Original

Maternal Satisfaction with Routine Immunization Services at a Tertiary Healthcare Facility in Ekiti State, South Western Nigeria: A Cross-Sectional Study

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Abstract

Background: Maternal satisfaction is critical for the uptake routine immunization services globally. Routine immunization services uptake is suboptimal in many developing countries. The objective of this study is to assess maternal satisfaction with routine immunization services at a tertiary healthcare facility in Ekiti State, Southwestern Nigeria.

Methods: A cross-sectional study among 333 mothers with children less than 24 months selected through a systematic sampling technique from the immunization age sex register of the baby. Data was collected using a pre-tested semi-structured questionnaire. Descriptive, inferential, and logistic regression analyses were performed using SPSS version 25, and a p-value less than 0.05 was considered statistically significant.

Result: Most respondents (327, 98.2%) were satisfied with the quality of immunization services received. Short waiting time (189, 57.8%), affordable services (177, 54.4%), and the expertise of the health provider (173, 52.9%) were the most common reasons for their satisfaction. Age was found to be significantly associated with maternal satisfaction (p-value 0.002). Similarly, occupation, number of children, and income were found to be significantly associated with maternal satisfaction (p-values 0.049, 0.013, and 0.046, respectively). Only age 30 to 39, and having two children were the predictors of maternal satisfaction with routine immunization services.

Conclusion: The maternal satisfaction with routine immunization services is very high among the respondents. Policy makers should pay attention to the waiting time, affordable of services and the expertise of the service provider

Keywords: Maternal satisfaction, routine immunization, services

How to cite this article

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INTRODUCTION

Immunisation is one of the most cost-effective health investments and a proven tool for controlling and eliminating life-threatening infectious diseases, estimated to avert between 2 - 3 million deaths each year.[1] It is therefore essential that qualitative improvement, including client satisfaction with immunisation services, be carefully guided and ensured through periodic audit of the immunisation chain.[1,2]
Inadequate immunisation coverage continues to be a public health problem in Nigeria.[3] According to the 2018 Nigeria Demographic and Health Survey, only 31% of children age 12-23 months have received all eight basic vaccinations – one dose each of BCG and measles vaccine and three doses each of DPT-HepB-Hib and polio vaccine with less than half (47%) of children receiving the third dose of polio vaccine.[3]

The inadequate immunisation coverage in the country, even though the services are offered free, is a cause for concern. The acceptance of immunisation services by mothers is dependent on the provision of these services and other factors, such as the knowledge and attitude of mothers, as well as the density of health workers.[4,5,6]
An indicator of quality of care is a mother's satisfaction with the services provided.[7] A satisfied mother is more likely to develop a deeper and long-lasting relationship with their medical service provider, which would translate to improved compliance, continuity of care, and eventually improved health care outcomes.[7]

Quality of care can be assessed at three levels: the structure level; the service delivery level; and the client /outcome level. Outcome assessment concerns the results of care on the health status of clients, including but not limited to client satisfaction with health care. Outcomes have received special emphasis as a measure of quality. Assessing outcomes has merit both as an index of the effectiveness of different interventions and as part of an important monitoring system directed to improving quality of care as well as detecting its deterioration.[8,9]

Mothers are asked to assess not their health status after receiving care, but their satisfaction with the services delivered. The Bruce-Jain framework emphasizes assessing quality from the client's perspective. It expresses quality in terms of six central elements: choice of methods, information given to clients, technical competence, interpersonal relations, follow-up and continuity mechanisms, and the appropriate constellation of services.[10,11]

A better understanding of the determinants of maternal satisfaction would help policy and decision-makers to develop and implement improved immunisation strategies which will culminate in an increase in immunization coverage and utilization of services. The purpose of the study is to determine the level of satisfaction of mothers with the immunization services provided at the immunization and infant welfare clinic of the federal teaching hospital, Ido-Ekiti.

METHODOLOGY

This is a descriptive cross-sectional study conducted at a tertiary health centre in Ido–Osi Local Government Area, Ekiti State. The study targets mothers who bring their infants to attend the Immunization and Infant Welfare Clinic of the hospital. The study was carried out in a tertiary health centre located in Ido Ekiti, which is the capital of Ido–Osi LGA, one of the 16 LGAs in the state. It is also a semi–urban LGA[12]. The tertiary health centre is also one of the three tertiary health centres located within the state. The other two tertiary health centres are located in the state capital Ado-Ekiti.[12]
Inclusion and exclusion criteria: All consenting mothers with children less than 24 months of age who assessed services at the immunization and infant welfare clinic were included

