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Availability of Human and Material Resources and Quality of Maternal and Child Health Services in Primary and Secondary Health Facilities, Bauchi LGA, Bauchi State, Nigeria

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Abstract

Adequate human and material resources are essential for the provision of quality maternal and child health (MCH) services. This study assessed the availability of human and material resources and evaluated the quality of MCH services in primary and secondary health facilities in Bauchi Local Government Area (LGA), Bauchi State, Nigeria. A mixed-method design comprising a retrospective cross-sectional and exploratory qualitative approach was used. Nine public health facilities (six primary and three secondary) were studied. Data were collected using a structured facility checklist, self-administered questionnaire, key informant interviews and focus group discussions. Of 400 questionnaires distributed, 265 were correctly completed and analysed. Eighteen healthcare providers participated in key informant interviews and 63 clients in focus group discussions. Quantitative data were analysed with descriptive statistics and independent-samples t-tests ($\alpha = 0.05$); qualitative data were thematically analysed. Results showed that 87.6% of material resources in primary facilities were available, functional and sufficient, compared with 78.0% in secondary facilities. None of the primary facilities had a medical doctor, while eight trained medical doctors were available across the secondary facilities. Specialist Hospital Bauchi had two obstetricians and one paediatrician. There was no statistically significant difference in human resources between primary and secondary facilities ($t = -1.379$, $df = 5$, $p = 0.226$). Clients rated waiting time (mean = 1.9) and cost of services (mean = 1.8) as fair, while provider skill sets (mean = 3.5), nature of services (mean = 3.3) and provider knowledge (mean = 3.3) were rated good. There was no statistically significant difference in perceived quality between primary and secondary facilities ($t = 1.338$, $df = 243$, $p = 0.182$). The study concludes that important gaps exist, particularly the absence of medical doctors in primary facilities and deficiencies in selected equipment. Strengthening human resources, ensuring continuous availability of essential materials, and addressing waiting time and cost concerns are necessary to improve the quality of MCH services in Bauchi LGA.

Keywords: Human resources, Material resources, Quality of care, Maternal and child health, Primary health care, Secondary health care, Bauchi.

Introduction

Maternal and child health is a critical component of healthcare because the health and well-being of mothers and children have far-reaching implications for families, communities and the wider health system (Kruk et al., 2018). Quality of healthcare refers to the extent to which health

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services increase the likelihood of achieving desired health outcomes while remaining consistent with current professional knowledge and the needs and preferences of service users (World Health Organization WHO, 2020). The World Health Organization identifies safe, effective, timely, efficient, equitable and people-centred care as important dimensions of quality healthcare.

Human resources are particularly important in maternal and child healthcare because nurses, midwives, doctors and other health professionals are responsible for providing preventive, promotive, curative and referral services (Nuamah et al., 2019). Adequate staffing contributes to continuity of services and the capacity of facilities to respond to emergencies. Similarly, material resources constitute an important structural component of healthcare quality. The availability of appropriate equipment and supplies does not necessarily guarantee effective care; equipment must also be functional, sufficient and appropriately used (Srivastava et al., 2015).

In Nigeria, concerns regarding maternal and child health outcomes have increased attention to the availability, accessibility and quality of health services (Adewuyi et al., 2018). Bauchi State, located in northeastern Nigeria, continues to require strengthening of maternal and child health services, particularly at the primary healthcare level. Despite the importance of adequate staffing and material resources, there is limited facility-level evidence comparing these resources and perceived quality of maternal and child health services across primary and secondary health facilities in Bauchi Local Government Area.

Statement of the Problem

Although primary and secondary health facilities in Bauchi LGA provide maternal and child health services, questions remain about the adequacy of the human and material resources available to support those services and about the quality of care experienced by clients. Shortages of skilled personnel, particularly medical doctors at the primary level, and gaps in essential equipment may compromise both technical quality and clients' willingness to use facility-based care (Sayyadi et al., 2021; Ojifinni & Ibisomi, 2020). Without comparative evidence on resource availability and perceived quality across the two levels of care, it is difficult for policy makers and facility managers to prioritise investments that will improve service delivery.

Purpose of the Study

The purpose of the study is to examine the availability of human and material resources and the quality of maternal and child healthcare services in Primary and Secondary Healthcare facilities of Bauchi LGA, Bauchi State.

