CHILDHOOD VACCINATION UPTAKE AND PUBLIC PERCEPTION POST-COVID-19 IN BAYELSA STATE, NIGERIA

Adelekun, Omobolanle Esther

School of Public Health, Texila American University, Guyana.

Abstract: This study sought to evaluate the demographic distribution, perceptions of childhood vaccination, and their relationship with vaccination uptake among participants. Public attitudes toward vaccines are influenced by multiple factors, including past interactions with healthcare systems, cultural and religious beliefs, exposure to misinformation, and perceptions of vaccine safety and effectiveness. The dynamics surrounding these perceptions were further complicated by the COVID-19 pandemic, during which the spread of misinformation on social media significantly undermined public trust. A total of 810 participants were surveyed. Data on demographic variables, perception of childhood vaccination, and vaccination uptake were collected via interviewer-administered questionnaire and analysed using chi-square tests and odds ratios. Most participants were aged 30-39 years (34.3%), female (78%), and married (60.2%). Most had secondary education (55.1%) and were self-employed (40.2%). The perception of childhood vaccination was generally positive, with 66.2% agreeing that vaccines are important for protecting children from serious diseases. However, 55.1% disagreed that vaccines have more risks than benefits. The association between demographic variables and perception revealed significant differences based on gender (p=0.015), marital status (p<0.001), and education level (p=0.021). Participants with a poor perception of vaccination were almost twice as likely to have incomplete vaccination (OR=1.95, 95% CI: 1.4 – 2.6, p=0.0001). The study highlights the importance of addressing demographic factors in vaccination campaigns to improve perception and uptake of childhood vaccination. Efforts should focus on educating and engaging specific demographic groups to enhance vaccination coverage.

Keywords: Vaccination, Perception, Uptake, COVID-19, Bayelsa.

I. INTRODUCTION

Vaccination remains one of the most effective public health interventions for preventing infectious diseases and mitigating their spread. The COVID-19 pandemic emphasized the critical role of vaccines in global health, with unprecedented efforts to develop, distribute, and administer vaccines within a remarkably short timeframe. However, the success of vaccination campaigns depends not only on vaccine availability but also on public acceptance and trust.

The impact of vaccines is undeniable. Measles mortality rates, for instance, have plummeted by 84% worldwide since 2000 due to vaccination efforts. Similarly, pertussis deaths among children under five have decreased significantly, from 390,000 in 1999 to 160,700 in 2014[1]. Thanks to vaccination programs, diseases like smallpox have been eradicated, and polio is on the brink of extinction. Even for diseases such as measles, diphtheria, and pertussis, immunization has dramatically reduced their incidence in many regions[2]. While these achievements are monumental, challenges persist. Immunization coverage remains suboptimal in many developing countries, including Nigeria, where various obstacles hinder the full realization of vaccination goals. Addressing these challenges is crucial to ensuring that everyone, regardless of their location, benefits from the life-saving power of vaccines[3, 4].

Vaccination programs have led to the near eradication of diseases like polio and smallpox globally, and in many regions, have considerably reduced the incidence of diseases such as measles, diphtheria, and pertussis. Despite these successes, immunization coverage remains suboptimal in many developing countries, particularly in Nigeria, where various challenges have impeded the full realization of vaccination goals[5, 6].

Bayelsa State, located in the Niger Delta region of Nigeria, has unique socioeconomic and cultural characteristics that influence health behaviors, including vaccination. Despite national and global efforts to ensure widespread COVID-19 vaccine coverage, vaccine hesitancy remains a significant barrier. Public perception of vaccines is shaped by various factors, such as prior experiences with healthcare systems, religious and cultural beliefs, exposure to misinformation, and the perceived safety and efficacy of vaccines(Jelly et al., 2023; Mahachi et al., 2022).