Sample size determination: The sample size was determined using Fischer's formula,[13]

$$n = \frac{Z^2 \times P (1 - P)}{E^2}$$

Where Z standard normal deviate at 95% = 1.96
P: proportion of maternal satisfaction in a previous Study= 73.5[14]
E: Level of error = 5%

$$n = \frac{(1.96)^2 \times 73.5 (100 - 73.5)}{5^2}$$

$$= \frac{3.842 \times 73.5 (26.5) / 25}{}$$

= 299

For non-response rate compensation
ns= n/0.9
ns = 299/0.9 =333
Therefore, 333 mothers will participate in the study
Sampling technique: Respondents were selected from the age sex register of immunization of the baby. The

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babies were selected using a systematic sampling technique. The mothers of the selected babies were interviewed, provided they consented.

Sampling instrument/tool: Data were collected with a pre-tested semi-structured questionnaires[12,14,19] adapted from previous similar studies, which was then interviewer-administered by trained resident doctors in the department of Community Medicine, FETHI. The questionnaire was first pretested in another tertiary institution (Ekiti State University Teaching Hospital Ado-Ekiti) before being administered

Data analysis: Filled questionnaires were sorted, and the data were analysed using Statistical Package for Social Sciences (SPSS) version 22. Data were then presented in the form of frequency tables and prose. Chi-square was used to test for a significant association between socio-demographic characteristics and maternal satisfaction with routine immunization services. Logistic regression was used to determine the predictors of maternal satisfaction with routine immunization services. A confidence interval of 95% was used, and a P-value less than 0.05 was considered statistically significant

Ethical consideration: Ethical approval was obtained from the Human Research and Ethics Committee of the Federal Teaching Hospital, Ido-Ekiti (ERC/2021/06/11/559A). Verbal Informed consent was sought from the respondents, and only those who consented were recruited for the study

Results

Table 1: Socio-Demographic and other characteristics of Mothers

Variable	Frequency (N=333)	Percentage (%)
Age Group (Years)		
<30 years	111	33.3
30-39 years	193	58.0
≥40 years	29	8.7
Marital Status		
Married	301	90.4
Separated	21	6.3
Single	11	3.3
Level of Education		
No formal/Primary	6	1.8
Secondary	86	25.8
Tertiary	241	72.4
Occupation		
Trader	106	31.8
Civil Servant	120	36.0
Artisan	41	12.3
Others (farmer, clergy etc)	66	19.8
Tribe		
Yoruba	292	87.7
Igbo	16	4.8
Others (Hausa, Ebiraetc)	25	7.5
Religion		
Christian	311	93.4
Islam	22	6.6
Number of Children		
1	84	25.2
2	119	35.7
3	105	31.5
4 and more	25	7.5
Husbands Occupation		

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Farmer	18	5.4
Trader	109	32.7
Civil Servant	173	52.0
Others (artisan, clergy and unemployed)	33	9.9
Distance of nearest PHF to Residence		
<1 Hour	65	19.5
>1 Hour	268	80.5
Income (₦)		
<5,000	41	12.3
5,000-10,000	62	18.6
10,001-20,000	71	21.3
20,000-50,000	67	20.1
>50,000	92	27.6

All the questionnaires were correctly filled, giving a response rate of 100%. The socio-demographic characteristics of the respondents are as shown in Table 1. Most of the respondents were between the ages of 30 and 39 (193, 58.0%) , with a mean age ± SD of 31.95 ±5.02. Most of the respondents (301, 90.4%) were married. This study found that most of the mothers attending the immunization clinic had a tertiary level of education (241, 72.4%), and most of the respondents were civil servants (120, 36.0%). Similarly, most of the respondents' spouses were also civil servants (173, 52.0%).

Table 2: Maternal satisfaction with the quality of care

Variable	Frequency (N=333)	Percentage (%)
Satisfied with the quality of service received at the health facility		
Yes	327	98.2
No	6	1.8
Reasons for being satisfied* (n=327)		
Good attitude of health provider	148	45.3
Expertise of the health provider	173	52.9
Accessibility	154	47.1
Adequate privacy during immunization	154	47.1
Short waiting time	189	57.8
Affordable services	177	54.1
Clean and comfortable waiting area	159	48.6
Others	155	47.4
Would want to visit the health facility again (n=327)		
Yes	275	84.1
No	52	15.9
Reasons for not being satisfied* (n=6)		
Poor attitude of health providers	1	16.7
Lack of equipment	1	16.7
Long waiting time	2	33.3
Long travel distance	0	0.0
Cost of service	6	100.0
Dirty waiting area	0	0.0
Others	0	0.0

*Multiple Responses

Table 2 shows the perceived maternal satisfaction with the quality of care received. Most of the respondents (327, 98.2%) said they were satisfied with the quality of immunization service received. The three most common reasons for their

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satisfaction are short waiting time (189, 57.8%), affordable services (177, 54.4%) and expertise of the health provider (173, 52.9%).

