ORIGINAL ARTICLE

Quantitative and qualitative assessment of maternal and child health services among hard-to-reach communities in Adamawa state, Nigeria

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Abstract

Background: Recent global reports highlighted the significance of improving the quality of healthcare delivery in all settings, including rural and Hard-to-reach communities, as a central strategy for attaining sustainable development goals.

Objectives: This study aimed at assessing and document relevant data associated with delivering qualitative Maternal and Child health (MCH) services in the hard-to-reach (HTR) communities using carefully selected indicators.

Methods: The study used a mixed-design approach of quantitative and qualitative methods.

Results: This study report high performance on the first antenatal visit (ANC 1), use of modern contraceptives (CPR), Penta 3, measles vaccination coverage, and, Low dropout rate also noticed in Penta 3, thus signifying a generally good performance in all the local government areas (LGAs). Furthermore, Yola South, Fufore, Toungo, Ganye and Michika LGA were found to be the best performing LGAs on the selected maternal and Child indicators, namely: (ANC1), ANC4, ANC8, Institutional delivery rate, and Contraceptive Prevalence Rate (CPR), while Gombi, Guyuk and Madagali LGAs were the poorest performing LGAs. The poor performance of these LGAswere associated with human and environmental interferences: ongoing insecurity, high HTR communities due to mountains and riverine, high illiteracy, inadequate outreach services, poverty, lack of adequate emergency transport system, inadequate human resource for health (HRH), inadequate and poor infrastructure, many communities lacking primary healthcare center.

Conclusion: The assessment highlights the coverage of LGAs with low utilization of MCH services in HTR communities of Adamawa State, the reasons for the low coverage, and the possible strategies for increased utilization of these services. These findings suggest an urgent need for designing efficient outreaches for the delivery of maternal newborn and child's intervention in HTR communities.

INTRODUCTION

World Health Organization Report (2015) highlighted the importance of addressing the quality of care in all settings, including Rural and Hard to reach communities, as a central strategy for attaining sustainable development goals and universal health coverage (WHO, 2020). In the year 2000, member countries of the United Nations agreed on 8-millennium development goals (MDGs) to improve the health and socio-economic well-being of the people in their countries in the 21st century (1). MDG 5— to improve maternal health — set a target of reducing maternal mortality by three-fourths by 2015 (Target 5. A). Unfortunately, of all the Millennium Development Goals, MDG 5 has made little progress (2). Increased mortality burden in rural and hard-to-reach reflects the inability to provide routine services of good quality (3). There is also the paucity of research documenting the impact of the inaccessibility of healthcare services in Nigeria's rural and hard-to-reach communities. (4)

Maternal mortality remains a major problem in many parts of the world, including Nigeria. Understanding the causes of maternal mortality is crucial in confronting the challenge of unyielding high rates (5).

The number of women dying due to complications during pregnancy and childbirth decreased by 34% from 1990 to 2008. Although the progress in healthcare delivery has notably increased, the annual rate of decline was regrettably reported to be less than half of the annual decline (5.5%) required to achieve the MDG target. The 34% decline since 1990 translates into an average annual decline of just 2.3% based on available data, and in many nations, including Nigeria, maternal mortality is still a severe issue (World Health Organization, 2019). In order to address the issue of persistently high rates, it is essential to understand the reasons for maternal death (Hamal et al., 2020, WHO, 2010).

The increase in Maternal and Childs mortality in Nigeria was reported to be alarming that out of every 100,000, 512 women died in a year (NDHS, 2019). Maternal mortality rates consistently increase from 126/100,000 live births in 2018 to over 400/100,000 live births in 2021 (DHIS 2.0). The widest disparity in health outcomes between poor and wealthy nations is found in sub-Saharan Africa, where women have a 1 in 16 probability of dying during pregnancy or childbirth compared to a 1 in 4000 risk in industrialized nations (6). Over 99% of maternal deaths in developing countries among poor and rural women are avoidable (7).

Different interactive factors contribute to maternal mortality, including the behavior of families and communities, social status, education, income, nutritional status, age, parity, and availability and accessibility of health services (Yadav et al., 2020). The non-health sector activities that influence maternal outcomes include education, water and sanitation, roads, communication, agriculture, and internal security (8).

Ninety-nine percent of newborn and child mortality worldwide occurs in underdeveloped countries before the age of five (Nahian et al., 2020). Nigeria's maternal and child mortality indices are poor compared to other African nations. MMR stands at 576/100,000, SBA stands at 42/1000 live births, U5 mortality stands at 120/1000, and under-five mortality stands at 32/1000 (NPC, 2019). Even though many of these deaths are avoidable, Nigeria's healthcare system continues to fail women and children in terms of coverage and quality. Less than 20% of health facilities currently offer emergency obstetric care, and trained birth attendants attend only 35% of deliveries. The Major causes of infant mortality may include: Complications during pregnancy, sudden infant death syndrome, maternal, malformation and accident and unintentional injuries (9).