The COVID-19 pandemic further complicated these dynamics, as misinformation proliferated across social media platforms, eroding public trust. In Bayelsa State, low literacy rates and limited access to accurate health information have exacerbated vaccine hesitancy(Afolabi et al., 2021; Fantay Gebru et al., 2019; Talbird et al., 2022). Understanding how public perception affects vaccination uptake post-COVID-19 is essential for designing effective health interventions. Furthermore, exploring the lingering effects of the pandemic on public attitudes toward vaccines can provide valuable insights for improving immunization programs against other diseases. This study seeks to bridge the knowledge gap by examining the interplay between public perception and vaccination uptake post-COVID-19 in Bayelsa State. The findings aim to inform strategies for enhancing public trust in vaccines and increasing vaccination coverage in the region.

II. METHODS

2.1 Study Population

The study population consisted of 810 parents or primary caregivers of children aged 0 to 5 years living in Bayelsa State, Nigeria. This age group is selected as it encompasses the period during which children typically receive their early childhood immunizations according to national immunization schedules.

2.2 Study Procedure

Quantitative data was collected through a structured questionnaire (Appendix I) administered to parents. The questionnaire assessed demographic information, perceptions of childhood immunization, fears, and attitudes toward vaccines, as well as knowledge of immunization schedules. The attitude of the individuals towards vaccination was classified based on Bloom's Taxonomy as Poor (Likert Average <2.5) and Good (Likert Average ≥2.5)[7]. Data collection was done in community centers or healthcare facilities to ensure accessibility.

2.3 Data Analysis

Quantitative data from the questionnaires was analyzed using descriptive and inferential statistics with the help of Statistical Package for Social Sciences (SPSS) software. Descriptive statistics (frequencies, percentages, means, and standard deviations) was used to summarize the socio-demographic characteristics of the respondents, as well as their perceptions, toward immunization. Inferential statistics, such as chi-square tests and logistic regression analysis, was used to examine the relationships between independent variables (parental characteristics, perceptions, fears, and attitudes) and the dependent variable (immunization uptake).

2.4 Ethical Considerations

Ethical approval to carry out the study was obtained from the Research and Ethics committee of the Bayesla State Primary Healthcare board. All participants were fully informed about the nature and purpose of the study before participating. A detailed explanation was provided regarding their rights, the voluntary nature of participation, and their ability to withdraw from the study at any time without consequence. Written or verbal informed consent was obtained from all participants before proceeding with data collection. The privacy of participants was a top priority. Personal identifiers were associated with study ID numbers and removed from the data to ensure that the information collected cannot be traced back to individual participants.

III. RESULTS

The study participants were predominantly aged between 30 and 39 years, making up 34.3% of the sample, followed by those aged 19 to 29 years at 29.9%. Participants aged 40 to 49 years constituted 23%, while those aged 50 and above made up 12.8%. The majority of participants were female, accounting for 78%, with males representing 22%. In terms of marital status, 60.2% were married, 27.2% were single, 9.4% were divorced or separated, and 3.2% were widowed. Regarding education, 55.1% had secondary education, 28.9% had tertiary education, 8.4% had no formal education, and 7.7% had primary education. The occupational distribution showed that 40.2% were self-employed, 23.2% were employed in the private sector, 18.5% were unemployed, 17.3% were employed in the government sector, and 0.7% were students. Most

participants resided in rural areas (84.4%), while 15.6% lived in urban areas. In terms of religious affiliation, 93.3% were Christians, 3.5% adhered to traditional beliefs, and 3.2% were Muslims.

