIS) cards [27].

The economic impact of COVID-19 on households and countries has been monumental [28,29] and existence of illegal co-payments within the health systems further jeopardizes the plight of household members in accessing basic health care services, especially maternal and child health care. Follow-up mixed-methods studies by the Ghana Health Service (GHS), National Health Insurance Authority (NHIA) and partners on this important revelation is therefore imperative to unravel the details and curtail the menace of illegal co-payments by NHIS subscribers most of whom happen to be antenatal and postnatal mothers.

The results further showed that none of the quality care markers was ranked up to four (4) on the Likert scale. Indeed, the only service areas ranked up to three (3) on the scale were “privacy/confidentiality” and “facility environment”. The remaining service areas were ranked two (2)

on the scale with “dignity and respect” accorded clients being the worst quality care indicator. It is important to recognize that the facilities sampled for this study were largely regional, municipal and district level facilities mostly located in urban and peri-urban areas which makes the sub-optimal rankings rather worrying, suggesting the situation in lower-level health facilities could be worse. Quality of care studies in Ghana and elsewhere [20,30,31] made similar conclusions that most health facilities, especially government-owned, still struggle to render care that is client-centered and prioritizes patient dignity, respect and support as found in this study.

Alhassan et al. (2015) found in their study of 64 health facilities in two regions of Ghana that private health facilities were mostly perceived by clients to render better client-centered care than publicly owned health facilities [25]. Perhaps, the trend could be attributed to the business model run by many private health facilities vis-à-vis the public sector. Indeed, this observation could also be due to experiential quality care perception of clients accessing care in private health facilities. It is however instructive to admit that the current empirical evidence is not emanating from a comparative study of private and public health facilities and will therefore not be sufficient evidence to advocate for policy reforms towards adopting the managed-health care systems in market-oriented countries like the United States of America [32]. Nonetheless, the consistency in reports of clients' dissatisfaction with health care services in public facilities calls for policy dialogues and broader stakeholder consultations to possibly pilot the managed health care system with selected public health facilities, perhaps led by the National Health Insurance Authority (NHIA).

Significant predictors of perceived healthcare quality care by postnatal mothers were the region of residence, marital status, ethnicity, and rural-urban location of the respondents. A similar observation was intimated by Gage et al. (2017) who investigated rural-urban differentials in patient satisfaction of health care quality in Haiti [33]. In Ghana previous studies on patient satisfaction with health service delivery also admitted the importance of these predictors of perceived service quality among clients [34,35]. These dynamics in perceptions of service quality demand tailored-made quality improvement strategies that take into consideration peculiar needs of maternal and child health care services in Ghana. The focused antenatal concept initiated by the GHS and partners is typical opportunity for health managers and clinicians to address peculiar health needs of antenatal clients and their enhance personal experiences with the service delivery environment, particularly in public health facilities.

Outbreak of COVID-19 has taught the world the importance of Water Sanitation and Hygiene (WASH) given that WASH remains an important non-pharmaceutical intervention (NPI) that has contributed immensely to fighting COVID-19 [36,37] before and after discovery of COVID-19 vaccines. Strict adherence to hand washing protocols and proper

Table 4
Univariate ordered logistic regression on associations between socio-demographic factors and overall perceived quality care.