Access to health care comprises several multidimensional factors, which include but are not limited to availability, acceptability, financial accessi-

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bility, geographic accessibility, vaccination, impacts vaccine uptake, and other Maternal and child services (10, 11), World Health distance threshold for a population to be considered hard to reach; however, two studies used 5 km from a health centre as a threshold (WHO, 2015). Distance is not only a barrier from the perspective of individuals' ability to reach the health facility but can also impede health providers' ability to conduct vaccination outreach activities (WHO, 2015).

Adamawa State, Nigeria, has been affected by several security challenges leading to a massive increase in the internally displaced population. The State also has over 1000 HTR communities due to mountains, rivers, and the non-availability of health facilities in the HTR communities, which consequently leads to poor access to maternal, newborn, and child health (MNCH) by the State's growing population.

Despite the environmental and human challenges affecting the State, there is an urgent need for data to be collected to improve access and health care coverage to the populace, especially women and children. This research aimed to collect Qualitative and quantitative data and secondary data from HTAs of Adamawa State with the view to improve access to better Maternal and Child Health Care Coverage.

MATERIALS AND METHODS

This section discussed the materias and methods such as research design, research participants, analytical methods and ethical consents and approval.

Study Design and Settings

The study used a mixed-design approach of quantitative and qualitative methods. The quantitative assessment involved a desk analysis of health facility records from the district health information system 2.0 (DHIS 2.0, 2021).

The qualitative assessment involves surveying health facility managers and other staff through critical informants' interviews and focused group discussions with community stakeholders. Participants for this assessment included health workers at the catchment area HFs, officials at LGA PHCAs, PHCDA headquarters, and the State Ministry of Health. The qualitative data were generated through audio recordings and later transcribed verbatim in English. The transcripts were shared and read thoroughly, independently, and repeatedly by the study team members, and themes were generated in line with the research questions and objectives. A saturation sampling procedure was adopted. Accordingly, empirical data reached saturation within a narrow range of interviews (9–17), particularly those with relatively homogenous study populations and narrowly defined objectives (12, 13). A topic guide was used to explore further stakeholders' perspectives about facilitators and constraints to MCH services at health facilities and LGA levels.

Study participants

The study adopted a stakeholder consultation approach (14). The participants were purposively selected based on their roles and involvement in maternal and Child program management at State, LGAs, and health facility levels to elicit diverse perspectives on the topic of study. The key informants were drawn from the State Ministry of Health (SMoH), the State Primary Health Care Development Agency (SPHCDA), the Local Government Primary Health Care Authority (LGA-PHCA), and the PHCs serving the HTR communities. In all, 12 respondents were selected (Table 1). Furthermore, 6 FGDs with 6 – 8 participants each were conducted from the intervention communities. All the participants were fully involved in the study, and only one dropped out.

Method of Analysis

The quantitative data downloaded from the district health information system was run on Microsoft Excel and analyzed. Manual thematic analysis was performed on qualitative data from the KII and FGD. Audio files were transcribed verbatim, and transcripts were anonymized using pseudonyms. All transcripts were manually coded, and a provisional list of codes/themes was deductively generated based on the research questions and study objectives. A codebook was developed using a structural coding

method. An inductive approach was then adopted to identify emerging themes, patterns, and experiences (Karami et al., 2017). Constant comparison was used to identify emerging themes for the final analysis and to serve as a reliability test for the data.

Ethics approval and consent to participate

Written informed consent was obtained from all study participants. All experimental protocols were approved by Ethical committee (HREC) of Adamawa State Ministry of Health reference number S/MoH/1131/I/23. The collected data was only accessed by the research team and it was always kept under lock and key. Research assistants signed confidentiality agreements in bid to protect the data from leaking to the public. All methods were carried out in accordance with relevant guidelines and regulations.

RESULTS

Results for quantitative assessment of LGAs

The indicators selected for the quantitative assessment for this study include the following MCH indicators from 2021 DHIS 2.0 Antenatal care visit 1 (ANC1), ANC4, ANC8, Institutional delivery rate, and Contraceptive Prevalence Rate (CPR) Penta 3 coverage, Penta 3 drop out, measles coverage and vitamin A supplementation.

I. Performance of the LGAs in the Adamawa Central Senatorial Zone on maternal indices

Figure 1 shows the performance of the LGAs in the central senatorial zone. The result indicates high performance on ANC 1 and modern contraceptives (CPR) use across all the LGAs. Yola south LGA showed a better performance than all the other LGAs in the zone with ANC 1 (85.5%), ANC 4 (46.2%), 26.8 achieved FANC of 8th ANC visit, 55.5% institutional delivery rate, and 33.5 % uses modern contraceptives. The results further suggested that Gombi LGA is the poorest performing LGA on the selected maternal indicators for this study with 77.7%, 17.1%, 3.7%, 35.7, 35.1, on ANC 1, ANC

4, ANC 8 Institutional delivery, and contraceptive prevalence rate respectively.