Table 1: Demographic distribution of Study Participants

Demographic Variable	Frequency (n=810)	Percent (%)
Age groups		
19 - 29	242	29.9
30 - 39	278	34.3
40 - 49	186	23
50 and above	104	12.8
Gender		
Female	632	78
Male	178	22
Marital Status		
Single	220	27.2
Married	488	60.2
Divorced/Separated	76	9.4
Widowed	26	3.2
Highest level of education		
No formal education	68	8.4
Primary education	62	7.7
Secondary education	446	55.1
Tertiary education	234	28.9
Occupation		
Unemployed	150	18.5
Self-employed	326	40.2
Employed (private sector)	188	23.2
Employed (government sector)	140	17.3
Student	6	0.7
Area of Residence		
Urban	126	15.6
Rural	684	84.4
Religious affiliation		
Christianity	756	93.3
Islam	26	3.2
Traditional beliefs	28	3.5

Figure 1 shows that 518 respondents (63.95%) reported their children had received all vaccinations as scheduled, while 292 (36.05%) said they had not.
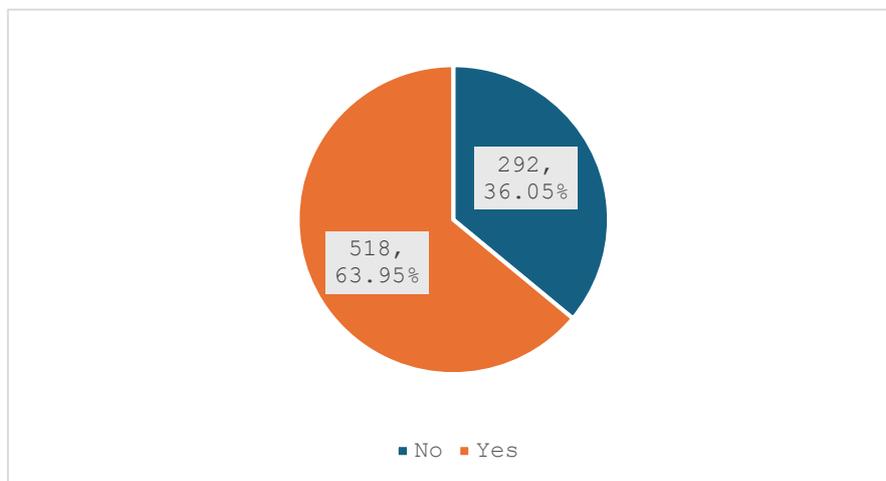

Figure 1: Child has received all vaccinations as scheduled

The majority of participants (66.2%) agreed that vaccines are important for protecting children from serious diseases, with 13.1% strongly agreeing. A significant portion (63.5%) trusted the information provided by healthcare professionals about vaccines, while 10.9% strongly agreed. However, 55.1% disagreed that vaccines have more risks than benefits for their child, and 22% strongly disagreed. Most participants (59.8%) believed that all children should follow the recommended vaccination schedule, with 10.4% strongly agreeing. Lastly, 63.2% of participants agreed that they worry about the safety of vaccines for their child, and 6.4% strongly agreed.

Table 2: Responses on Perception to Childhood Vaccination

Item	Strongly Disagree n (%)	Disagree n (%)	Agree n (%)	Strongly Agree n (%)	Total n (%)
Vaccines are important for protecting children from serious diseases.	74(9.1)	94(11.6)	536(66.2)	106(13.1)	**810(100.0)**
I trust the information provided by healthcare professionals about vaccines.	78(9.6)	130(16.0)	514(63.5)	88(10.9)	**810(100.0)**
Vaccines have more risks than benefits for my child.	178(22.0)	446(55.1)	172(21.2)	14(1.7)	**810(100.0)**
I believe that all children should follow the recommended vaccination schedule.	74(9.1)	168(20.7)	484(59.8)	84(10.4)	**810(100.0)**
I worry about the safety of vaccines for my child.	68(8.4)	178(22.0)	512(63.2)	52(6.4)	**810(100.0)**