Overall perceived quality care	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
OPD	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Inpatient	2.937	2.447	1.20	.23	-1.859	7.733	
Postnatal	4.975	1.85	2.69	.007	1.349	8.601	***
Volta	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Upper West	-2.437	.812	-3.00	.003	-4.029	-.846	***
Eastern	-.536	.51	-1.05	.293	-1.536	.464	
Western	-2.519	.631	-3.99	.000	-3.756	-1.282	***
Ahafo	.647	.625	1.04	.301	-.578	1.873	
Regional Hospital	Ref	Ref	Ref	Ref	Ref	Ref	Ref
District/Municipal Hospital	1.289	.428	3.01	.003	.45	2.128	***
Health Centre	.895	6.345	0.14	.888	-11.54	13.33	
Age	.021	.026	0.78	.438	-.031	.072	
Akan	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Ga-Dangme	1.18	.498	2.37	.018	.205	2.155	**
Ewe	.13	.408	0.32	.75	-.67	.929	
Guan	.869	1.549	0.56	.575	-2.167	3.905	
Grusi	.209	.72	0.29	.771	-1.202	1.62	
Mande	1.378	.931	1.48	.139	-.446	3.202	
All others	.681	.614	1.11	.268	-.523	1.884	
Married	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Single	.107	.572	0.19	.851	-1.013	1.228	
Separated/divorced	1.414	1.58	0.89	.371	-1.683	4.511	
Living together	1.638	.514	3.19	.001	.631	2.645	***
Islam	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Christianity	-.47	.424	-1.11	.267	-1.301	.36	
Basic education	Ref	Ref	Ref	Ref	Ref	Ref	Ref
JHS/JSS	-.363	.604	-0.60	.548	-1.546	.821	
SHS/SSSS	-.166	.612	-0.27	.786	-1.366	1.034	
Vocational/NVTI	.257	.66	0.39	.697	-1.037	1.551	
Tertiary (University)	-.161	.742	-0.22	.828	-1.614	1.293	
Unemployed	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Farmer	-.5	.862	-0.58	.562	-2.189	1.189	
Professional	-.64	.507	-1.26	.207	-1.634	.354	
Housewife	-.039	.624	-0.06	.95	-1.262	1.185	
Student	.107	.735	0.15	.884	-1.332	1.547	
Unskilled Labourer	1.075	.945	1.14	.255	-.778	2.928	
Retired	.435	6.564	0.07	.947	-12.431	13.301	
Others	-.795	1.455	-0.55	.585	-3.646	2.056	
Professional	-.323	.625	-0.52	.605	-1.548	.902	
Basic education	Ref	Ref	Ref	Ref	Ref	Ref	Ref
JHS/JSS	.017	1.226	0.01	.989	-2.385	2.42	
SHS/SSSS	-.794	1.225	-0.65	.517	-3.196	1.607	
Vocational/NVTI	-.36	1.296	-0.28	.781	-2.9	2.18	
Tertiary (University)	-.58	1.254	-0.46	.644	-3.038	1.878	
Nuclear family	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Extended family	-.759	.394	-1.93	.054	-1.532	.013	*
Rural	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Peri-urban	.007	.563	0.01	.989	-1.096	1.111	
Urban	2.299	.512	4.49	.000	1.296	3.301	***
NHIS	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Private	1.22	1.237	0.99	.324	-1.204	3.644	
Expired	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Unexpired	.458	.696	0.66	.51	-.906	1.823	
Mean dependent var		2.981	SD dependent var			0.554	
Pseudo r-squared		0.116	Number of obs			200.000	
Chi-square		150.630	Prob > chi2			0.000	
Akaike crit. (AIC)		1285.117	Bayesian crit. (BIC)			1519.298	

***p < 0.01, **p < 0.05, *p < 0.1.

Data source: Field Data (2021); Note: earmarked responses from Northern region participants were incomplete for meaningful analysis, hence dropped from the subsequent analysis.

sanitation have proven to reduce the rate of COVID-19 transmission globally [38,39]. Availability of WASH amenities in health facilities is therefore critical to preventing and controlling COVID-19 transmission. This study found that most WASH amenities were perceived to be present except availability of toilet facilities which 83% of respondents said

did not exist.

Earlier studies on clients' perspectives on WASH amenities in Ghana found similar responses [40] except one by Kanyangarar et al. (2021) who concluded that even though availability of WASH services in health facilities has generally improved in sub-Saharan Africa, the conditions

Table 5
Respondent's perspectives on WASH amenities.