Research Objectives

The study aimed to:

1. Assess the availability of material and human resources for the provision of maternal and child health services in primary and secondary health facilities in Bauchi LGA, Bauchi State.
2. Evaluate the quality of maternal and child health services provided in primary and secondary health facilities in Bauchi LGA, Bauchi State.

Research Hypothesis

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H_0: There is no significant difference in the quality of maternal and child health services between primary and secondary health facilities in Bauchi LGA, Bauchi State.

Materials and Methods

Research Design

A mixed-method design was employed, comprising a quantitative retrospective cross-sectional component and a qualitative exploratory component. The design enabled the researchers to combine facility-level assessment and retrospective records with information obtained directly from clients and healthcare providers.

Target Population

The study population comprised clients receiving maternal and child health services in the selected facilities and healthcare providers responsible for providing such services. The retrospective component involved records of patients who received maternal and child health services between January 2018 and December 2021.

Sample Size and Sampling Techniques

A sample size of 400 was initially determined for the quantitative component using the Taro Yamane formula. Of the 400 questionnaires distributed, 287 were retrieved and 265 were correctly completed and included in the analysis (response rate 66.3% of distributed; 92.3% of retrieved). A stratified sampling procedure was used to divide the facilities into primary and secondary healthcare strata. Simple random sampling was then used to select six primary and three secondary healthcare facilities. For the qualitative component, 63 clients participated in focus group discussions, while 18 healthcare providers participated in key informant interviews. Qualitative participants were selected sequentially until data saturation was reached.

Instruments and Methods of Data Collection

Data were collected using a structured facility checklist (the Utilisation of Maternal and Child Health Services Evaluation Checklist - UMCHEC), a self-administered questionnaire, a key informant interview guide and a focus group discussion guide. The UMCHEC assessed facility characteristics, 41 material-resource items and 14 human-resource items. The questionnaire included nine items assessing perceived quality of services on a four-point modified Likert scale ranging from poor to very good. The instruments were subjected to face and content validation by five experts in maternal and child health and public health nursing. A pilot study was conducted at General Hospital Dass (outside the study area). Reliability assessment of the questionnaire produced a Cronbach's alpha of 0.87.

Methods

Quantitative data were processed using the Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics (frequencies, percentages and means) were used. For the four-point Likert scale, a mean score of 2.5 or above was considered accepted/good, while a score below 2.5 was considered below the acceptable level. Independent-sample t-tests were used to compare human resources and perceived quality of services between primary and secondary

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facilities at a 0.05 level of significance. Qualitative data were transcribed, coded and thematically analysed. Findings from the quantitative and qualitative components were triangulated.

Ethical Considerations

Ethical clearance was obtained from the Research and Ethics Committee of the Bauchi State Ministry of Health. Permission was secured from the management of the participating facilities. Informed consent was obtained from all questionnaire respondents and qualitative participants. Confidentiality and anonymity were maintained throughout the study.

Results

Sociodemographic Characteristics of Respondents

Table 1: Socio-demographic characteristics of respondents (n = 265)

VARIABLES	n	%
AGE (years)		
17-25	82	31
26-35	136	51
36-45	47	18
46 & above	-	-
PARITY		
1-2	138	52
3-5	96	36
6 & above	31	12
RELIGION		
Islam	218	82
Christianity	47	18
MARITAL STATUS		
Married	252	95
Single		
Widow		
Divorced	13	5
EDUCATIONAL STATUS		
None	27	10
Primary	52	20
Secondary	142	53
Post-secondary	44	17
EMPLOYMENT STATUS		
Employed	36	14

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Self Employed	195	73
Unemployed	34	13

Table 1 shows that the majority of respondents (51%) were aged 26–35 years, while 18% were aged 36–45 years. Most respondents (82%) were Muslims and 95% were married. Fifty-three percent had completed secondary education and only 17% had post-secondary education. Seventy-three percent were self-employed, 14% were formally employed and 13% were unemployed. These characteristics are typical of the reproductive-age population utilising public MCH services in the study area.

Availability of Material Resources

A structured facility checklist was used to assess the availability, functionality and sufficiency of material resources required for maternal and child health services. Table 1a provides a facility-by-facility overview of material-resource status in the six primary healthcare facilities. Overall, 87.6% of assessed material resources in primary facilities were classified as available, functional and sufficient, compared with 78.0% in secondary facilities.