Figure 2 indicates that 70.1% (568 out of 810) of respondents had a good perception of childhood vaccinations, while 29.9% had a poor perception.
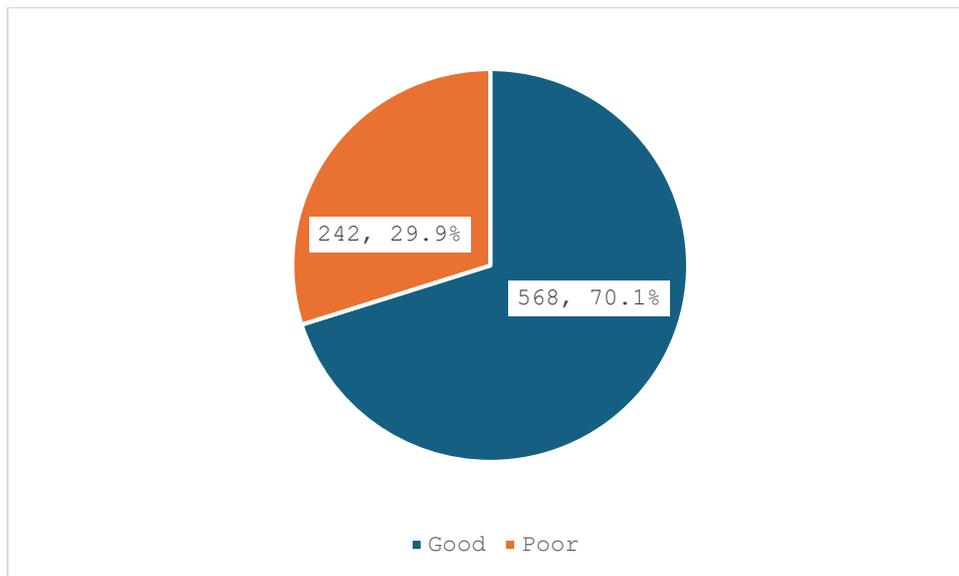

Figure 1: Rating of Respondents perception of childhood immunization

The association between demographic variables and perception of childhood vaccination revealed that younger age groups (19-29 and 30-39) had a higher percentage of good perception (72.7% and 71.9%, respectively) compared to older age groups. Females had a lower percentage of good perception (68%) compared to males (77.5%), which was statistically significant (p=0.015). Marital status showed that widowed participants had the highest percentage of poor perception (76.9%), while single participants had the highest percentage of good perception (78.2%), with a significant association (p<0.001). Education level indicated that participants with no formal education had the highest percentage of poor perception (44.1%), while those with primary education had the highest percentage of good perception (74.2%), with a significant association (p=0.021). Occupation and area of residence did not show significant associations with perception of childhood vaccination. Religious affiliation showed that participants with traditional beliefs had a higher percentage of poor perception (50%) compared to those with Christianity and Islam, but this association was not statistically significant (p=0.060).

Table 3: Association of Demographic Distribution and perception of Childhood vaccination

Demographic Variable	Poor Perception n, (%)	Good Perception n, (%)	Total n, (%)	Chi-square (p-value)
Age groups				
19 - 29	66(27.3)	176(72.7)	**242(100.0)**	3.92 (0.269)
30 - 39	78(28.1)	200(71.9)	**278(100.0)**	
40 - 49	60(32.3)	126(67.7)	**186(100.0)**	
50 and above	38(36.5)	66(63.5)	**104(100.0)**	
Gender				
Female	202(32.0)	430(68.0)	**632(100.0)**	5.90 (0.015)*
Male	40(22.5)	138(77.5)	**178(100.0)**	
Marital Status				
Single	48(21.8)	172(78.2)	**220(100.0)**	
Married	158(32.4)	330(67.6)	**488(100.0)**	38.56
Divorced/Separated	16(21.1)	60(78.9)	**76(100.0)**	(<0.001)*
Widowed	20(76.9)	6(23.1)	**26(100.0)**	
Highest level of education				
No formal education	30(44.1)	38(55.9)	**68(100.0)**	9.78 (0.021)*
Primary education	16(25.8)	46(74.2)	**62(100.0)**	
Secondary education	120(26.9)	326(73.1)	**446(100.0)**	
Tertiary education	76(32.5)	158(67.5)	**234(100.0)**	
Occupation				
Unemployed	54(36.0)	96(64.0)	**150(100.0)**	
Self-employed	86(26.4)	240(73.6)	**326(100.0)**	7.86 (0.097)
Employed (private sector)	50(26.6)	138(73.4)	**188(100.0)**	
Employed (government sector)	50(35.7)	90(64.3)	**140(100.0)**	
Student	2(33.3)	4(66.7)	**6(100.0)**	
Area of Residence				
Urban	38(30.2)	88(69.8)	**126(100.0)**	0.06 (0.940)
Rural	204(29.8)	480(70.2)	**684(100.0)**	
Religious affiliation				
Christianity	220(29.1)	536(70.9)	**756(100.0)**	5.63 (0.060)
Islam	8(30.8)	18(69.2)	**26(100.0)**	
Traditional beliefs	14(50.0)	14(50.0)	**28(100.0)**	

