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ASSESSMENT OF PARENTAL KNOWLEDGE OF ANTENATAL CARE AND CHILDHOOD IMMUNISATION SERVICES IN ZAMFARA STATE, NIGERIA

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Abstract
Efforts have been made over the years to improve uptake of antenatal care (ANC) and childhood immunisation services, lack of knowledge of the essential components of the services constitutes a major challenge to many parents in accessing the services in Nigeria. This study examined the parental knowledge about ANC and childhood immunisation services in Zamfara State. Based on theoretical orientation of Health Seeking Behavior developed by Anderson, Mixed Methods were used for the study. A cross-sectional design was employed, involving 382 parents selected through multistage sampling technique. Descriptive statistics were used for analysis of the quantitative data using Statistical Package for Social Sciences (SPSS), while ATLASti8 software was used for qualitative data analysis. The study found that most of the respondents were aware of the existence of ANC and childhood immunisation programs but lacked the knowledge of basic essential components of the services. Knowledge about 8 ANC visits was relatively very low among the respondents irrespective of place of residence. It was discovered that with exception of doses of vaccines that children under-fives receive at birth and at six weeks, more than 80% of the respondents had no knowledge that children under the age of five get inoculated at 10 and 14 weeks, as well as at six, nine, twelve, and fifteen months of age. The study recommends enlightenment programs through the social media, radio and television stations as well as healthcare facilities educating parents about specific ANC and childhood immunisation services that are received including the timing and doses.

Key words: Antenatal care; childhood immunisation; knowledge; maternal and child mortality

Introduction

Antenatal care (ANC) and childhood immunisation services are among the most vital global strategies for averting maternal and under-five mortality (Reiss, 1999; WHO, 2016; NDHS, 2023-24). ANC is conceptualized as the care provided to pregnant women and adolescent girls during pregnancy by health-care professionals in order to ensure the best health conditions for both mother and baby (WHO, 2016). While childhood immunisation refers to a safe, and effective way of protecting children against harmful diseases, before they come into contact with them (WHO, 2024). Over the years, there has been increasing concern by governmental and nongovernmental organisations on high levels of maternal and child mortality in the developing countries, especially the Sub-Saharan Africa which could have been prevented through effective utilisation of ANC and childhood immunisation services. A joint report released by World Health Organisation [(WHO *et al.* 2023), revealed that the global maternal mortality ratio (MMR) in 2020 was estimated at 223 maternal deaths per 100 000 live births but Sub-Saharan Africa remains the region with highest MMR accounting for 70% of global maternal deaths. Nigeria was estimated to have accounted for 28.5% of global maternal deaths in 2020 and the highest in the world (WHO *et al.*, 2023). Although a study by Alubo (2021),

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might be regional, facility-based, or used a different methodology, while NDHS is the national benchmark. The NDHS (2018) estimated the national MMR at 512/100,000 live births, recent research (Alubo, 2021) suggests this figure may be significantly higher, reporting 814/100,000 live births, indicative of persistently high rates.

The situation is not quite different regarding child mortality in Nigeria. About 56% of the global under-five deaths occurred in Sub-Saharan Africa in 2021, where 74 children died per 1,000 live births (UNICEF, 2023). The level of under-five mortality in Nigeria was higher than Sub-Saharan Africa as it was estimated at 110 Under-five died per 1000 live births (NDHS, 2023-24).

In response to the global health challenges and high levels of maternal and child mortality in developing countries, concerted efforts have been made over the years at both global and local levels to revamp healthcare sector in general and maternal and child healthcare services in particular. Such notable efforts include lunching of Expanded Program on Immunisation by WHO in 1974, organizing international conference on primary healthcare in 1987 at Alma Ata, Kazakhstan to improve primary healthcare delivery, championed by UNICEF and WHO (Umar, 2006); launching of safe motherhood initiative in Kenya in 1987 by United Nations in which most African countries became intensely involved (Harrison,1998). World Summit for Children in 1990 to enhancing children's health, promoting pre-natal care and lowering infant and child mortality in all countries and among all peoples (UN, 1990). In furtherance to that it is very clear in Beijing Declaration and Platform for Action that it is the right of women to control all aspect of their health and make decisions concerning their reproductive health (UN, 1995). Others included signing fifteen year time line international bundle of Millennium Development Goals (MDGs) in 2000 by United Nations member States including Nigeria but now has been renamed as Sustainable Development Goals (SDG) which Goal 4 and 5 are devoted to reduction of maternal and child mortality through effective utilisation of maternal and child health services; the Global Vaccine Action Plan 2011–2020 (GVAP), which was developed to help realize the vision of the Decade of Vaccines as well as recent Immunisation Agenda 2030 (IA2030) launched in 2020.