Table 2: Overview of material resources availability in primary healthcare facilities

Primary health care	Not Available	ASNF	AFNS	AFS
PHC Tirwun	14,15,23	40,41	5	1-4,6-13,16-22,24-39,41-45.
PHC Nasarawa Jahun	15,30	41-42	21	1-14,16-20,22-29,31-40,41-45
PHC Ibrahim Bako	12,15,23,28,30,33,36	13,40,41,43,	5,16,20, 22,24	1-11,13,1416-19,21,25-27,29,31-32,34-35,37-3942,44,45
PHC Tashan Babaye	15	34,40,41	5,29,31	1-4,6-14,16-28,30,32-39,42-45
PHC Kofan Ran	15	4,34,40,41	0	1-3,5-14,16-33,42-45
PHC Under five	15,30	0	5,19,36	1-4,6-14,16-19,20-29,31-35,37-45

Table 2 shows that item 15 (enema kit) was unavailable in every primary healthcare facility. Other recurrent shortages involved selected procedural and diagnostic items (notably items 12, 23, 28, 30, 33 and 36 in one or more facilities). Despite these specific gaps, the great majority of the assessed material-resource items were recorded as available, functional and sufficient, producing the overall estimate of 87.6% for primary facilities. This pattern indicates a generally adequate material-resource base at the primary level, interrupted by a small number of critical single-item deficiencies that can still affect particular clinical procedures.

At the secondary level the overall proportion of material resources assessed as available, functional and sufficient was 78%. The most consequential gaps concerned neonatal care: special care baby units (SCBU) and infant/radiant warmers were unavailable in all three secondary facilities. Cardiograph machines, infusion pumps and pulse oximeters were also missing or non-functional in some secondary facilities, while mackintoshes were available and functional but insufficient in number. Because secondary facilities are expected to manage higher-risk deliveries

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and neonatal complications, these equipment gaps have direct implications for the quality and safety of care that can be offered.

Human Resources Available at Primary Health Care Centres

Table 3: Human resources available at the primary health care centres

	PHC Tirwun			PHC Nasarawa Jahun			PHC Ibrahim Bako			PHC Tashan Babiye			PHC Kofan Ran			Under five PHC		
Human Resources	**AT**	**AU**	**Total**	**AT**	**AU**	**Total**	**AT**	**AU**	**Total**	**AT**	**AU**	**Total**	**AT**	**AU**	**Total**	**AT**	**AU**	**Total**
Medical Officer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nurse/Midwife	2	2	**4**	14	4	**18**	10	6	**16**	7	4	**11**	28	17	**45**	11	7	**18**
CHEW/CHO	4	3	**7**	2	-	**2**	1	5	**6**	6	-	**6**	6	2	**8**	3	3	**6**
JCHEW	-	-	-	2	-	**2**	-	1	**1**	2	-	**2**		1	**1**	-	-	-
Health Assistant		8	**8**		11	**11**		21	**21**	4	13	**17**		32	**32**		8	**8**
Security	-	2	**2**		1	**1**	-	1	**1**	-	1	**1**		4	**4**	-	1	**1**

Key: AT=Available and Trained, AU=Available and Untrained,

Table 3 shows that none of the six primary healthcare facilities had a medical doctor. The number of nurses/midwives varied substantially across facilities (from 4 in PHC Tirwun to 45 in PHC Kofan Ran). Across the primary facilities the majority of available nurses/midwives were trained, although the proportion varied by facility. Community Health Extension Workers (CHEWs)/Community Health Officers (CHOs) were present in all facilities, while Junior CHEWs were fewer. Health assistants and security personnel were largely untrained. The complete absence of medical doctors at the primary level has important implications for the management of obstetric and neonatal complications and for timely referral.

Human Resources Available at Secondary Health Care Facilities

Table 4: Human resources available at the secondary health care facilities

	Specialist Hospital Bauchi	Women and Children General Hospital Bauchi	Bayara General Hospital

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S/N	Human Resources	AT	A U	Total	AT	AU	Total	AT	AU	Total
1	Medical Officer	5	0	**5**	2	0	**2**	1	0	**1**
2	Obstetricians	2	0	**2**	0	0	**0**	0	0	**0**
3	Paediatrician	1	0	**1**	0	0	**0**	0	0	**0**
4	Nurse/Midwives	43	13	**56**	11	5	**16**	14	7	**21**
5	Pharmacist	0	4	**4**	0	1	**1**	0	1	**1**
6	CHO	1	0	**1**	1	0	**1**	0	0	**0**
7	CHEW	15	4	**19**	5	0	**5**	2	0	**2**
8	Radiographers	0	7	**7**	0	1	**1**	0	1	**1**
9	Laboratory Technician	0	21	**21**	0	12	**12**	0	6	**6**
10	Laboratory Scientist	2	5	**7**	0	2	**2**	0	1	**1**
11	Physiotherapist	0	4	**4**	0	0	**0**	0	4	**4**
12	Nutritionist	3	0	**3**	2	0	**2**	2	0	**2**
13	Medical records Officers	0	8	**8**	0	16	**16**	0	5	**5**
14	Health Assistance	0	13	**13**	0	11	**11**	0	4	**4**