Statistically significant (p<0.05)

The association between perception of childhood vaccination and vaccination uptake showed that participants with a poor perception had a higher percentage of incomplete vaccination (39%) compared to those with a good perception (24.7%). Conversely, participants with a good perception had a higher percentage of complete vaccination (75.3%) compared to those with a poor perception (61%). This association was statistically significant (p=0.0001), with an odds ratio of 1.95 (95% CI: 1.4 – 2.6), indicating that participants with a poor perception were almost twice as likely to have incomplete vaccination compared to those with a good perception

Table 4: Association of perception of Childhood vaccination and Vaccination Uptake

Perception	Incomplete Vaccination n, (%)	Complete Vaccination n, (%)	Chi-square (p-value)	OR (95% CI)
Poor	114(39.0)	128(24.7)		
Good	178(61.0)	390(75.3)	18.3 (0.0001)*	1.95 (1.4 – 2.6)
Total	**292(100.0)**	**518(100.0)**		

IV. DISCUSSION

The study reveals that 63.95% of respondents reported their children had received all vaccinations as scheduled, while 36.05% indicated incomplete vaccinations, reflecting a moderately high level of coverage but still falling short of the 90% threshold recommended by the World Health Organization to achieve herd immunity[8]. This coverage aligns with averages reported in some low- and middle-income countries and slightly exceeds Nigeria's national immunization average of 57%, yet the 36.05% gap underscores persistent challenges in achieving universal vaccination[9]. Rural residence, where 84.4% of respondents live, likely contributes to this gap, as limited healthcare infrastructure, vaccine storage issues, and transportation barriers hinder access to immunization services[10, 11]. Parental concerns about vaccine safety, with 63.2% expressing worry, further exacerbate the problem, while lower educational levels, economic constraints, and poor perceptions of vaccination, as highlighted in the study, significantly influence adherence to vaccination schedules. The incomplete vaccination coverage increases the risk of outbreaks of preventable diseases, threatens community herd immunity, and places a greater burden on families and healthcare systems due to higher morbidity and mortality rates among unvaccinated children[12].

The findings reveal that the majority of participants (66.2%) acknowledged the importance of vaccines in protecting children from serious diseases, with 13.1% expressing this view strongly, underscoring a broadly positive perception of immunization benefits. Similarly, 63.5% of respondents reported trust in healthcare professionals as reliable sources of vaccine information, with 10.9% strongly endorsing this trust, reflecting the critical role of healthcare providers in influencing vaccination decisions. Notably, 55.1% of participants disagreed that vaccines pose more risks than benefits, and 22% strongly disagreed, further indicating a generally favorable attitude toward vaccination safety. However, concerns about vaccine safety persist, as 63.2% of participants admitted to worrying about their child's safety when vaccinated, and 6.4% strongly agreed, highlighting the presence of lingering apprehension despite overall positive attitudes. These findings suggest that while there is widespread acknowledgment of the benefits and safety of vaccines, persistent concerns about vaccine safety and hesitancy in some respondents underscore the need for targeted public health strategies[9]. Educational campaigns emphasizing vaccine safety, tailored to address specific fears and misconceptions, combined with leveraging the trust in healthcare professionals, can further improve vaccine acceptance and adherence to recommended schedules, ultimately strengthening immunization coverage and protecting public health[13].