WASH indicators	Statistics	
Clean toilet facilities	Freq. (f)	Percent (%)
No	88	25.58
Yes	256	74.42
Total	344	100
Suitable latrine for pregnant women		
No	71	20.64
Yes	273	79.36
Total	344	100
Suitable latrine for disabled		
No	83	24.13
Yes	261	75.87
Total	344	100
Availability of toilet facilities		
No	285	82.85
Yes	59	17.15
Total	344	100
Access to toilet facilities when in need		
No	73	22.46
Yes	252	77.54
Total	325	100
Sufficient water in facility		
No	19	5.52
Yes	325	94.48
Total	344	100
Available safe/potable water		
No	148	43.02
Yes	196	56.98
Total	344	100
Availability of handwashing facilities		
No	56	16.28
Yes	288	83.72
Total	344	100
Availability of soap		
No	68	19.77
Yes	276	80.23
Total	344	100
Availability of water		
No	25	7.27
Yes	319	92.73
Total	344	100
Availability of tissue paper		
No	81	23.55
Yes	263	76.45
Total	344	100
Taught handwashing by staff		
No	39	11.34
Yes	305	88.66
Total	344	100

Source: Field Data (2021)

are still below the global target of 80% in many countries including Ghana [41]. Significant predictors of respondents' perceptions of WASH amenities were region of residence, level of health facility, marital status and the type of health insurance cover by the clients. These dynamics are therefore important and must be taken into consideration when planning WASH campaigns rollout at the level of health care clients and providers to ensure their success. Active community engagement and mobilization will be key in promoting these targeted WASH campaigns especially if vulnerable groups like postnatal mothers must benefit from these campaigns.

5. Limitations

First, the researchers acknowledge that the responses were largely based on verbal autopsies of respondents which are subject to recall bias and social desirability responses. To address this limitation, the interviews were conducted by research assistants who are not staff of the healthcare facilities where the interviews were conducted. Secondly, the internal consistency of the data collection was checked after piloting and the scale reliability coefficient for the Likert scale items was above the

0.70 rule of thumb. Non-probability sampling technique was used in selecting the study subjects. Hence, generalization of the findings of the study should be done with caution. Nonetheless, selection of health facilities across the various geographical belts of Ghana makes the findings reasonably representative and the empirical evidence compelling.

6. Conclusion

Client's experience and perception of health service quality are important ingredients for continuous quality improvement. In view of this, quality care experts have always incorporated client satisfaction surveys in health facilities management. Medical technical quality is often not well appreciated by health care clients due to information asymmetry between clients and providers hence the need for continuous assessment of functional/non-technical quality care components of service delivery, particularly for antenatal and postnatal care.

The outbreak of COVID-19 pandemic disrupted health systems globally. Maternal and child health service are among the service areas severely disrupted by the global pandemic due to the extreme vulnerability of women and children. This study thus, investigated the experiences of mothers who accessed care after the outbreak of COVID-19 and found that, clients' perceptions on the quality antenatal care services was positive for some aspects of care. However, quality indicators like accordance of dignity/respect and support for clients remain problematic and must be fixed. Perspectives on WASH amenities were also generally positive with many indicating the amenities were present except availability of toilet facilities.

Finally, a significant percentage of postnatal mothers said they paid out-of-pocket (OOP) for some essential medications during antenatal care visits, namely drugs for intestinal worms and iron tablets/syrups. Since this investigation did not independently verify these accounts by clients, it is recommended future researchers employ a mixed-methods study design to explore the subject matter further to inform immediate policy intervention by relevant regulatory agencies and health managers.

Implications for public health policy

1. Relevant managers, service providers and regulatory institutions are encouraged to initiate and sustain policy dialogues and stakeholder consultations on the healthcare quality care gaps established in this study.
2. There is need to fully incorporate WASH indicators in the routine patient satisfaction surveys and the ongoing regional peer-reviews by the Ghana Health Service (GHS) to maintain the required WASH standards in these health facilities.
3. Furthermore, as part of the maternal and child health strategy by the Ministry of Health (MoH) and GHS, health facilities (particularly MCH units) should invest a statutory percentage of their internally generated funds to WASH infrastructure. In addition, new infrastructure should ensure that there is adequate WASH infrastructure incorporated into the design
4. Finally, a percentage of the current COVID-19 fund should be dedicated to quality of care and WASH related research and development efforts to promote resilience in the health system, particularly for maternal and child health.

Data availability statement

The data that support the findings of this study are available upon reasonable request from the corresponding author. The data are not publicly available due to privacy restrictions.

Authors' contributions

All authors contributed equally to this study and approved this

Table 6
Univariate ordered logistic regression on associations between background characteristics and perceived WASH conditions.