In Nigeria, National Program on Immunisation began in 1976 (Sorungbe, 1989) Government policies such as National Primary Healthcare Development Agency (NPHCDA), the Midwives Service Scheme (MSS), bi-annual Maternal Newborn and Child Health Weeks (MNCHW), and humanitarian donations of pharmaceutical drugs by international organization such as UNICEF, WHO among others were available in Nigeria to improve primary healthcare services delivery and encourage mothers to easily access the services. However, despite the concerted efforts utilisation of the services in Nigeria remains below the global standard. Although many factors such as level of education, income, cultural beliefs among others might affect utilization of ANC and childhood immunisation in developing countries like Nigeria, recent studies found influence of knowledge about ANC and immunisation services as a dominant one.

ANC and childhood immunisation composed of many components (Zoe et al., 2001; WHO, 2002; Park, 2015). According to Park (2015), antenatal visit is one of the most important components of ANC services, achieving the other components depends on the willingness of parents to attend the ANC programs at health facilities. ANC visits are disaggregated by trimesters and effectiveness of certain ANC interventions such as tetanus vaccination, malaria prevention, anemia prevention, health talks, family planning advices and prevention of mother-to-child transmission (PMTCT) of HIV depends on knowledge of repeated visits based on the

trimester in which they occur. Similarly, parents' knowledge of childhood diseases and vaccines scheduled for the Nigerian children which included Bacille Calmette-Guerin [BCG] (for tuberculosis), HepB (for hepatitis B), Oral Polio Vaccine [OPV] (for polio virus), PENTA (for pertussis, diphtheria, tetanus, and Haemophilus influenzae type b), Pneumococcal Conjugate Vaccine [PCV] (for pneumonia), ROTA(for diarrhea), Inactivated Polio Vaccine [IPV] (for polio), Measles, Vitamin A (for vitamin A deficiency), Yellow fever (for jaundice) and Meningitis as well as times the vaccines should be received also influence patronage of the services. The questions this study seeks to address include what is the level of knowledge of vaccines preventable diseases in Zamfara State (VPDs)? Are parents knowledgeable about specific/components of ANC and child immunisation services that are received? To what extent do mothers are conversant with immunisation schedule and eight ANC visits during pregnancy in Zamfara State?

The Problem

Studies conducted in different countries (Odusanya, *et al*., 2008; Fagbamigbe *et al*., 2013; Adewoye *et al*. 2013; Yar'zever & Said, 2013; Gidado, *et al*., 2014; Suleiman, 2015; Chris-Otubor *et al*. 2015; Gunnala, et al., 2016; Omondi *et al*. 2017; Al hazmi, *et al.*, 2017; Basheer *et al.*, 2018; Abdulkadir & Rainin, 2019) have shown that knowledge about ANC and childhood immunisation services is a critical determinant of utilisation of the services. However, no effort was made in all the studies reviewed to investigate the essential issues in utilisation of maternal and child health services such as knowledge of the required ANC contacts, knowledge relating to number of anti-tetanus injections and anti-malarial drugs that are received. Furthermore, mother's knowledge about vaccine preventable diseases, knowledge of immunisation schedule and benefit of immunisation are worth investigating in the State as no study conducted in the State that explored such issues.

Unvaryingly, women experience many diseases during pregnancy and children under-fives are vulnerable to childhood killer diseases, leading to maternal and child mortality. However, most complications that may lead to maternal and child deaths are preventable and curable by accessing effective maternal and child health services. It is imperative for pregnant women to receive antenatal care services while under-five children to receive recommended vaccines at the right times for prevention.

Historically, from the early 1900 on-ward, antenatal care was based on many visits which is also known as traditional approach model. In 2001, it was revised by WHO to focused antenatal care (FANC) restricting the visits to only four (4) which was further reviewed in 2016 and arrived at a new model called 2016 WHO ANC model consisting of eight visits (WHO, 2016). The recent 2016 WHO shift to the 8-contact ANC model represents a critical, evidence-based development. The problem is that as Nigeria follows this recommendation, a knowledge gap regarding this updated schedule likely exists among parents, potentially leading to sub-optimal compliance."