The findings on the association between demographic variables and the perception of childhood vaccination align with and contribute to existing literature on the topic. Similar studies have demonstrated that younger age groups tend to have better health perceptions and adoption of preventive measures, including vaccinations, likely due to higher levels of health information access and awareness compared to older populations. For instance, research by [8]in Mali found a similar trend where younger adults displayed more positive attitudes toward childhood immunizations, underscoring the role of generational differences in health literacy.

The gender disparity observed, where males had a significantly higher percentage of good perception compared to females, diverges from certain global trends suggesting women often show better health-seeking behaviors and awareness. However, this finding is consistent with studies conducted in similar cultural settings, such as Obohwemu et al., [14], which highlighted barriers faced by women, including limited access to information and decision-making autonomy in healthcare-related matters.

Marital status as a determinant is striking, with widowed participants showing the poorest perception and single participants demonstrating the most favorable attitudes toward childhood vaccination. This trend aligns with findings from Islam et al.,

[15], where single individuals were often more informed and engaged in health promotion campaigns, possibly due to fewer competing responsibilities and more exposure to health education. The significantly poor perception among widows could be attributed to social and economic vulnerabilities, as documented by Chiappini et al., [16] who noted similar patterns in marginalized groups.

The educational gradient observed in this study, where higher education levels correlate with better perceptions, is well-documented in the literature. Participants with no formal education exhibiting the poorest perceptions aligns with findings from studies in low-resource settings, emphasizing the critical role of education in fostering health literacy and positive attitudes toward vaccinations. Research corroborates this, showing that targeted health education programs can significantly improve vaccination perceptions among less-educated populations [16, 17].

Interestingly, the lack of significant associations with occupation and area of residence contrasts with findings from other studies where these variables were predictive of health perceptions. For instance, Bertin et al., [18] found urban residency to be a strong determinant of positive vaccination attitudes due to better healthcare access. This divergence could suggest that in the post-COVID-19 context in Bayelsa State, other factors such as widespread public health campaigns or communal influences may have diluted the impact of these variables.

Religious affiliation's non-significant association, despite traditional beliefs showing a higher percentage of poor perception, highlights the complex interplay of cultural and religious norms in health decision-making. Studies have shown that religious beliefs can either facilitate or hinder vaccination uptake, depending on the alignment of health messages with cultural values [19, 20]. The findings here suggest an opportunity to engage religious leaders as advocates for vaccination to address residual hesitancy among traditionalists.

Participants with poor perceptions were more likely to have incomplete vaccinations, with 39.0% in this category compared to 24.7% among those with complete vaccinations. Conversely, participants with good perceptions had higher rates of complete vaccination uptake (75.3%) compared to those with incomplete vaccination (61.0%). The observed difference was statistically significant indicating that perception is a strong determinant of vaccination status.

The odds ratio (OR) of 1.95 (95% CI: 1.4–2.6) further underscores the impact of poor perception on vaccination uptake. Participants with poor perceptions were nearly twice as likely to have incomplete vaccination compared to those with good perceptions. This finding aligns with global literature emphasizing that positive attitudes and beliefs about vaccines strongly predict higher immunization rates. For example, Cooper et al., [21] found a similar relationship in Sub-Sahara African countries, where favorable perceptions of vaccination correlated with complete immunization schedules in children.