Key: AT=Available and Trained, AU=Available and Untrained

Table 4 shows that eight medical doctors were available across the three secondary facilities and all were trained. Specialist Hospital Bauchi had five medical doctors, two obstetricians and one paediatrician. Women and Children General Hospital and Bayara General Hospital had two and one medical doctors respectively, but no specialist obstetricians or paediatricians. Most nurses/midwives were trained. Qualitative findings indicated concerns regarding staffing adequacy. Some healthcare providers reported that staffing was insufficient to cover 24-hour services and that additional staff, particularly nurses and midwives, were needed. One key informant stated: "Staffs are inadequate to cover 24hrs shifts and we have no doctors." Another reported: "We need more staff, especially in the maternity." Conversely, some respondents considered the available workforce adequate in their facilities, indicating variation in perceptions of staffing adequacy.

Comparison of Human Resources Between Primary and Secondary Facilities

Table 5: Independent-samples t-test comparing human resources between primary and secondary facilities

Measure	Secondary	Primary
Mean	20.00	52.00
SD	25.18	49.48
Observations	13	5
t-value	−1.379	
df	5	

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p-value	0.226

Table 5 shows that the independent-samples t-test yielded t = −1.379, df = 5, p = 0.226. Because the p-value is greater than 0.05, the difference in measured human resources between primary and secondary facilities is not statistically significant. Although the numerical distribution of personnel differed markedly (particularly the complete absence of doctors at the primary level), the statistical test did not demonstrate a significant difference. This result should be interpreted in light of the small number of facility-level observations and the substantial variation in staffing across individual facilities.

Perceived Quality of Maternal and Child Health Services

Table 6: Clients' ratings of quality of maternal and child health care services (n = 265)

S/N	Statement	Poor	Fair	Good	Very Good	Mean	SD	Remark
1	Waiting time before getting medical attention	89	128	25	23	1.9	1.6	**Fair**
2	Nature of the services you receive	23	37	30	175	3.3	3.0	**Good**
3	Knowledge of the healthcare providers concerning what needs to be done to the patient	6	36	96	127	3.3	2.9	**Good**
4	Nurses/midwives and doctors' skill sets in the provision of MCH services	5	28	66	166	3.5	3.0	**Good**
5	Promptness/Speed at which you receive medical attention from nurses/midwives and doctors whenever you have a problem	20	54	106	85	3.0	2.6	**Good**
6	Effectiveness of the drugs and interventions you receive	7	29	164	65	3.1	2.6	**Good**
7	Services meeting your expectations and needs	11	37	183	34	2.9	2.4	**Good**
8	The attitude of the nurses/midwives and doctors towards patients	26	32	172	35	2.8	2.4	**Good**
9	Cost of the services	136	76	31	22	1.8	1.5	**Fair**
	Total mean score					2.8	2.4	**Good**

Key: SD Standard deviation

Table 6 shows that the strongest rating was for the skill sets of nurses, midwives and doctors (mean = 3.5), followed by the nature of services and providers' knowledge (mean = 3.3 each). Effectiveness of drugs and interventions (mean = 3.1), promptness of attention (mean = 3.0), services meeting expectations (mean = 2.9) and provider attitude (mean = 2.8) were all rated good. Waiting time (mean = 1.9) and cost of services (mean = 1.8) were rated only fair and

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constituted the principal areas of weaker perceived performance. The overall mean score of 2.8 indicates that, on balance, clients perceived the quality of MCH services as good.

Qualitative findings supported the quantitative results. Many participants reported satisfaction with antenatal care, immunisation and family-planning services, while waiting time was identified as a concern. Some participants attributed long waiting times to large numbers of clients and inadequate staffing.