Overall perceived WASH conditions	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
OPD	Ref	Ref	Ref	Ref	Ref	Ref
Inpatient	-2.457	2.816	-0.87	.383	-7.976	3.062
Postnatal	-1.665	2.253	-0.74	.46	-6.08	2.751
Volta	Ref	Ref	Ref	Ref	Ref	Ref
Upper West	2.442	.987	2.47	.013	.507	4.376
Eastern	2.026	.616	3.29	.001	.818	3.234
Western	.929	.748	1.24	.215	-.538	2.395
Ahafo	5.296	.831	6.38	0.000	3.668	6.924
Regional Hospital	Ref	Ref	Ref	Ref	Ref	Ref
District Hospital	1.806	.496	3.64	0.000	.834	2.778
Health Centre	-2.047	1.624	-1.26	.207	-5.23	1.136
Age	.001	.031	0.02	.986	-.06	.061
Akan	Ref	Ref	Ref	Ref	Ref	Ref
Ga-Dangme	.395	.596	0.66	.508	-.773	1.563
Ewe	.521	.485	1.07	.283	-.43	1.472
Guan	-.272	1.578	-0.17	.863	-3.365	2.821
Grusi	.058	.919	0.06	.95	-1.743	1.859
Mande	-1.087	1.066	-1.02	.308	-3.176	1.002
All others	-.274	.739	-0.37	.711	-1.723	1.175
Married	Ref	Ref	Ref	Ref	Ref	Ref
Single	.983	.654	1.50	.133	-.299	2.264
Separated/divorced	-.67	1.662	-0.40	.687	-3.928	2.589
Living together	1.917	.59	3.25	.001	.761	3.073
Islam	Ref	Ref	Ref	Ref	Ref	Ref
Christianity	.02	.492	0.04	.968	-.945	.985
Basic education	Ref	Ref	Ref	Ref	Ref	Ref
JHS/JSS	.478	.716	0.67	.504	-.925	1.88
SHS/SSSS	1.032	.752	1.37	.17	-.441	2.505
Vocational/NVTI	1.598	.824	1.94	.052	-.017	3.212
Tertiary (University)	.021	.898	0.02	.981	-1.739	1.782
Unemployed	Ref	Ref	Ref	Ref	Ref	Ref
Farmer	-.289	.901	-0.32	.749	-2.054	1.477
Professional	.435	.588	0.74	.46	-.718	1.588
Housewife	1.342	.756	1.77	.076	-.141	2.824
Student	1.222	.966	1.26	.206	-.672	3.116
Unskilled Labourer	-.393	1.09	-0.36	.719	-2.529	1.744
Retired	1.034	2.396	0.43	.666	-3.663	5.731
Others	-2.02	1.588	-1.27	.203	-5.132	1.093
Professional	.541	.728	0.74	.458	-.886	1.968
Basic education	Ref	Ref	Ref	Ref	Ref	Ref
JHS/JSS	1.561	1.515	1.03	.303	-1.408	4.53
SHS/SSSS	1.783	1.515	1.18	.239	-1.186	4.753
Vocational/NVTI	1.201	1.568	0.77	.444	-1.872	4.274
Tertiary (University)	2.509	1.562	1.61	.108	-.552	5.571
Nuclear family	Ref	Ref	Ref	Ref	Ref	Ref
Extended family	-.823	.476	-1.73	.084	-1.755	.11
Rural	Ref	Ref	Ref	Ref	Ref	Ref
Peri-urban	.64	.615	1.04	.298	-.565	1.844
Urban	.162	.544	0.30	.765	-.903	1.228
NHIS	Ref	Ref	Ref	Ref	Ref	Ref
Private	3.181	1.271	2.50	.012	.689	5.673
Expired	Ref	Ref	Ref	Ref	Ref	Ref
Unexpired	-.834	.806	-1.03	.301	-2.414	.747
Mean dependent var		1.943	SD dependent var			0.404
Pseudo r-squared		0.196	Number of obs			189.000
Chi-square		120.774	Prob > chi2			0.000
Akaike crit. (AIC)		591.264	Bayesian crit. (BIC)			746.868

***p < 0.01, **p < 0.05, *p < 0.1.

Data source: Field Data (2021); Note: earmarked responses from Northern region participants were incomplete for meaningful analysis, hence dropped from the subsequent analysis.

manuscript for submission.