The findings align with theoretical frameworks, such as the Health Belief Model, which suggests that individuals are more likely to engage in health-promoting behaviors—like completing vaccination schedules—when they perceive benefits and have fewer barriers. Poor perception may stem from misinformation, distrust in healthcare systems, or cultural misconceptions, all of which have been highlighted in studies from low- and middle-income countries, including Bell et al., [22].

These results also echo findings from Ames et al., [23], who noted that targeted health education and community engagement significantly improved vaccine perceptions and uptake. Interventions addressing misinformation, building trust in healthcare providers, and emphasizing the benefits of complete vaccination schedules can potentially shift perceptions from poor to good, thereby improving uptake rates.

V. CONCLUSION

While the vaccination coverage of 63.95% in Bayelsa State represents a positive step, the 36.05% of children not fully vaccinated is a public health concern that requires urgent attention. Addressing the socio-economic, logistical, and cultural barriers identified in this study is critical for improving vaccination rates and safeguarding the health of children in the region. the findings highlight that demographic variables such as age, gender, marital status, and education level significantly influence the perception of childhood vaccination, which, in turn, strongly impacts vaccination uptake. Younger age groups, single participants, and individuals with primary education demonstrated more favourable perceptions, while widowed participants and those with no formal education exhibited poorer perceptions. Gender differences, with males showing higher good perception than females, underscore potential sociocultural barriers affecting women's health

attitudes in the context of Bayelsa State. Furthermore, the significant association between good perception and complete vaccination uptake emphasizes the critical role of public perception in achieving high immunization coverage. It is recommended that targeted interventions be implemented to improve public perception of childhood vaccination. Tailored health education campaigns should focus on addressing misinformation and cultural misconceptions, particularly among older adults, widows, and individuals with limited formal education. Engaging community and religious leaders as advocates can help bridge trust gaps and encourage positive vaccination behaviors.

REFERENCES

[1] Fleming JA, Munthali A, Ngwira B, et al. Maternal immunization in Malawi: A mixed methods study of community perceptions, programmatic considerations, and recommendations for future planning. Vaccine 2019; 37: 4568–4575.

[2] Tadesse T, Getachew K, Assefa T, et al. Factors and misperceptions of routine childhood immunization service uptake in ethiopia: Findings from a nationwide qualitative study. Pan African Medical Journal; 28. Epub ahead of print 5 December 2017. DOI: 10.11604/PAMJ.2017.28.290.14133.

[3] Abakar MF, Seli D, Lechthaler F, et al. Vaccine hesitancy among mobile pastoralists in Chad: A qualitative study. Int J Equity Health; 17. Epub ahead of print 14 November 2018. DOI: 10.1186/S12939-018-0873-2.

[4] Gidado S, Nguku P, Biya O, et al. Determinants of routine immunization coverage in Bungudu, Zamfara State, Northern Nigeria, May 2010. Pan African Medical Journal; 18. Epub ahead of print 2014. DOI: 10.11604/PAMJ. SUPP.2014.18.1.4149.

[5] Adedire EB, Ajayi I, Fawole OI, et al. Immunisation coverage and its determinants among children aged 12–23 months in Atakumosa-west district, Osun State Nigeria: a cross-sectional study. BMC Public Health 2016; 16: 905.

[6] Cockcroft A, Usman MU, Nyamucherera OF, et al. Why children are not vaccinated against measles: A cross-sectional study in two Nigerian States. Archives of Public Health; 72. Epub ahead of print 29 December 2014. DOI: 10.1186/2049-3258-72-48.

[7] Adams NE. Bloom's taxonomy of cognitive learning objectives. J Med Libr Assoc 2015; 103: 152.

[8] Ogbuanu IU, Li AJ, Anya B philomene M, et al. Can vaccination coverage be improved by reducing missed opportunities for vaccination? Findings from assessments in Chad and Malawi using the new WHO methodology. PLoS One; 14. Epub ahead of print 1 January 2019. DOI: 10.1371/journal.pone.0210648.