II. Performance of the Adamawa Northern Senatorial Zone on maternal indices

Fig. 2 shows the selected maternal indicators from DHIS 2.0 (ANC1, ANC4, ANC8, Institutional delivery rate, and CPR). The result indicates high performance on ANC 1 and modern contraceptives (CPR) use across all the LGAs. Ganye LGA showed a better performance than all the other LGAs in the zone with ANC 1 (125.5%), ANC 4 (48.6%), 11.7 achieved FANC of 8th ANC visit, 64% institutional delivery rate and 67.1 % using modern contraceptives. The results further suggested that Guyuk LGA is the poorest performing LGA on the selected maternal indicators for this study, with 31.6%, 12.5%, 2.2%, 26%, 14.5%, on ANC 1, ANC 4, ANC 8 Institutional delivery, and contraceptive prevalence rate respectively.

III. Performance of the LGAs in the Adamawa Southern Senatorial Zone on maternal indices

Figure 3 indicates the performance of ANC1, ANC4, ANC8, Institutional delivery rate, and CPR). The result indicates high performance on ANC 1 and modern contraceptives (CPR) use across all the LGAs. Mubi South LGA showed a better performance than all the other LGAs in the zone with ANC 1 (117.2%), ANC 4 (40.2%), 6.4 achieved FANC of 8th ANC visit, 57.8% institutional delivery rate and 30.6% using modern contraceptives. The results further suggested that Madagali LGA is the poorest performing LGA on the selected maternal indicators for this study, with 53.5%, 16.3%, 8.0%, 34.5%, 28.3%, on ANC 1, ANC4, ANC8 Institutional delivery, and contraceptive prevalence rate respectively.

IV. Performance of the LGAs in the Adamawa Central Senatorial Zone on child's indices

The carefully selected child indicators from DHIS 2.0 includes Penta 3 coverage, Penta 3 dropout rate, measles coverage, and Vitamin A supplementation. The result indicates high Penta 3 and Measles coverage performance across all the LGAs exceeding their targets. A low dropout rate is also noticed in Penta 3 dropout rate, thus signifying ga generally good performance by all the LGAs in the zone.

Furore LGA showed a better performance than all the other LGAs in the zone with Penta 3 dropout rate (2.4%), Penta 3 coverage (106.8%), 93.7% Measles coverage, and 51.9% Vitamin A supplementation. The results further suggested that Gombi LGA is the poorest performing LGA on the selected child's indicators for this study with 0.66%, 98.6%, 76.3%, and 34.5% on Penta 3 dropout rate, Penta 3 coverage, Measles coverage, and vitamin A supplementation rate respectively.

V.   Performance of the LGAs in the Adamawa Southern Senatorial Zone on child's indices The carefully selected child's indicators from DHIS 2.0 (Penta 3 coverage, Penta 3 dropout rate, measles coverage, and Vitamin A supplementation). The result indicates high performance on Penta 3 and Measle coverage across all the LGAs exceeding their targets. A low dropout rate is also noticed in Penta 3 dropout rate, thus signifying a generally good performance by all the LGAs in the zone. Toungo LGA showed a better performance compared to all the other LGAs in the zone with Penta 3 dropout rate (4.5%), Penta 3 coverage (156%), 152.2% Measles coverage, and 48.7% Vitamin A supplementation. The results further suggested that Guyuk LGA is the poorest performing LGA on the selected child's indicators for this study with 0.3%, 96.5%, 76.9%, and 20.9% on Penta 3 dropout rate, Penta 3 coverage, Measles coverage, and vitamin A supplementation rate respectively.

VI.   Performance of the LGAs in the Adamawa Northern Senatorial Zone on child's indices

The carefully selected child's indicators from DHIS 2.0 (Penta 3 coverage, Penta 3 dropout rate, measles coverage, and Vitamin A supplementation). The result indicates high Penta 3 and Measles coverage performance across all the LGAs exceeding their targets. A low dropout rate is also noticed in Penta 3 dropout rate, thus signifying a generally good performance by all the LGAs in the zone. Michika LGA showed a better performance than all the other LGAs in the zone with Penta 3 dropout rate (4.2%), Penta 3 coverage (108.1%), 84.7% Measles coverage, and 191.5% Vitamin A supplementation. The results further suggested that Madagali LGA is the poorest performing LGA on the selected child's indicators for this study with 6.6%, 82.8%, 82.5%, and

100.5% on Penta 3 dropout rate, Penta 3 coverage, Measles coverage, and vitamin A supplementation rate respectively.

VII.   Confirmed Malaria cases across the LGAs

The 2021 data also shows that confirmed malaria cases are higher in Fufore, Shelleng, and Maiha in the Central, Southern, and Northern senatorial districts.