Arising from the stated problem, this study examined the parental knowledge about the required ANC contacts, knowledge regarding number of anti-tetanus injections and anti-malarial drugs that should be received, knowledge about vaccine preventable diseases as well as immunisation schedule in Zamfara State, Nigeria

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A Brief Literature Review

Many studies conducted over the years in different countries (Fagbamigbe *et al*., 2013; Adewoye *et al*. 2013; Omondi *et al.* 2017; Al hazmi, *et al*., 2017) have examined the influence of knowledge about ANC services on utilisation of the services and revealed a strong association between knowledge of ANC services and utilisation of the services. Respondents who had good knowledge and those with moderate knowledge of the services rendered during ANC visits were more likely to patronise the services. For instance, findings of a study conducted in Kenya revealed lack of awareness by most mothers about the various ANC services such as abdominal examination, urine and blood tests, weighing etc. and their importance during and after pregnancy discouraged women from going for ANC Omondi *et al*. (2017). The study is substantiated by a similar study carried out in Saudi Arabia which revealed that majority of women (89.7%) had good knowledge about the importance of ANC services which in turn culminated in about 80.1% of pregnant women followed up their pregnancies consistently and regularly at ANC facilities Al hazmi *et al*. (2017). While these studies confirm the significance of general knowledge, they consistently fail to examine parental familiarity with the specific, actionable clinical guidelines now governing services, such as the revised 8-contact ANC model and dosage schedules.

Regarding childhood immunisation, studies over the years (Odusanya, *et al*.2008; Basheer *et al*. 2018; Abdulkadir, *et al*. 2019; Ogunyemi *et al.* 2020) have also revealed similar influence of mothers' knowledge about childhood immunisation including knowledge of symptoms of vaccine preventable diseases, appropriate times/schedules for immunisation and types and doses of vaccines that under-five children should receive on utilisation of the services. Study in Dutse, Jigawa State showed that 84% of the respondents did not possess satisfactory knowledge of immunisation and consequently only 7.6% of children were fully immunised (Abdulkadir & Rainis, 2019). The study confirmed an earlier study in Kebbi State, Nigeria (Basheer *et al.*,2018) which revealed number of knowledge related factors such as mother's knowledge about benefit of immunisation, vaccine side effects, mothers' knowledge about age at which vaccination begins and completes as well as information received about the next vaccination schedule significantly affected complete vaccination among children in Nigeria. This finding was in line with finding of a study in Nepal (Sigdel, *et al*., 2023) which revealed lack of awareness of the respondents about childhood vaccination schedule as an important predictor of compliance with immunisation. However, considering that most of the studies reviewed demonstrated the influence of mothers' knowledge about immunisation as a vital determinant, similar studies in Zamfara State were not available. It is therefore imperative to carefully investigate the extent to which mothers in Zamfara State possess knowledge of immunisation services including types and symptoms of vaccine preventable diseases, doses of vaccines that children should receive among others.

Theoretical Framework

The study applied model for Health Seeking Behavior developed by Ronald Max Anderson. The model was first developed in the late 1960s predicting and explaining why families use health services and examining inequality in accessing health care services, as well as advancing policy that aids in achieving equitable access (Andersen, 1995). Historically, the model focused on three determinants: predisposing characteristics, enabling characteristics, and need-based characteristics, which later more variables were incorporated (Andersen, 1995).

The basic proposition of the theory is that utilisation of health care services by people depends on three major variables/determinants: the predisposing factors, enabling factors and need for health care. Individuals may likely use health services based on demographics position within

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the social structure, and beliefs of health services benefits (Andersen, 1995). The specific knowledge is operationalized as a key Predisposing Characteristic (specifically under Beliefs) which influences the ultimate outcome of utilization.

Relevant to this study is the predisposing aspect of the model which explains the socio-cultural attributes of individuals that exist prior to illness which according to them, people with certain of these characteristics are more likely to use health services (Andersen & Newman, 1973). These characteristics included influence of factors such as education, occupation, culture, social networks, insecurity, social interactions, people's attitudes, values, and knowledge concerning and towards health care System. specific knowledge (of 8 visits, doses, schedules) enhances the parents' Health Beliefs (a sub-component of Predisposing factors), which increases their propensity to act, ultimately leading to higher utilization of ANC and immunisation services.

Materials and Methods

This study was conducted from October to December, 2021 in Zamfara State. The State is one of the States in northern Nigeria with highest rates of maternal and under-fives mortality and lowest coverage of ANC and childhood immunisation services (NDHS, 2018). The State covers an area of 38,418 square kilometers with an estimated population of 5,066556 people in 2020, out of which 1,114,642 constituting 22% were women of child bearing age (ZSMH, 2021). The State consists of fourteen (14) Local Government Areas (LGAs) which include Anka, Bakura, Bungudu, Bukuyum, Birnin Magaji, Gummi, Gusau, Kaura Namoda, Talata-Mafara, Maradun, Maru, Shinkafi, Tsafe and Zurmi. The LGAs are furthered grouped into three senatorial districts – Zamfara Central Senatorial District (ZCSD), Zamfara North Senatorial District (ZNSD) and Zamfara West Senatorial District (ZWSD). In the context of this study, Gusau (the State capital) was considered as urban area, local government headquarter was considered as semi-urban while political ward head-quarter and other villages were considered rural areas.