Table 3: Factors Associated with Maternal Satisfaction

Variables	Maternal Satisfaction with Immunization Services			
	Satisfied n (%)	Not satisfied n (%)	X^2	P-value
Age Group (Years)			11.67[F]	0.002
<30 years	108(97.3)	3(2.7)		
30-39 years	169(87.6)	24(12.4)		
≥40 years	29(100.0)	0(0.0)		
Marital Status			3.54[F]	0.152
Married	279(92.1)	22(7.3)		
Separated	18(85.7)	3(14.3)		
Single	9(81.8)	2(18.2)		
Level of Education			3.55[F]	0.152
No formal/Primary	6(100.0)	0(0.0)		
Secondary	83(96.5)	3(3.5)		
Tertiary	217(90.0)	24(10.0)		
Occupation			7.54[F]	0.049
Trader	100(94.3)	6(5.7)		
Civil Servant	106(88.3)	14(11.7)		
Artisan	41(100.0)	0(0.0)		
Others (farmer, clergy, unemployed)	59(89.4)	7(10.6)		
Tribe			3.07[F]	0.156
Yoruba	265 (90.8)	27(9.2)		
Igbo	16(100.0)	0(0.0)		
Others (Hausa, Ebira etc)	25(100.0)	0(0.0)		
Religion			1.08[Y]	0.299
Christian	284(91.3)	27(8.7)		
Islam	22(100.0)	0(0.0)		
Number of Children			10.11[F]	0.013
1	82(97.6)	2(2.4)		
2	103(86.6)	16(13.4)		
3	96(91.4)	9(8.6)		
4 and more	25(100.0)	0(0.0)		
Husbands Occupation			2.89[F]	0.384
Farmer	18(100.0)	0(0.0)		
Trader	98(89.9)	11(10.1)		
Civil Servant	161(93.1)	12(6.9)		
Others (artisan, clergy, unemployed)	29(87.9)	4(12.1)		
Distance of nearest PHF to Residence			1.97[Y]	0.161
<1 Hour	63(96.9)	2(3.1)		
>1 Hour	243(90.7)	25(9.3)		
Income (Naira)			9.21[F]	0.046

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<5,000	37(90.2)	4(9.8)		
5,000-10,000	55(88.7)	7(11.3)		
10,001-20,000	69(97.2)	2(2.8)		
20,000-50,000	65(97.0)	2(3.0)		
>50,000	80(87.0)	12(13.0)		
Adverse Effect following Immunization			1.12	0.291
Yes	105(89.7)	12(10.3)		
No	201(93.1)	15(6.9)		
Given a dare for the next appointment			<0.01[Y]	>0.999
Yes	291(91.8)	26(8.2)		
No	15(93.8)	1(6.2)		

The factors associated with maternal satisfaction were described in Table 3. Age was found to be significantly associated with maternal satisfaction at a p-value of 0.002. Similarly, occupation, number of children, and income were found to be significantly associated with maternal satisfaction at p values of 0.049, 0.013, and 0.046, respectively.

Table 4: Predictors of Maternal Satisfaction

Variables	B	AOR	95% CI		P-value
			Lower	Upper	
Age Group (Years)					
<30 years (Ref)		1.00			
30-39 years	-1.53	0.22	0.05	0.90	0.035
≥40 years	17.67	4.69e[7]	0.00	.	0.998
Occupation					
Trader (Ref)		1.00			
Civil Servant	-0.11	0.90	0.26	3.14	0.863
Artisan	17.92	6.06e[7]	0.00	.	0.998
Others (farmer, clergy etc)	-1.32	0.27	0.07	1.04	0.058
Number of Children					
1 (Ref)		1.00			
2	-1.90	0.15	0.03	0.75	0.020
3	-0.67	0.51	0.10	2.67	0.428
4 and more	18.11	7.36e[7]	0.00	.	0.998
Income (₦)					
<5,000 (Ref)		1.00			
5,000-10,000	-0.56	0.57	0.13	2.48	0.456
10,001-20,000	1.85	6.37	0.92	44.17	0.061
20,000-50,000	1.70	5.48	0.85	35.31	0.073
>50,000	0.05	1.05	0.27	4.11	0.942

Table 4 shows the predictors of maternal satisfaction. Only age 30 to 39 and having two children were the predictors of maternal satisfaction with routine immunization services.