Results for qualitative assessment

I. Socio-demographic characteristics of study participants

Table 1 shows the results of assessment KII. The results showed that 12 MCH stakeholders were from the state level (4), LGA levels (5), and Health facility level (3). It shows that 58% (n=7) and 42% (n=5) were male and female, respectively.

II. Perceived Facilitators and Barriers to access of MNCH services in the HTR communities

The quality of MCH services in the HTR communities is affected by several factors, including; organizational and external. Respondents from the KII and FGD identified these factors as presented below;

Acknowledge of Good Performing LGAs/Settlements/Communities on MNCH

I. **Perceived Knowledge of Good and Poor Performing LGAs/Settlements/Communities on MNCH**

The coverage in MNCH indicators is determined by the presence of barriers that limit assessment. The coverage could be higher in LGA that generally have such barriers. Most respondents stated that, out of the 21 LGAs in the State, some perform better than others. Those LGAs that performed well in the previous year include: Lamurde, Ganye, Mubi South, Michika, and Girei are performing better. While Guyuk, Madagali and Gombi. Also, for the detailed analysis of the poorly performing LGAs on MNCH indicators.

"The State generally is performing averagely. The LGAs that performed better in the previous year include Ganye and Girei, as reported in one review meeting, while Gombi and Madagali are the ones

that have reported poor performance on MNCH indicators."- **(KII-P010)**

"Out of the 21 LGAs, some perform better than others. Those LGAs that performed well in the previous year include Lamurde, Ganye, and Girei. While Madagali and Hong are poorly performing on MNCH indices.."- **(KII-P009).**

II. Perception of respondents on reasons for poor performance

The majority of the respondents highlighted the reasons for the poor performing LGAs, which include: Poor infrastructure, inadequate HR in the health facilities, Poor health-seeking behavior by the people in the HTR communities, many hard-to-reach settlements due to mountains, rivers, and poor road network.

"There are several reasons for these LGAs being poor; these include: inadequate HR in the health facilities, Poor health seeking behavior by the people in the hard-to-reach communities, the high number of hard-to-reach settlements due to mountains, rivers, poor road network, etc." **(KII-P001).**

"Poor educational levels, the high number of Hard-to-Reach, security challenges, and rivers overflooding their banks during the rainy season." – **(KII-E004).**

"Because the settlements are hard to access due to the wrong road due to mountains and rivers." – **(KII-F008).**

III. Perceived factors affecting accessibility to PHC services

Most of the respondents revealed that the factors affecting accessibility are numerous; it may be due to inaccessibility because of difficulty to access, low level of education, poverty, and lack of good road network.

"The inaccessibility is due to the many communities behind the many mountains in the LGA. Other factors include poverty." **(KII-E012).**

"Several factors affect the people of HTR's access to care: Inaccessibility due to difficulty to access, low level of education, poverty, lack of good road network, etc.." **(KII-P010).**

"Because the settlements are hard to access because of the lousy road due to mountains and rivers." **(KII-F008).**

B Knowledge of catchment area communities that are hard to reach

I. Perceived Knowledge of HTR

All the respondents are familiar with hard-to-reach communities (HTR) and defined as "Hard-to-reach communities are communities/settlements where PHC services do not reach them because they are difficult to access due to some barriers such as being behind a mountain or rivers in the rainy season. Alternatively, poor and bad road network, security compromised, and a very far settlement that does not have access to PHC services.

"My understanding of HTR locations is that they are places where assessments are challenging because of poor roads, mountains, rivers, and great distances. It may take hours or days to see a vehicle or anyone passing." **(KII-P010).**

"If we say hard to reach, the community is the community that is difficult to access either because of the distance or any natural barrier." **(KII-E005)**.

"Hard-to-reach communities are communities/settlements where primary health care (PHC) services do not reach them because they are difficult to access because of some barriers, such as being behind a mountain or river in the rainy season. Alternatively, poor and bad road network, security compromised, and a very far settlement that does not have access to primary health care (PHC) services. We have many hard-to-reach (HTR) communities in Adamawa. State." **(KII-E004).**

II. Perception of Knowledge of types and number of HTR communities/settlement

Majority of respondents stated the various types of HTR communities as Mountainous, riverine, very far, non-motorable, security compromised, and many others.

"We have Mountainous, distance, riverine communities and security compromised." **(KII-E012).**

"We have many communities, some are situated behind Mountains with no road network, some are riverine, while many are far from the ward head

quarter health facilities with a distance of more than 10 KM area. We also have some villages that are security compromised. Some have a deplorable road network that only motorcycles and bicycles can go there etc." – **(KII-E005).**

Delivery of services to HTR communities

I. Perceived K nowledge on the types of PHC Services provided to the HTR Communities

Most respondents highlighted that services in the HTR communities are through outreach where routine immunization services, malaria services, HIV services, and family planning.