Mixed methods/triangulation was used for this study. Data triangulation and methodological triangulation were the types of triangulations employed for the study. Both quantitative design in form of a survey and qualitative design in form of a Focus Group Discussion were used. The study's population for the survey was only women of child bearing age that had at least one under-five child in Zamfara State. While household heads and women of child bearing age that had at least one under-five child constituted the study's population for the qualitative design.
In determining the sample size, a formula developed by Kreiche & Morgan (1970) was adopted. The formula is as follows:

$$S = \frac{X^2\ NP\ (1-P)}{d^2\ (N-1)+X^2\ P\ (1-P)}$$

Based on application of the formula, the sample size was 384 respondents. Furthermore, six LGAs were used out of the fourteen LGAs in the State. Two political wards were selected from each of the LGAs. Total population of women of child bearing age was obtained for all the selected Political Wards which enabled proportional distribution of the sample size. The formula below was used in determining sample size for each political ward.

$$\text{Ward Sample Population} = \frac{No.\ of\ Ward\ Population}{No.\ of\ the\ Total\ populationof\ all\ the\ wards} \times \frac{Sample\ size}{1}$$

For the qualitative design, 12 sessions (6 each for mothers and fathers) of FGD were conducted in the State.

Multi-Stage Cluster Sampling was employed for the study. Stage one: the whole State was grouped into the three Senatorial Districts. Stage two, simple random sampling was used in selecting two LGAs from each of the three SDs. Stage three, one Political Ward was selected from each of the six LGAs using simple random sampling and one political ward located in the headquarter of each LGA was purposively selected in order to have diverse findings. Stage four, enumeration areas were selected. Stage five, Systematic sampling technique was employed in administering 384 copies of questionnaires to mothers. Where the target mother was not found, the next house was adopted and where there was more than one target mother, balloting was used to select. Regarding the qualitative design, the participants were selected using purposive sampling technique.

On methods of data collection, semi-structured questionnaire was used in gathering the quantitative data and 76% of the questionnaire was translated into Hausa language. The respondents were met in their respective homes through female research assistants who were employed and trained by the researchers. The reason for choosing only female research assistants was due to cultural/religious reason. Both direct administration and self - administration techniques of administering questionnaire were used. On the qualitative design, the twelve sessions of focus group discussion (FGD) were conducted in Hausa language except one session which was conducted in English Language. The reason was that the participants could express their views better in Hausa Language than in English Language and eight (8) participants were used in all the sessions.

A total of 382 copies of questionnaire were retrieved. The copies were edited, itemized, coded and entered into computer. Data cleaning was done by carrying out the range and consistency checks. The Statistical Package of Social Science (SPSS) was used for the analysis. Descriptive statistics were employed. While the recorded qualitative data were carefully transcribed verbatim, translated into English and thematically analysed using ATLAS ti8 software.
Ethical approval and permission to carry out the study was obtained from Zamfara State Health Research Ethics Committee, with the ethics approval number: ZSHREC03092021 on 29th September, 2021. Informed consent was obtained from each respondent to participate in the study and publish the findings. Confidentiality and anonymity of the respondents were assured and maintained during and after the study. Participants were informed that participation was voluntary and they could withdraw at any time without penalty

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Results

Table 1: Socio-Demographic Characteristics of the Respondents for the Quantitative Data

Characteristics		Frequency	Percentage
Location	Urban	98	25.7
	Semi-urban	154	40.3
	Rural	130	34.0
	Total	**382**	**100.0**
Age in years	han 18 years	17	
	18 -29	191	
	39	139	
	9		
	d above		0.8
		382	**100.0**
Highest educational qualification	rmal education		
	Quranic education	121	31.7
	Primary certificate	22	5.8
	SSCE	111	29.1
	NCE/ND	44	11.5
	HND	19	5.0
	University degree	28	7.3
	Others	1	0.3
	Total	**382**	**100.0**
Religious affiliation		311	
	Christianity	71	18.6
	Total	**382**	**100.0**
Ethnic background	a	278	
	Fulani	30	7.9
	Yoruba	24	6.3
	Igbo	31	8.1
	Others	19	5.0
	Total	**382**	**100.0**
Income	No response	3	.8
	Less than N5000	207	54.2
	N5,001 – 15,000	70	18.3
	01 – 20,000		
	001 – 30,000		
	001 -40,000		
	001 and above		
			100.0