Ethics statement

All experimental protocols were approved by the Ghana Health

Service (GHS) Ethics Review Committee (ERC) (GHS-ERC:001/03/21). Written informed consent was obtained from all subjects before they were recruited into the study.

Funding

IRC Ghana funded this project in terms of data collection.

Competing competing interest

The authors reports that there are no competing interests to declare.

Acknowledgements

The authors appreciate and acknowledge the support of the research assistants who were involved in the data collection, and all respondents who voluntarily participated in the study. The authors are grateful to the Ghana Health Service (GHS), Institutional Care Division (ICD) of GHS and Regional and District Health Directorates of the study regions. The authors are thankful to IRC-Ghana for the financial support in the data collection process.

List of Abbreviations

ADL	Activities of daily living
ANC	Antenatal care
COVID-19	Coronavirus Disease 2019
DQA	Data Quality Assurance
ERC	Ethics Review Committee
GHS	Ghana Health Service
LMICs	Lower-middle Income Countries
MoH	Ministry of Health
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
NPIs	Non-pharmaceutical Interventions
OOP	Out-of-pocket payment
OPD	Outpatient Department
SDGs	Sustainable Development Goals
USA	United States of America
VIFs	Variance Inflation Factors
WASH	Water Sanitation and Hygiene
WHO	World Health Organization