"Some communities do have health facilities, but those facilities are not functional, and the ward headquarters facility usually carries out outreach services to all those settlements; those services rendered there are integrated health services which include Immunization, ante-natal care (ANC), Nutrition, growth monitoring, treatment of minor illnesses, post natal (PNC) and the rest." **(KII-P001).**

"HTR communities do not have PHCs that deliver complete packages with them. However, special packages containing Maternal services such as customized ant-natal care (ANC), referral for delivery, Family planning (FP), HIV councelling and testing (HCT), and minor treatment of ailments for women and adults; Child's services like RI, Vitamin A supplementation, Malaria services, and treatment of other childhood illnesses are carried out through the mobile team during outreach services." **(KII-E003)**.

"Immunization, anti-natal care, and malaria are the only services in this community." **(FGD2-R001).**

II. Respondent's perception of the strategies to improve access to MNCH services

Most of the respondents suggested several strategies for serving underserved communities. All the strategies were subject to the availability of funds; the strategies include: Catchment area health facilities providing logistics for a few of its staff for an outreach at least once a month to render the services and also non-governmental organization sponsor mobile teams from LGA for a special kind of outreach service specifically to the HTR communities. In rare cases, do the community members come to the HFs for services? Lots of children miss their immunization; home delivery is very rampant etc.

"We are reaching them from time to time but not all the time. We reach them sometimes once every month or two months with vigilantes for security compromised areas during outreach services." **(KII-E012).**

"We adopt outreach services and mobile services; outreach services have been carried out from the health facilities (HF) either weekly or on bi-weekly bases, while mobile services have been carried out from local government (LGA) level either weekly or bi-weekly basis." **(KII-P001).**

"The health Workers come to our village and provide us with services."**(FGD2-R006).**

III. Respondent's perception of the number or frequency of visits needed in the communities to improve the MNCH indicators

The majority of the respondents emphasized that people of the HTR communities generally have poor health-seeking behaviour, particularly for services such as preventive services like RI, ANC, and Delivery. Most of these services reach them through visits by the HWs. the frequency of the visits depends on the availability of funding, but when there is no funding, it does not happen; between 2016 and 2018, it used to be monthly.

"Under normal circumstances is four, but at least they get two times a month when there are funds, particularly from donors. Nevertheless, since the exit of the donors, some of these communities have suffered, and we only reach out to them during campaigns such as maternal, newborn and child health week (MNCHW) and outbreak response (OBR) or state supplementation activites (SIAs)."**(KII-E003).**

"Sometimes, in some areas where the difficulty to reach is less, they visit twice a month or once. In some instances, even weekly. For riverine communities even use canoes to scale a river for immunization. Atimes community volunteers come down for assistance after crossing, which is some of the ways the community use to access services to increase their health-seeking behaviour."**(KII - P010).**

"The services are free, especially when they come, but when we visit the clinics, we pay for the services."**(FGD3 - R003)**

IV. **Perceived Knowledge on the kind of the maternal and Childs services delivered to HTR communities.**

Most participants stated that the maternal and child services delivered during outreach include: Antenatal care, HIV screening, TT for pregnant women for TT HIV counselling and testing and referral family planning, Vitamin A supplementation, and Routine Immunization. Other services include treating infections in women and other adults, such as malaria diagnosis and treatment, and treating typhoid fever. Since 2019, the services have not been rendered.

"ANC, PNC, Family planning, Malaria diagnosis and treatment, Vitamin A supplementation, HIV Aids testing and counselling, MUAC screening, and referral to the health facility**." (KII-D002).**

"Thanks very much. The maternal services delivered are tetanoid toxoid (TT) for women, Antenal care (ANC), Delivery, postnatal care (PNC), HIV councelling and testing (HCT), FP, and curative services, while the child's services are immunization, Health Education, Nutritional services, and HIV services." **(KII-E005).**

"All services, including maternal and child services, are only accessed when we visit the health facility since 2019, and the road network is terribly bad. There is no vehicle to convey pregnant women to the hospital; the rivers will block people for days."**(FGD1-R001).**

IV: **Perceived Knowledge on the Sources of Commodities for the HTR communities**

All the participants agreed to the fact that commodities are obtained from both government and partners.

"The government and other developmental partners and HF DRF provided commodities." **(KII-P010).**

"Most of the commodities are from donor agencies with the Adamawa state government's support; for instance, HIV counseling and testing commodities are Jhpiego, Ruft from UNICEF, and the rest of them." **(KII-E005).**

Recommendation on designing a strategy for the delivery of services to HTR communities

I. **Perception of the respondent on the recommendation on designing a strategy for the delivery of services to HTR communities**

Most respondents emphasized the need for developing strategies and gaining support from either the NGOs or the government and then providing logistics to facilities to support the local government to at least support those hard-to-reach teams with the drugs and medications that can help them. Also, providing the CHIPs with commodities like Paracetamol, anti-diarrheal, and cough syrup will go a long way in reducing the health challenges of the HTR communities.