Table 1, reveals that, 40.3% of the respondents were of semi-urban background, 34% were of rural background while 25.7% were of urban background. This shows that majority of the respondents were either of urban or semi-urban backgrounds. Most of the respondents (95%) were within their productive age (18 - 49 years). Significant percentage of mothers (40.9%) had no Western/formal education out of which 31.7% had Quranic education. In furtherance to that, schooling process of majority of women with Western education terminates at completion

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of secondary school education as the number of women with post-secondary certificates was low (24%). The largest group of respondents were Muslims (81.4%) followed by Christians (18.6%). Hausa and Fulani constituted the majority (80.7%), while none of the remaining ethnic groups such as Yoruba, Igbo etc. reached 9% and therefore, constituted minority in the study area. The respondents' low level of education reflected in their very low level of income, as 54.2% earned less than N 5,000 per month.

On socio-demographic characteristics of the discussants that participated in 12 sessions of Focus Group Discussions (FGD), eight discussants participated in each session, making a total of 96 participants. Six sessions were conducted in rural areas, four in Semi-urban and two in urban areas. Six sessions were conducted for both house wives and household heads and for those with formal education and those with no formal education across the State. The qualitative data were used to generate Figure I.

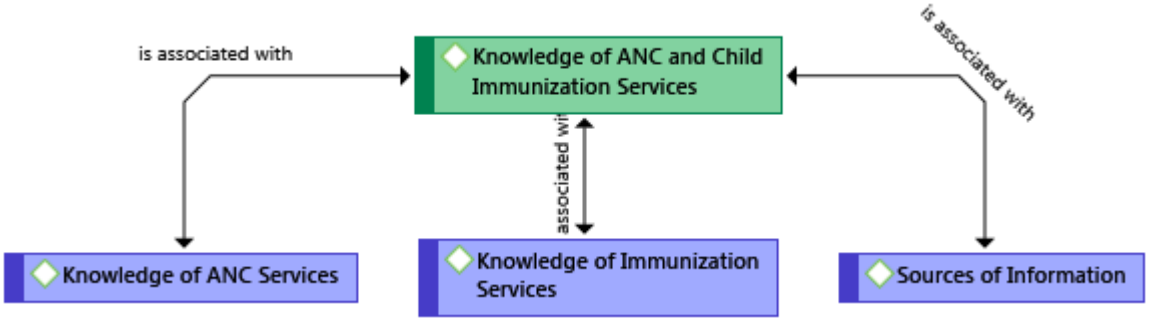

Figure 1 Knowledge of ANC and Childhood Immunisation

Figure1 reveals that knowledge of ANC services, knowledge of immunisation services and sources of information were the sub-themes developed from thematic analysis of the qualitative data. The sub-themes were explained concurrently with quantitative data.

Table 2: Views of Respondents on Awareness of ANC and Childhood Immunisation Services

	Response	**Frequency**	**Percentage (%)**
Awareness of ANC services	Yes	341	89.3
	No	41	10.7
	Total	**382**	**100.0**
Awareness of childhood immunisation services	Yes	357	93.5
	No	17	4.5
	No response	8	2.1
	Total	**382**	**100.0**

Table 2 reveals that majority of the respondents (89.3%) and (93.5%) were aware of the existence of ANC and childhood immunisation services respectively. The reason for mothers' awareness of childhood immunisation more than ANC could be due to the fact that childhood immunisation is more pronounced in the area. Hearing from radio, television, health workers, relatives, friends and religious leaders were the sources of information reported by the respondents. These findings agreed with the findings of qualitative data as most of the discussants from all the 12 FGD sessions reported that radio, television, healthcare staff, friends, announcement by town crier were the main sources of information. A household head participant stated thus:

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I get information about ANC from radio, television, and newspapers. In addition, non-governmental organisations often organise some programs enlightening the general public on the importance of ANC services during pregnancy. Advocating that pregnant women should attend ANC in order to stay healthy and have healthy babies and ensure that children are sickle-free, as well as avoiding any history-related disease, among other tactics (Household Head FGD, Urban Ward).

Another household head participant added that:
Actually, information about prenatal care is an idea that is passed down from generation to generation, whether from a mother to her children, a husband to his wife, or friends to their friends. It is an idea that is carried down from person to person, not necessarily through the media (Household Head FGD, Urban Ward).