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DISCUSSION

Our study revealed that the level of maternal satisfaction was exceptionally high. The three most common reasons for their satisfaction are short waiting time, affordable services, and the expertise of the health providers. Maternal age, maternal occupation, number of children and income were the other factors associated with maternal satisfaction with routine immunization in the health facility. Parental satisfaction with immunization care is an indicator of provider quality that has been relatively unexplored in relation to childhood immunization.[15] Assessing outcomes has merit both as an indicator of the effectiveness of different interventions and as a part of an efficient monitoring system aimed at improving quality of care as well as detecting its deterioration. For maternal satisfaction, mothers are asked to assess not their health status after receiving care but their satisfaction with the services received[16] In addition, Patients' satisfaction has also been reported to be an important predictor of health-related behaviour such as service utilization, compliance to treatment and outcome of treatment[14]

This study found that majority of the mothers (327, 98.2%) were satisfied with the quality of care received, this is similar to findings in studies done in Ethiopia where 68.2% of the mothers were satisfied with the immunization services received[18] and in Osun state, Nigeria[14] where most of the respondents had a high level of satisfaction with services received. In another study done in Benin City, Nigeria[17] 84% of the respondents were satisfied with immunization services received. This contrasts with a study done in Calabar, Nigeria where 56.4% of the mothers were dissatisfied with the immunization services received[19]

Mothers patronize Infant welfare clinics in health facilities to assess preventive, promotive and curative healthcare services for the children. Consequently, it is important to ensure that mothers are satisfied with the services received to promote a positive health outcome. This study revealed that mothers were satisfied with the services rendered at the immunization clinic because of the short waiting time, affordability of services and the expertise of the health provider. This is similar to the finding in a study conducted in primary health care centers in Edo State, Nigeria, where a short waiting time of less than 30 minutes was significantly associated with maternal satisfaction with immunization services.[20] This is also in tandem with another study from Calabar, Nigeria.[2]

Our study identified maternal age, maternal occupation, number of children and income as factors associated with maternal satisfaction with routine immunization in the health facility. The study in Edo demonstrated that income was a factor associated with mothers' satisfaction with routine immunization services. Another study conducted in Ethiopia identified the age of the mother of less than 30 years as a factor associated with maternal satisfaction.[21] The finding is consistent with the findings in our study. The little difference noticed was due to the difference in the age categorization. In this study, only age 30 to 39, and having two children were the predictors of maternal satisfaction with routine immunization services.

Strengths and limitations of the study

One of the strengths of this study is that the questionnaires were administered by the research assistants in private rooms in the department. This ensured privacy and some level of confidentiality, which allowed the respondents to express themselves freely. Secondly, the questionnaire was administered by trained research assistants, thereby ensuring accuracy and detailed insight into the experience of the mothers as regards the service accessed.

The limitation of this study includes the use of only a tertiary health facility, which makes it difficult to generalise the findings. More multi-centered studies will be needed with the inclusion of private facilities. Another limitation of the study was its sole reliance on quantitative methods, which did not incorporate qualitative approaches to gain a deeper understanding of the causes of caregivers' satisfaction and dissatisfaction with the services provided.

Implications of the findings from the study: Findings from the study will ensure the timely identification of potential problems leading to early resolution. Also, with an improvement in the mothers' satisfaction, there will be a corresponding improvement in treatment outcome as satisfied mothers are more likely to comply with treatment advice and come back for follow-up. A satisfied mother is also likely to tell friends and neighbours and thus ensure that more women access care leading to an improvement in immunization indices.

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CONCLUSION

This study revealed that the level of maternal satisfaction was exceptionally high, surpassing that of most studies conducted in Nigeria. The three most common reasons for their satisfaction are short waiting time, affordable services, and the expertise of the health providers. Maternal age, maternal occupation, number of children and income were the other factors associated with maternal satisfaction with routine immunization in the health facility. Therefore, it is pertinent that programmers in routine immunization ensure clients' waiting time is as short as possible, ensure services provided are affordable, and continuously improve the skills and expertise of immunization services providers.

Declarations

Ethical Consideration: Ethical approval was obtained from the Human Research and Ethics Committee of the Federal Teaching Hospital, Ido-Ekiti (ERC/2021/06/11/559A)

Authors' Contribution: Study conception and design were done by AMA and AKR. TI and AI did data collection. Data analysis and interpretation were done by all authors, OIA and ASA. AMA, AI, and ASA did the first draft of the article. AKR, TI and OIA did a critical revision of the article. All the authors read and approved the final manuscript.