"Designing HTR strategies such as mobile outreach teams, supporting HFs for their routine outreach services, and other essential strategies that could reach the underserved population is always welcomed. While implementing any of these interventions, Frequent supervision by both the LGA and State is also important**." (KII-P009**).

"Design HTR strategies such as mobile outreach teams, support HFs for their routine outreach services and conduct frequent supervision by both the LGA and State.." **(KII-E009).**

DISCUSSION

This study assess and document relevant data associated with delivering qualitative Maternal and Child health services in the HTR communities using carefully selected indicators namely: Antenatal care visit 1 (ANC1), ANC4, ANC8, Institutional delivery rate, and Contraceptive Prevalence Rate (CPR) Penta 3 coverage, Penta 3 drop out, measles coverage and vitamin A supplementation).

Fig. 1-6 generally indicates high performance across the State on the first antenatal visit (ANC 1), use of modern contraceptives (CPR), Penta 3, measles vaccination coverage, and, Low dropout rate is also noticed in Penta 3, thus signifying a generally good performance by all the LGAs across the State. These results agree with the research conducted by **(au-**

thor?) (15). The results further highlighted that Yola South, Fufore, Toungo, Ganye, and Michika LGA are the best performing LGAs on the selected maternal and Child indicators, namely: (ANC1), ANC4, ANC8, Institutional delivery rate, and Contraceptive Prevalence Rate (CPR) while Gombi, Guyuk, and Madagali LGAs are the poorest performing LGAs. The poor performance of these LGAs is: ongoing security challenges, high HTR communities due to mountains and riverine, low level of education, inadequate outreach services during the period under review, poverty, lack of effective emergency transport system, inadequate HRH, inadequate and poor infrastructure, many communities lack a comprehensive PHC. These reasons are highlighted in research conducted by (Adewuyi et al.,2018; Duodu et al., 2022; Akseer et al., 2020) (16, 17).

From the qualitative assessment results on the coverage of MNCH indicators in the LGAs/communities, Lamurde, Ganye, Mubi South, Michika, and Girei are performing better. While Guyuk, Madagali, and Gombi are the poorly performing LGAs on MNCH indicators. This is determined by the presence of barriers that limit access to the services due to some barriers such as security challenges, high HTR communities due to mountains and riverine, low level of education, inadequate outreach services during the period under review, poverty lack of a good road network. The qualitative results agree with the quantitative data presented in Fig. 1- 6. Similarly, (author?) (18) reported that place of residence, region, mothers' education level, and household wealth index were associated with the utilization of a minimum of four ANC services at a 5% significance level in Ethiopia.

The study further defined Hard-to-reach communities as communities that need access to services due to distance or natural barriers such as bad roads, mountains, riverine, and long distances. Similar definition was quoted by (19).

Furthermore, the study reveals strategies for reaching out to the people: catchment area health facilities conduct outreach at least once a month to render the services, and non-governmental organizations sponsor mobile teams from LGA for a special kind of mobile teams specifically to the HTR communities.

All two strategies are subject to the availability of funds. The strategies are mentioned by (author?) (20) where mention that Strategies fall into four broad categories: improving service delivery through selected, trained, and supported community health workers (CHWs) to act alongside formal health workers and the distribution of critical medicines to the home; improving the desirability of existing services by addressing the quality of care, innovative training and supervision of health workers; generating demand by engaging communities; and improving health knowledge for timely care-seeking. Task shifting, strengthened roles of CHWs and volunteers, mobile teams, and inclusive structured planning forums have proved effective. Moreso, Antenatal care, HIV screening, TT for pregnant women for TT HIV counselling and testing and referral family planning, Vitamin A supplementation, and Routine Immunization. Other services include treatment for infections in women and other adults, such as malaria diagnosis and treatment, and typhoid fever treatment were identified to be the most critical MCH services delivered during a health facility outreach or mobile outreach.

CONCLUSIONS

Provision of maternal newborn and child health services in the hard-to-reach communities is very challenging, especially, in developing nations like Nigeria. This study assessed the performance of LGAs on MNCH indicators in Adamawa state. The assessment highlights that Gombi, Guyuk and Madagali LGAs with low utilization of MCH services among the 21 LGAs of the State. The poor performance in the LGAs was associated with both human and environmental interferences: ongoing security challenges, high HTR communities due to mountains and riverine, low level of education, inadequate outreach services during the period under review, poverty, lack of adequate emergency transport system, inadequate HRH, inadequate and poor infrastructure, many communities lack a comprehensive PHC. The findings suggest an urgent need for designing an efficient strategies (outreaches) for the delivery of maternal newborn and child's intervention in HTR

communities. Therefore, in future, the cost-effective strategies to provide maternal newborn and child health services will be design for implementation to help in reaching out the people in the hard-to-reach communities. The study is limited to only officers whose responsibility is targeting people in the HTR communities, the LGAs with low coverage on MNCH indicators and data from the DHIS 2 for 2021 and stakeholders from the six HTR communites.