The finding is not surprising because radio, television, relatives, healthcare providers among others remain the major means of disseminating health related information to people especially people with low educational attainment. Although 89.3% of the respondents as indicated earlier, were aware of the existence of ANC, most women had no adequate knowledge of specific services that are received during ANC visits as shown in a table below.

Table 3: Awareness of Specific ANC Services that are Received during ANC Visits

	Response	**Frequency**	**Percentage (%)**
Awareness that eight (8) ANC visits are required for normal pregnancy	Yes	97	25.4
	No	285	74.6
	Total	**382**	**100.0**
Awareness that blood pressure is measured	Yes	195	51.0
	No	187	49.0
	Total	**382**	**100.0**
Awareness that abdominal examination is performed	Yes	211	55.2
	No	171	44.8
	Total	**382**	**100.0**
Awareness that tetanus toxoids (TT) injections are received	Yes	189	49.5
	No	193	50.5
	Total	**382**	**100.0**
Awareness that anti-malarial drugs are received	Yes	157	41.1
	No	225	58.9
	Total	**382**	**100.0**
Awareness that folic-acid and iron tablets are given	Yes	152	39.8
	No	230	60.2
	Total	**382**	**100.0**
Awareness that diet related advice is received	Yes	121	31.7
	No	261	68.3
	Total	**382**	**100.0**
Awareness that breast feeding advice is received	Yes	97	25.4
	No	285	74.6
	Total	**382**	**100.0**
Awareness that family planning advice is received	Yes	81	21.2
	No	301	78.8
	Total	**382**	**100.0**

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Most of the respondents as depicted in Table 3 were not aware that 8 ANC visits are required during pregnancy (74.6%), not aware that anti-malarial drugs are received (58.9%), not aware that folic acid and iron tablets are given (60%), not aware that diet related advice is received (68.3%) and not aware that breast feeding related advice is received (74.6%), as well as advice on family planning (78.8%). These findings were in line with findings from different sessions of FGD which revealed overwhelming majority of the informants were aware that women go to hospital for ANC during pregnancy but majority had no knowledge of specific services that are received. Those with little knowledge only recalled services such as measuring blood pressure, folic acid and iron tablets, mosquito nets and abdominal examination. According to a mother discussant:

Before I started going for ANC, I had no idea my unborn child was so little. When I went for the first ANC visit, the health officials instructed me to go for scanning, which I did and revealed that my child was too little and would most certainly die unless proper measures were taken. They later encouraged me to be eating blood-forming foods like eggs, fishes, and vegetables, as well as taking folic acid and iron supplements on a daily basis. Subsequently the baby returned to normal and was delivered safely as a result of the intervention (Mother FGD, Semi-Urban Ward).

Another mother discussant from a different session of the FGD added that "pregnant women receive blood pressure measurement, TT injection and the health officials often inquire if women have anything disturbing them, health talks, medicines are received or written for you to buy, anti-malaria drugs are also given" (Mother FGD, Rural Ward). Inadequate knowledge about specific components of ANC and childhood immunisation services has a serious implication on patronage of the services, because mothers need to be well informed about all the specific services to enable them sufficiently utilise them.

Pertaining to immunisation, majority of mothers (95.8%) knew that child immunisation protects children from childhood killer diseases. However, knowledge of specific vaccines preventable diseases (VPDs) that immunisation offers protection was very low among the respondents.

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Table 4: Knowledge of the Respondents on Vaccines Preventable Diseases

	Response	Frequency	Percentage (%)
Aware that immunisation protects children from polio	Yes	262	68.6
	No	120	31.4
	Total	**382**	**100.0**
Aware that immunisation protects children from tuberculosis	Yes	158	41.4
	No	224	58.6
	Total	**382**	**100.0**
Aware that immunisation protects children from diphtheria	Yes	80	20.9
	No	302	79.1
	Total	**382**	**100.0**
Aware that immunisation protects children from pertussis/whopping cough	Yes	93	24.3
	No	289	75.7
	Total	**382**	**100.0**
Aware that immunisation protects children from measles	Yes	259	67.8
	No	123	32.2
	Total	**382**	**100.0**
Aware that immunisation protects children from pneumonia	Yes	77	20.2
	No	305	79.8
	Total	**382**	**100.0**
Aware that immunisation protects children from diarrhea	Yes	117	30.6
	No	265	69.4
	Total	**382**	**100.0**
Aware that immunisation protects children from yellow fever	Yes	150	39.3
	No	232	60.7
	Total	**382**	**100.0**

More than 60% of the respondents lacked knowledge that childhood immunisation protects children from diphtheria, yellow fever, pneumonia and pertussis/whopping cough as depicted in Table 4. Highest knowledge was recorded for poliomyelitis (68.6%) and measles (67.8%). These findings were strengthened by findings of FGDs which unveiled that all the discussants were aware of childhood immunisation program, but majority lacked the knowledge of vaccines preventable diseases other than polio and measles. Only few participants mentioned, yellow fever, meningitis, and pneumonia in buttressing the assertion, a mother participant expressed very low knowledge of VPDs thus "except for polio and measles, I have no idea on what diseases childhood immunisation prevents" (Mother FGD, Rural Ward). Another mother participant added that "I have no idea on what types of vaccines are given to our children or what diseases immunisation protects them from" (Mother FGD, Semi-Urban Ward).