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REFERENCES

1. World Health Organization. Immunization. Geneva: WHO. http://www.who.int/topics/immunization/en/. Accessed 7 June 2020.
2. Udonwa N, Gyuse A, Etokidem A, Ogaji D. Client views, perception and satisfaction with immunisation services at primary health care facilities in Calabar, South-South Nigeria. Asian Pacific Journal of Tropical Medicine. 2010; 3(4): 298–298. https://doi.org/10.1016/S1995-7645(10)60073-9
3. National Population Commission (NPC) [Nigeria] and ICF. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF, 2019. Available from: https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf
4. Matsumura T, Nakayama T, Okamoto S, Ito H. Measles vaccine coverage and factors related to uncompleted vaccination among 18-month-old and 36-month-old children in Kyoto, Japan. *BMC Public Health*. 2005; 5:59. doi:10.1186/1471-2458-5-59
5. Torun SD, Bakirci N. Vaccination coverage and reasons for non-vaccination in a district of Istanbul. *BMC Public Health*. 2006; 6:125. doi:10.1186/1471-2458-6-125
6. Anand S, Bärnighausen T. Health workers and vaccination coverage in developing countries: an econometric analysis. *Lancet*. 2007; 369(9569): 1277-1285. doi:10.1016/S0140-6736(07)60599-6
7. Whitworth J, Pickering H, Mulwanyi F, Ruberantwari A, Dolin P, Johnson G. Determinants of attendance and patient satisfaction at eye clinics in south-western Uganda. *Health Policy Plan*. 1999; 14(1):77-81. doi:10.1093/heapol/14.1.77
8. Donabedian A. The quality of care. How can it be assessed? *JAMA*. 1988; 260(12): 1743-1748. doi:10.1001/jama.260.12.1743
9. Epstein AM. The outcomes movement--will it get us where we want to go? *N Engl J Med*. 1990; 323(4): 266-270. doi:10.1056/NEJM199007263230410
10. Fisher AW. Patient's evaluation of outpatient medical care. *J. Med. Educ.* 1971; 46: 238-244.
11. Bruce J. Fundamental elements of the quality of care: a simple framework. *Stud Fam Plann*. 1990; 21(2): 61-91.
12. Oluwadare CT. Client's perception of quality hospital service in Ekiti State, Nigeria. Global research Journal of Medical Science. 2012; 2(3): 43-47.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

13. Jekel JF, Katz DL, Elmore JG, Wild D. Sample size, randomization and probability theory. Epidemiology, Biostatistics and preventive medicine. Philadelphia Saunders. 2014; 194-199.
14. Abodunrin OL, Adeomi AA, Adeoye OA. Clients' satisfaction with quality of healthcare received: Study among mothers attending infant welfare clinics in a semi-urban community in South-western Nigeria. Sky Journal of Medicine and Medical Sciences. 2014; 2(7): 45-49
15. Luman ET, McCauley MM, Shefer A, Chu SY. Maternal characteristics associated with vaccination of young children. *Pediatrics*. 2003; 111: 1215-1218.
16. El Gammal HA. Maternal satisfaction about childhood immunization in primary health care center, Egypt. Pan Afr Med J. 2014; 18:157. doi: 10.11604/pamj.2014.18.157.1773. PMID: 25419295; PMCID: PMC4236845.
17. Ofili AN, Ofovwe CE. Patients' assessment of efficiency of services at a teaching hospital in a developing country. Annals of African Medicine. 2005; 4(4): 150-153
18. Fisha AG, Nega TA, Netsanet TG, Bisrat ZS. Maternal Satisfaction towards Childhood Immunization Service and Its Associated Factors in Wadla District, North Wollo, Ethiopia. Hindawi. International Journal of Pediatrics. 2019; 2020: 1-13. Doi: 10.1155/2020/3715414
19. Udonwa NE, Gyuse AN, Etokidem AJ, Ogaji D. Client views, perception and satisfaction with immunisation services at Primary Health Care Facilities in Calabar, South-South Nigeria. Asian Pacific Journal of Tropical Medicine 2010; 3(4): 298-301.
20. Uwaibi NE, Omozuwa SE. Maternal satisfaction with childhood immunization services in primary health care centres in Edo State, Nigeria. Afr J Reprod Health. 2021; 25(2): 86-93. Doi: 10.29063/ajrh2021/v25i2.8. PMID: 37585756.
21. Fikadu T, Gebru Z, Abebe G, Tesfaye S, Zeleke EA. Assessment of mothers' satisfaction towards child vaccination service in South Omo zone, South Ethiopia region: a survey on clients' perspective. *BMC Women's Health*. 2024; 24: 272 https://doi.org/10.1186/s12905-024-03120-0

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