LIMITATION

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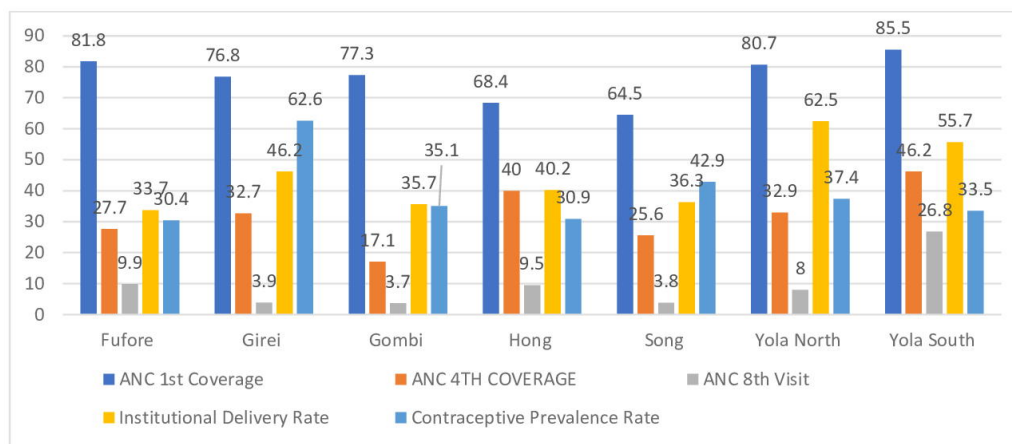
Fig 1: 2021 LGA performance on maternal indices in Adamawa Central Senatorial Zone
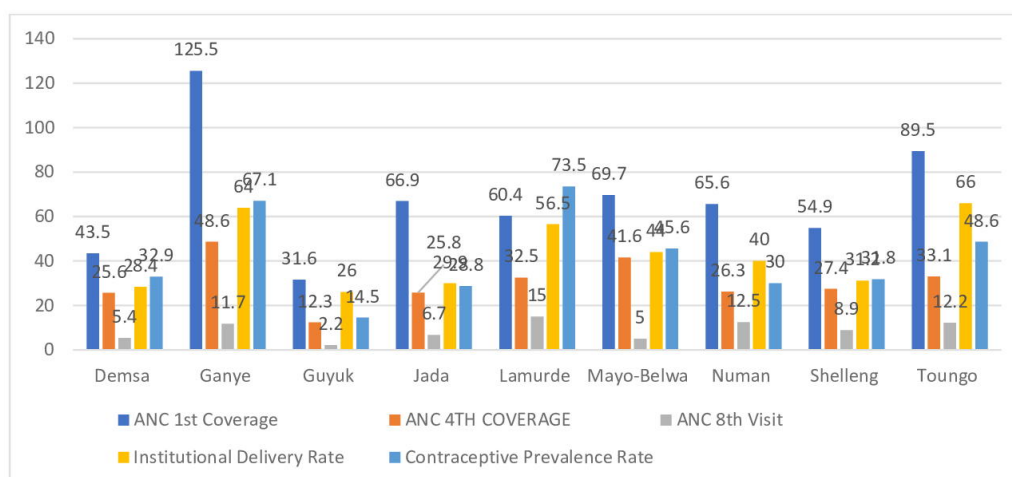

Fig 2: 2021 LGA performance on maternal indices in Adamawa Northern Senatorial Zone
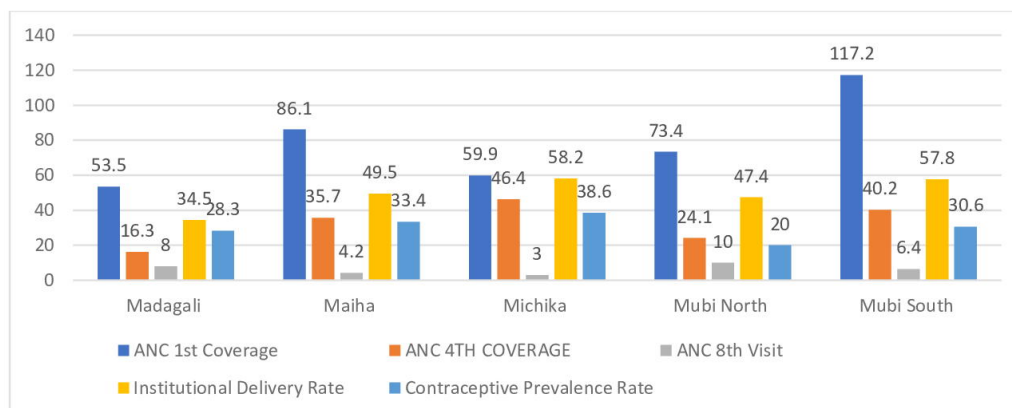