Furthermore, knowledge of specific injections that children should receive was also low among most mothers that participated in various sessions of FGD but was fair among educated household heads. This is because many educated fathers were able to mention more than three different vaccines that children receive, as an educated father stated thus: "I am aware that children under the age of five receive yellow fever vaccine, measles vaccine, meningitis vaccine, OPV, PCV, BCG vaccine among others" (Household head FGD, Semi-Urban Ward). Apparently must of the mothers or fathers that participated in FGD sessions who had no formal education, had very low level of knowledge about specific vaccines that under-five children should receive.

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Table 5: Respondents on Knowledge of Immunisation Schedule

	Response	Frequency	Percentage (%)
Number of women already aware that there are specific periods for immunisation	Yes	327	85.6
	No	39	10.2
	No response	16	4.2
	Total	**382**	**100.0**
Aware of childhood immunisation at birth	Yes	186	48.7
	No	196	51.3
	Total	**382**	**100.0**
Aware of childhood immunisation at 6 weeks	Yes	99	25.9
	No	283	74.1
	Total	**382**	**100.0**
Aware of childhood immunisation at 10 weeks	Yes	48	12.6
	No	334	87.4
	Total	**382**	**100.0**
Aware of childhood immunisation at 14 weeks	Yes	58	15.2
	No	324	84.8
	Total	**382**	**100.0**
Aware of childhood immunisation at 6 moths	Yes	46	12.0
	No	336	88.0
	Total	**382**	**100.0**
Aware of childhood immunisation at 9 months	Yes	71	18.6
	No	311	81.4
	Total	**382**	**100.0**
Aware of childhood immunisation at 12 months	Yes	43	11.3
	No	339	88.7
	Total	**382**	**100.0**
Aware of childhood immunisation at 15 months	Yes	40	10.5
	No	342	89.5
	Total	**382**	**100.0**

Majority of the respondents (85.6%) were aware that there are specific periods for child immunisation but knowledge of the specific periods that children should be immunised was very low as shown in Table 5. With exception of immunisation that is received at birth and at six weeks, more than 80% of the respondents had no idea that children under the age of five get inoculated at 10 and 14 weeks, as well as at sixth, nine, twelve, and fifteen months. These findings are similar with those of FGDs which found most of the participants had poor knowledge of immunisation schedules. For instance, one of the household head participants mentioned wrong immunisation schedule as quoted “children are immunised at one month, three months, eight months, and then after one year” (Household FGD, Rural Ward). The foregoing apparently shows that although most of the participants knew that there are specific periods for childhood immunisation, majority did not know the appropriate or recommended periods that children should be immunised in the State.

Discussion

Knowledge of parents/caregivers about ANC and immunisation services is a critical determinant of the services utilisation. Findings of the study illustrated that most of the respondents were aware of the existence of ANC, and childhood immunisation but lacked

inadequate knowledge of specific components of the services to be received and could be due to failure of immunisation stakeholders to enlighten mothers as well as the general public regularly on the timing and specific vaccines that are received. This finding is consistent with finding of a previous study in Kenya (Omondi *et al.*,2017) which reported low knowledge of the services among most of the respondents. The commonly reported sources of information about ANC and childhood immunisation were radio, health workers, relatives, friends, town criers and religious leaders. This finding is in consonance with finding of a study in Namibia which also found radio, television, health worker, relatives as sources of information about childhood immunisation (Amungulu, *et al*., 2023).

Majority of the respondents lacked the knowledge of specific components of ANC services including 8 ANC visits, anti-malarial drugs, folic acid and iron tablets, diet and breast-feeding related advices, as well as advice on family planning. In addition, blood pressure measurement, folic acid and iron tablets, mosquito nets, abdominal scanning were the only specific ANC services commonly mentioned by the respondents during FGD sessions. Contrary to previous studies (Fagbamigbe, et al., 2013; Suleiman, 2015) that reported satisfactory knowledge of maternal health services among the respondents.