References

- [1] WHO. Quality of care [cited 2022 Feb 10]. Available from: https://www.who.int/h-ealth-topics/quality-of-care/#tab=tab_1, 2022.
- [2] A.A. Mosadeghrad, Conceptual framework for quality of care, *Mater. Soc. Med.* 24 (4) (2012) 251.
- [3] M. Al, et al., Mitigating lockdown challenges in response to COVID-19 in Sub-Saharan Africa, *Int. J. Infect. Dis.* 96 (2020) 308–310.
- [4] G.N.C. Munthali, W. Xuelian, COVID-19 lockdown measures on least developing economies in africa-a case of Malawi economy, *Tech Soc Sci J* (2020;7(May)) 295–301.
- [5] R.K. Alhassan, J.J. Nutor, A.A. Abuosi, A. Afaya, S.S. Mohammed, M.A. Dalaba, et al., Urban health nexus with coronavirus disease 2019 (COVID-19) preparedness and response in Africa: rapid scoping review of the early evidence, *SAGE Open Med* 9 (2021), 205031212199436.
- [6] M.E. Ashinyo, Ghana beyond the epi-curve: initial lessons learned from the implementation of infection prevention and control measures in the COVID-19 response, *Pan Afr Med J* 38 (18) (2021) 1–5.
- [7] P.G.T. Walker, C. Whittaker, O.J. Watson, M. Baguelin, P. Winskill, A. Hamlet, et al., The impact of COVID-19 and strategies for mitigation and suppression, *Science* 369 (6502) (2020) 413–422, 80.
- [8] L.A. Rinkel, J.C.M. Prick, R.E.R. Slot, N.M.A. Sombroek, J. Burggraaff, A.E. Groot, et al., Impact of the COVID-19 outbreak on acute stroke care, *J Neurol [Internet]* 268 (2) (2021) 403–408, <https://doi.org/10.1007/s00415-020-10069-1>. Available from: .
- [9] C.C.F. Tam, K.S. Cheung, S. Lam, A. Wong, A. Yung, M. Sze, et al., Impact of Coronavirus Disease 2019 (COVID-19) Outbreak on ST-Segment-Elevation Myocardial Infarction Care in Hong Kong, China, 2019, *Circ Cardiovasc Qual Outcomes*, 2020. April):2019–21.
- [10] A. KC, R. Gurung, M.V. Kinney, A.K. Sunny, M. Moinuddin, O. Basnet, et al., Effect of the COVID-19 pandemic response on intrapartum care, stillbirth, and neonatal mortality outcomes in Nepal: a prospective observational study, *Lancet Global Health* 8 (10) (2020) e1273–e1281.
- [11] F.I. Saah, H. Amu, A.A. Seidu, L.E. Bain, Health knowledge and care seeking behaviour in resource-limited settings amidst the COVID-19 pandemic: a qualitative study in Ghana, *PLoS One* 16 (5 May) (2021) 1–15, <https://doi.org/10.1371/journal.pone.0250940> [Internet].
- [12] A.K. Morgan, B.A. Awafo, Lessons for averting the delayed and reduced patronage of non-COVID-19 medical services by older people in Ghana, *J Gerontol Soc Work [Internet]* 63 (6–7) (2020), <https://doi.org/10.1080/01634372.2020.1808142>. Available from: .
- [13] F. Agbozo, A. Jahn, COVID-19 in Ghana: challenges and countermeasures for maternal health service delivery in public health facilities, *Reprod. Health* 18 (1) (2021) 1–5, <https://doi.org/10.1186/s12978-021-01198-5>. Available from: .
- [14] WHO. GOAL 3, Target 3.8: achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all [poster], *World Heal Organ* 8 (2016). Available from: https://apps.who.int/iris/bitstream/handle/10665/208286/sdg_poster_goal3_3.8_eng.pdf?sequence=1&isAllo wed=y.
- [15] I.O. Ogunkola, Y.A. Adebisi, U.F. Imo, G.O. Odey, E. Esu, D.E. Lucero-Priso, Impact of COVID-19 pandemic on antenatal healthcare services in Sub-Saharan Africa, January), *Public Heal Pract* 2 (2021), 100076, <https://doi.org/10.1016/j.puhip.2021.100076>. Available from: .
- [16] C. Jensen, N.H. McKerrow, Child health services during a COVID-19 outbreak in KwaZulu-Natal Province, South Africa, *S. Afr. Med. J.* 111 (2) (2020), 13185.
- [17] P.A. Afulani, L. Buback, F. Essandoh, J. Kinyua, L. Kirumbi, C.R. Cohen, Quality of antenatal care and associated factors in a rural county in Kenya: an assessment of service provision and experience dimensions, *BMC Health Serv. Res.* 19 (1) (2019) 1–16.
- [18] M.I. Heaman, W.A. Sword, N. Akhtar-Danesh, A. Bradford, S. Tough, P.A. Janssen, et al., Quality of prenatal care questionnaire: instrument development and testing, *BMC Pregnancy Childbirth* 14 (1) (2014) 1–16.
- [19] J.A. Gliem, R.R. Gliem, Calculating, interpreting, and reporting Cronbach's Alpha reliability coefficient for likert-type scales, *Stud. Inorg. Chem.* (2003) 82–88.
- [20] P. Anabila, D.K. Kumi, J. Anome, Patients' Perceptions of Healthcare Quality in Ghana: A Review of Public and Private Hospitals International Journal of Health Care Quality Assurance Article Information, 2019;(January).
- [21] R.A. Atinga, Healthcare Quality under the National Health Insurance Scheme in Ghana Perspectives from Premium Holders, 2009;(December).
- [22] A.A. Abuosi, R.A. Atinga, Institutions: establishing the gaps for policy action, *Int J Heal Care* 26 (5) (2013) 481–492.
- [23] P.K. Turkson, Perceived quality of healthcare delivery in a rural district of Ghana, *Ghana Med. J.* 43 (2) (2009) 65–70.
- [24] A. Ahenkan, K. Aduo-Adjei, Predictors of patient satisfaction with quality of healthcare in university hospitals in Ghana, *Hosp Pract Res* 2 (1) (2017) 9–14.
- [25] R.K. Alhassan, S.O. Duku, W. Janssens, Nketiah- E, N. Spieker, P Van Ostenberg, et al., Comparison of perceived and technical healthcare quality in primary health facilities: implications for a sustainable national health insurance scheme in Ghana, *PLoS One* 1–19 (2015).
- [26] S. Kwasi, O. Duku, E. Nketiah-amponsah, W. Janssens, M. Pradhan, Perceptions of Healthcare Quality in Ghana: Does Health Insurance Status Matter, 2018, pp. 1–17.
- [27] P. Akweongo, M. Aikins, K. Wyss, P. Salari, F. Tediosi, Insured clients out-of-pocket payments for health care under the national health insurance scheme in Ghana, *BMC Health Serv. Res.* 8 (2021) 1–14.
- [28] J. Okoroh, S. Essoun, A. Seddo, H. Harris, J.S. Weissman, L. Dsane-selby, et al., Evaluating the Impact of the National Health Insurance Scheme of Ghana on Out of Pocket Expenditures: a Systematic Review, 2018.
- [29] P.A. Dalinjong, A.Y. Wang, C.S.E. Homer, Has the Free Maternal Health Policy Eliminated Out of Pocket Payments for Maternal Health Services? Views of Women, Health Providers and Insurance Managers in Northern Ghana, vols. 1–19, 2018.
- [30] P.L. Hutchinson, M. Do, S. Agha, Measuring Client Satisfaction and the Quality of Family Planning Services: A Comparative Analysis of Public and Private Health Facilities in Tanzania, 2011.
- [31] G. Fesseha, M. Alemayehu, B. Etana, K. Haillessie, Perceived Quality of Antenatal Care Service by Pregnant Women in Public and Perceived Quality of Antenatal Care Service by Pregnant Women in Public and Private Health Facilities in Northern Ethiopia, 2014;(August).
- [32] R. Robinson, A. Steiner, Managed Health Care: US Evidence and Lessons for the, National Health Service, York, 1998.
- [33] A.D. Gage, H.H. Leslie, A. Bitton, J.G. Jerome, R. Thermidor, P. Joseph, et al., Assessing the quality of primary care in Haiti, *Bull. World Health Organ.* (2017; February) 182–190.
- [34] P.A. Afulani, Rural/urban and socioeconomic differentials in quality of antenatal care in Ghana, *PLoS One* 1–28 (2015).
- [35] S. Yaya, G. Bishwajit, M. Ekholuenetale, V. Shah, B. Kadio, Urban-rural difference in satisfaction with primary healthcare services in Ghana, *BMC Health Serv. Res.* 1–9 (2017).
- [36] M.E. Ashinyo, K.E. Amegah, S.D. Dubik, G. Ntow-Kummi, M.K. Adjei, J. Amponsah, et al., Evaluation of water, sanitation and hygiene status of COVID-19 healthcare facilities in Ghana using the WASH FIT approach, *J. Water, Sanit. Hyg. Dev.* 11 (3) (2021) 398–404.
- [37] A. Fitzpatrick, S. Beg, L. Derksen, A. Karing, J. Kerwin, A.M. Lucas, et al., Journal of Economic Behavior and Organization Health Knowledge and Non-pharmaceutical Interventions during the Covid-19 Pandemic in Africa. *R J Econ Behav Organ [Internet]*, 190, 2021, pp. 33–53, <https://doi.org/10.1016/j.jebo.2021.06.045>. Available from: .