[9] Sato R, Fintan B. Fear, knowledge, and vaccination behaviors among women in Northern Nigeria. Hum Vaccin Immunother 2020; 16: 2438–2448.

[10] Alabi MA, Fasasi MI, Obiora RU, et al. Factors associated with full childhood vaccination coverage among young mothers in Northern Nigeria. PAMJ 2024; 47:4; 47. Epub ahead of print 4 January 2024. DOI: 10.11604/PAMJ. 2024.47.4.37517.

[11] Oku A, Oyo-Ita A, Glenton C, et al. Perceptions and experiences of childhood vaccination communication strategies among caregivers and health workers in Nigeria: A qualitative study. PLoS One; 12. Epub ahead of print 1 November 2017. DOI: 10.1371/JOURNAL.PONE.0186733.

[12] Afolabi RF, Salawu MM, Gbadebo BM, et al. Ethnicity as a cultural factor influencing complete vaccination among children aged 12-23 months in Nigeria. Hum Vaccin Immunother 2021; 17: 2008.

[13] Wong CKH, Liao Q, Guo VYW, et al. Cost-effectiveness analysis of vaccinations and decision makings on vaccination programmes in Hong Kong: A systematic review. Vaccine 2017; 35: 3153–3161.

[14] Obohwemu K, Christie-De Jong F, Ling J. Parental childhood vaccine hesitancy and predicting uptake of vaccinations: a systematic review. Prim Health Care Res Dev 2022; 23: e68.

[15] Islam MS, Siddique AB, Akter R, et al. Knowledge, attitudes and perceptions towards COVID-19 vaccinations: a cross-sectional community survey in Bangladesh. BMC Public Health 2021; 21: 1–11.

[16] Chiappini E, Parigi S, Galli L, et al. Impact that the COVID-19 pandemic on routine childhood vaccinations and challenges ahead: A narrative review. Acta Paediatrica, International Journal of Paediatrics 2021; 110: 2529–2535.

[17] Kagoné M, Yé M, Nébié E, et al. Community perception regarding childhood vaccinations and its implications for effectiveness: A qualitative study in rural Burkina Faso. BMC Public Health; 18. Epub ahead of print 6 March 2018. DOI: 10.1186/S12889-018-5244-9.

[18] Bertin P, Nera K, Delouvée S. Conspiracy Beliefs, Rejection of Vaccination, and Support for hydroxychloroquine: A Conceptual Replication-Extension in the COVID-19 Pandemic Context. Front Psychol 2020; 11: 565128.

[19] Trotter AB, Abbott EK, Coyle R, et al. Preparing for COVID-19 Vaccination: A Call to Action for Clinicians on Immunization Information Systems. Ann Intern Med 2021; 174: 695–697.

[20] Cascini F, Pantovic A, Al-Ajlouni YA, et al. Social media and attitudes towards a COVID-19 vaccination: A systematic review of the literature. EClinicalMedicine; 48. Epub ahead of print 1 June 2022. DOI: 10.1016/J.ECLINM.2022.101454.

[21] Cooper S, Schmidt BM, Sambala EZ, et al. Factors that influence parents' and informal caregivers' views and practices regarding routine childhood vaccination: a qualitative evidence synthesis. Cochrane Database of Systematic Reviews; 2021. Epub ahead of print 27 October 2021. DOI: 10.1002/14651858.CD013265.PUB2.

[22] Bell S, Clarke R, Paterson P, et al. Parents' and guardians' views and experiences of accessing routine childhood vaccinations during the coronavirus (COVID-19) pandemic: A mixed methods study in England. PLoS One 2021; 15: e0244049.

[23] Ames HMR, Glenton C, Lewin S. Parents' and informal caregivers' views and experiences of communication about routine childhood vaccination: A synthesis of qualitative evidence. Cochrane Database of Systematic Reviews; 2017. Epub ahead of print 7 February 2017. DOI: 10.1002/14651858.CD011787.PUB2.