As shown in Table 6, the alternate hypothesis which states that there is relationship between knowledge of eight (8) ANC visits and place of residence is rejected while the null hypothesis is accepted leading to a conclusion that Knowledge of eight (8) ANC visits does not vary significantly according to place of residence in Zamfara State. Knowledge of 8 ANC visits was relatively very low among the respondents irrespective of place of residence as more than 70% of the urban, semi-urban and rural dwellers were not aware that 8 ANC visits are required throughout a normal pregnancy. This finding is unique when compare with findings of the previous studies **(**Al hazmi et al., 2017; Amungulu *et al*., 2023; Manna *et al.*, 2024; Omondi, *et al*., 2017) in which no effort was made to examine the knowlede of 8 ANC contacs among the respondents.

Similar findings were also discovered pertaining to childhood immunisation. The main aim of childhood immunisation is protecting children under-fives from contracting childhood killer diseases such as polio, measles, yellow fever, tuberculosis among others. Knowledge of caregivers about immunisation and their confidence in its effectiveness are of paramount importance. Overwhelming majority of the respondents were knowledgeable that childhood immunisation protects under-five children from childhood diseases but knowledge of the specific VPDs immunisation offered protection was low except knowledge about poliomyelitis and measles and this might not be unconnected to the fact that, immunisation against polio and measles were commonly more pronounced types of childhood immunisation in Zamfara State. This finding confirmed the finding of a previous study in a neighboring state of Sokoto, Nigeria which reported only 49.1% of the respondents had good knowledge of childhood vaccine preventable diseases but most of them knew poliomyelitis (97.7%) and measles (95.9%) as childhood vaccine preventable diseases (] Awosan, *et al*., 2018).

In the same vein, the study ascertained that although most of the respondents were aware that there are specific periods for childhood immunisation, knowledge of immunisation schedule was very low. With exception of immunisation that is received at birth and at six weeks, more than 80% of the respondents had no knowledge that children under the age of five get inoculated at 10 and 14 weeks, as well as at six, nine, twelve, and fifteen months of age. This could lead to a situation whereby children are not receiving vaccines doses at appropriate times.

factor responsible for low level of knowledge regarding immunisation schedule could be lack of regular enlightenments and counselling of mothers at health facilities and media houses in the State. Moreover, higher knowledge of immunisation schedule was found among urban mothers compared to semi-urban and rural mothers in the State. This is in line with finding of the study in Dutse, Jigawa State, Nigeria which found most of the respondents did not possess satisfactory knowledge of immunisation services (Abdulkadir & Rainis, 2019).

Table 7, illustrated that the alternate hypothesis which states there is relationship between knowledge of immunisation at birth and place of residence is accepted while the null hypothesis is rejected. Knowledge of childhood immunisation at birth was significantly higher in urban area compared to semi-urban and rural areas of Zamfara State. The foregoing shows that knowledge of 8 ANC visits was relatively very low among the respondents irrespective of place of residence but knowledge of childhood immunisation at birth was significantly higher in urban area compared to semi-urban and rural areas. Contrary to the findings of previous studies in Namibia and Kolkata (Amungulu, *et al*., 2023; Manna *et al*., 2024) as well as other studies that were reviwed in this study as none of the studies explored such critical issues.

The findings are in consonance with the model underpinning the study, the Behavioural Model of Health Services Use developed by Andersen (Andersen, 1995). Lack of adequate knowledge of specific components of ANC services, inadequate knowledge of VPDs, low knowledge of immunisation schedule among the respondents could be disabling factors that discourage individuals to use health services. While satisfactory knowledge of specific ANC and immunisation services including doses, when and how the services can be accessed could serve as an enabling factor that encourage mothers to utilise the services.

Conclusion and Recommendations

This study revealed a significant gap between general awareness and the specific, actionable knowledge required for optimal utilization of ANC and childhood immunisation services among parents in Zamfara State. The study examined knowledge of parents about antenatal care and childhood immunisation services in Zamfara State. The study revealed that Parents' knowledge about specific ANC and immunisation services including awareness of the required number of ANC visits and other related services that are received, knowledge of VPDs, doses and types of vaccines children should receive remained low in Zamfara State and this may adversely affect the willingness of parents/caregivers to effectively patronise the services which in turn affects the continuum of maternal and childcare after childbirth in the State. Therefore, the paper recommends that government in collaboration with healthcare personnel should venture into an effective and efficient mobilization and enlightenment campaigns in the social media, radio and television stations as well as at healthcare facilities at regular intervals educating parents about specific ANC and childhood immunisation services that are received including the timing and doses.

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