Comparison of Quality Between Primary and Secondary Facilities

Table 7: Independent-samples t-test comparing perceived quality between primary and secondary facilities

Measure	Secondary	Primary
Mean	2.807	2.744
SD	0.367	0.391
Observations	147	118
t-value	1.338	
df	243	
p-value	0.182	

Table 7 shows that the independent-samples t-test comparing perceived quality of maternal and child health services between primary and secondary facilities yielded t = 1.338, df = 243, p = 0.182. Because the p-value is greater than 0.05, the null hypothesis is retained: there is no statistically significant difference in the quality of maternal and child health services between primary and secondary health facilities in Bauchi LGA. Despite differences in the availability and composition of resources, clients' assessments of the quality of care were broadly similar across the two facility levels.

Discussion

This study assessed the availability of human and material resources and the quality of maternal and child health services in selected primary and secondary healthcare facilities in Bauchi LGA. The findings present a mixed picture: most assessed resources were available and functional, and clients generally rated several dimensions of care as good, but important gaps existed in staffing, equipment, waiting time and cost.

The assessment of material resources showed that most resources were available, functional and sufficient in both facility categories, with a higher estimated proportion in primary facilities (87.6%) than in secondary facilities (78%). However, the presence of specific gaps is important because overall availability may conceal deficiencies in resources that are particularly critical for specific clinical functions. The universal absence of enema kits at the primary level and of special care baby units and infant/radiant warmers at the secondary level are notable examples. These findings are consistent with earlier assessments of primary healthcare capacity in northern

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Nigeria that have documented shortages of functional equipment (Sayyadi et al., 2021; Naseem et al., 2020).

Human-resource findings revealed a marked compositional difference between primary and secondary facilities. None of the six primary healthcare facilities had a medical doctor, whereas medical doctors were present at all three secondary facilities and Specialist Hospital Bauchi also had specialist obstetricians and a paediatrician. This distribution is consistent with the different levels of care but has clear implications for the capacity of primary facilities to manage complications and provide timely referral (Kruk et al., 2018). Qualitative data confirmed that some providers considered staffing inadequate for 24-hour coverage and maternity services. Interestingly, the statistical comparison did not demonstrate a significant difference in the measured human-resource variable ($p = 0.226$). This result should be interpreted cautiously given the small number of facility-level observations and the substantial variation in staffing across individual facilities.

With respect to perceived quality, respondents rated most dimensions as good. The highest mean score was recorded for the skills of nurses, midwives and doctors (3.5), suggesting that clients generally perceived providers to possess appropriate clinical skills. Provider knowledge and the nature of services received also received favourable ratings. However, waiting time (mean 1.9) and cost of services (mean 1.8) were rated only fair. Long waiting time can erode clients' experience of care even where technical aspects are viewed positively (Srivastava et al., 2015; Jibril et al., 2017). Cost remains a barrier to continued utilisation in many Nigerian settings (Adewuyi et al., 2018).

The overall comparison showed no statistically significant difference in perceived quality between primary and secondary facilities ($p = 0.182$). Thus, despite differences in the availability and composition of resources, clients' assessments of the quality of care were broadly similar across the two facility levels. This finding underscores an important distinction between structural quality (staff and equipment) and experienced quality (clients' assessment of the care they receive). A facility can have substantial resource availability while still experiencing problems such as waiting time, or clients may perceive care positively despite deficiencies in particular resources (WHO, 2020; Kruk et al., 2018).

Conclusion

The study found that most assessed human and material resources required for maternal and child health services were available in the selected primary and secondary healthcare facilities in Bauchi LGA. Nevertheless, important gaps were identified, including the absence of medical doctors in all assessed primary healthcare facilities and deficiencies in selected equipment and supplies at both levels. Clients generally perceived the quality of maternal and child health services positively; however, waiting time and cost of services were rated less favourably. There was no statistically significant difference in the measured human resources between primary and secondary facilities or in perceived quality of maternal and child health services between the two levels. The null hypothesis was therefore retained.

Recommendation

Based on the findings of the study the following recommendations are made:

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1. The government should review staffing requirements and deploy adequate numbers of doctors, nurses and midwives according to facility workload and service requirements, with particular attention to the complete absence of medical doctors at the primary level.
2. The government should provide a policy that will minimise the cost of maternal and child health care services and expand financial-protection mechanisms.
3. Government should provide and maintain adequate material resources for the provision of MCH services, with particular attention to identified gaps (enema kits at primary level; SCBU equipment and radiant warmers at secondary level).
4. Facilities should review patient-flow arrangements and staffing patterns to reduce unnecessary waiting time, and conduct routine supervisory assessments to evaluate not only whether equipment is present but whether it is functional, sufficient and available when required.

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