- [38] X. Chen, L. Ran, Q. Liu, Q. Hu, X. Du, X. Tan, Hand hygiene, mask-wearing behaviors and its associated factors during the COVID-19 epidemic: a cross-sectional study among primary school students in wuhan, China, *Int. J. Environ. Res. Publ. Health* 17 (8) (2020) 1–11.
- [39] R.B. Yapi, C.A. Houngbedji, D.K.G.N. Guessan, A.O. Dind, A.R. Sanhoun, A. Amin, et al., Knowledge, attitudes, and practices (KAP) regarding the COVID-19 outbreak in C ô t e d' ivoire: understanding the non-compliance of populations with non-pharmaceutical interventions, *Int. J. Environ. Res. Publ. Health* (2021) 1–21. December 2019.
- [40] A. Labi, N. Obeng-nkrumah, B.D. Nuerterey, S. Issahaku, F. Ndiaye, P. Baffoe, et al., Hand hygiene practices and perceptions among healthcare workers in Ghana: a WASH intervention study, *J Infect Dev Ctries* 13 (12) (2019) 1076–1085.
- [41] M. Kanyangara, S. Allen, S.S. Jiwani, D. Fuente, Access to water, sanitation and hygiene services in health facilities in sub-Saharan Africa 2013 – 2018: results of health facility surveys and implications for COVID-19 transmission, *BMC Health Serv. Res.* (2021) 1–11.