Fig. 3: 2021 LGA performance on maternal indices in Adamawa Southern Senatorial Zone
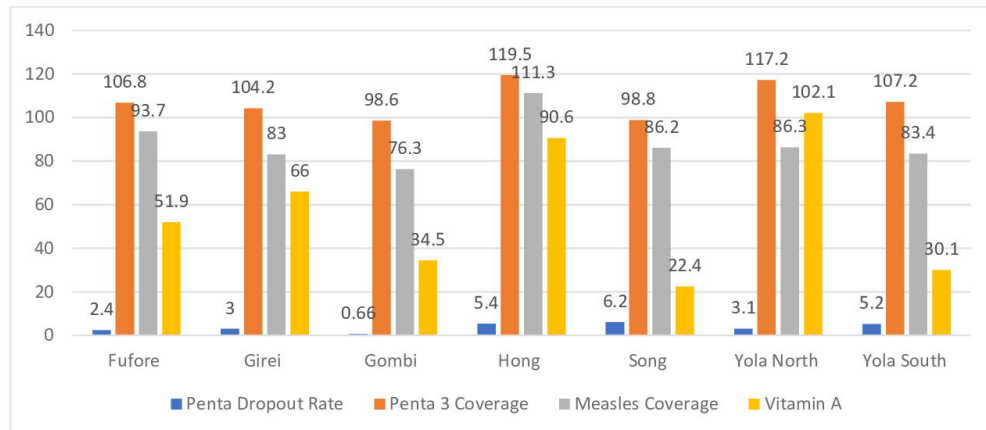
Fig 4: 2021 LGA performance on Child indices in Adamawa Central Senatorial Zone
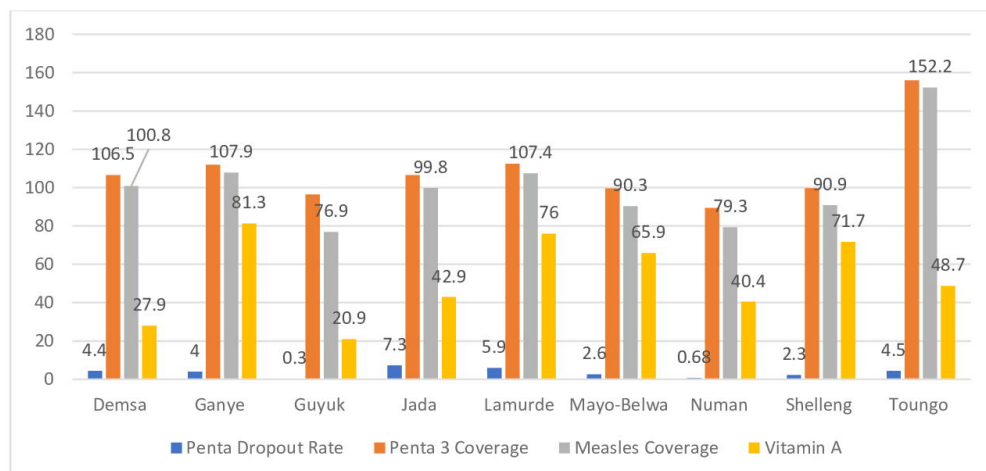

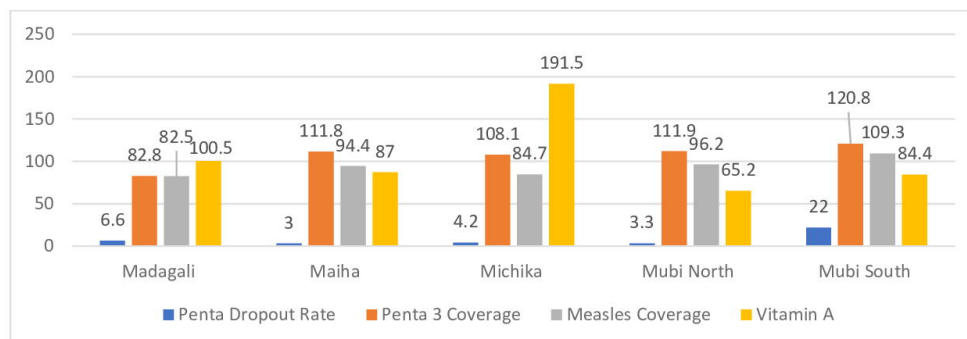*Fig 5: 2021 LGA performance on Child indices in Adamawa Northern Senatorial Zone*

Fig 6: 2021 LGA performance on Child indices in Adamawa Northern Senatorial Zone

Table 1: List of key informants for the in-depth interviews.

Designation of Participants	Number
State level 1. Executive secretary-SPHCDA 2. HTR and Humanitarian Desk officer 3. Program officers at the SPHCDA and the SMOH 4. Health Facility Managers	12
LGA level (for 7 LGAs) 1. 1 Representative of CAN 2. 1 Representative of JNI 3. 1 Representative of the youth group 4. 1 woman within the reproductive age group 5. 1 Community leader	6