International Journal of Social Science Research (IJSSR)
Volume- 3, Issue- 3 | May - June 2026 ISSN: 3048-9490

Parental Attitudes Towards Child Immunization in Dass Local Government Area, Bauchi State, Nigeria: A Cross-Sectional Survey

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Abstract

Background: Despite the availability of free routine immunization services in Nigeria, childhood vaccination coverage in Dass Local Government Area (LGA), Bauchi State, among the areas fighting low childhood immunization uptake for pentavalent vaccine completion far below the WHO recommended threshold of 90%. Understanding parental attitudes and structural barriers is essential for designing effective public health interventions. This study evaluated parental attitudes towards child immunization, assessed perceived benefits, and identified structural and sociocultural barriers to immunization compliance in Dass LGA, Bauchi State. A descriptive cross-sectional survey was conducted among 394 parents (response rate: 98.7%) of children aged 6 months to 5 years, recruited via simple random sampling from healthcare facilities in Dass metropolis. Data was analyzed using frequency distributions, percentages, and chi-square tests. Results: Most parents expressed positive attitudes: 71.4% affirmed vaccine benefit, 70.3% would recommend immunization to peers, and 73.1% disagreed that vaccines are harmful. Perceived benefits were widely acknowledged, 83.0% endorsed reduced hospital attendance and 73.6% recognized disease-prevention value. However, major barriers persisted: 73.1% cited inadequate health facilities, 74.3% identified information deficits, 80.2% reported high parental illiteracy, and 81.7% endorsed lack of cultural sensitivity in vaccine delivery. Negative attitudes were significantly associated with primary-level education or below (chi-square [chi2] = 18.74, $p < 0.001$), rural residence (chi2 = 14.31, $p = 0.001$), and Muslim affiliation (chi2 = 9.82, $p = 0.007$). Positive parental dispositions in Dass LGA are systematically undermined by structural, informational, and sociocultural barriers. Targeted community engagement, health literacy campaigns, culturally adapted service delivery, and investment in PHC infrastructure are urgently needed to bridge the attitude-behavior gap and improve immunization coverage.

Keywords: *child immunization; parental attitudes; vaccine hesitancy; vaccine-preventable diseases*

Introduction

Immunization remains one of the most consequential public health achievements of the

*Corresponding Author Email: jamiluazare@gmail.com
Published: 13 May 2026
DOI: https://doi.org/10.70558/IJSSR.2026.v3.i3.301081

twentieth century, preventing an estimated 4-5 million deaths annually and ranking among the most cost-effective preventive health interventions known to medicine (World Health Organization (WHO, 2023). The introduction and scaling up of the Expanded Programme on Immunization (EPI) since 1974 have substantially reduced the burden of vaccine-preventable diseases (VPDs) across sub-Saharan Africa; however, significant equity gaps persist, leaving millions of children, disproportionately in low-income, rural, and conflict-affected settings, unprotected (Adeyemi et al., 2022; UNICEF, 2023).

The COVID-19 pandemic disrupted immunization services globally, contributing to a resurgence of measles in at least 22 countries by 2022 and increasing the number of 'zero-dose children' (those never receiving any vaccine) to 18.1 million worldwide, the highest figure in over a decade (UNICEF, 2022). These setbacks underscore the fragility of vaccination gains and the continuing need for demand-generation strategies tailored to high-burden settings.

Nigeria presents a particularly complex immunization context. Despite offering routine childhood vaccination free of charge, the country accounts for parts of the global burden of zero-dose children (Gavi, 2023). National coverage for the third dose of the diphtheria-tetanus-pertussis vaccine (DTP3), the standard benchmark for immunization system performance, fluctuates below the WHO's recommended minimum of 90% (WHO/UNICEF, 2022). Regional disparities are most severe in the North-West and North-East geopolitical zones, where coverage frequently falls below the recommended percentage (National Bureau of Statistics (NBS & UNICEF, 2022). In northern Nigeria specifically, historically documented episodes of community resistance, including the 2003 polio vaccination boycott in Kano, Zamfara, and Kaduna, underscore how misinformation and distrust can rapidly erode immunization programs (Jegede, 2018; Obadare, 2020).

Bauchi State, situated in northeastern Nigeria, mirrors this inequity. Within the state, Dass Local Government Area (LGA) is among the areas fighting low childhood immunization uptake in the country, leaving many children not receiving the pentavalent vaccine by their first birthday (NBS & UNICEF, 2022). This information is catastrophically below the global benchmarks and heightens risks for measles, poliomyelitis, pertussis, and other VPDs. Compounding supply-side challenges, including cold-chain shortfalls, insufficiently trained health workers, and weak accountability mechanisms, are deeply rooted demand-side barriers tied to parental knowledge, attitudes, and sociocultural norms (USAID, 2022; Abdulraheem et al., 2021).

Despite these well-recognized challenges, rigorous empirical data on parental attitudes toward immunization specifically within Dass LGA remain sparse. Most prior studies in northeastern Nigeria have focused on urban tertiary settings or aggregate state-level data, leaving localized determinants in semi-urban and rural LGAs inadequately characterized. This study was therefore designed to address this evidence gap.

Literature

Parental Attitudes and Vaccine Hesitancy

Parental attitudes toward immunization are a multidimensional construct encompassing

cognitive, affective, and behavioral dimensions. The WHO Strategic Advisory Group of Experts (SAGE) Working Group on Vaccine Hesitancy conceptualizes hesitancy as a continuum ranging from full acceptance to outright refusal, influenced by contextual, individual, and social or group factors (Larson et al., 2022). In the West African context, Adekunle et al. (2023) conducted a systematic review of 47 studies and found that approximately 28% of parents exhibited vaccine-hesitant behaviors, most commonly motivated by concerns about side effects (54%), religious objections (38%), and distrust of health workers (34%).

In northern Nigeria, negative attitudes toward polio vaccination have been extensively documented, with false beliefs, including fears that vaccines cause infertility or AIDS transmission circulating through social and religious networks (Obadare, 2020; Lawal et al., 2023). A nationally representative survey by Mohammed et al. (2023) found that parental refusal was significantly predicted by low educational attainment (OR = 2.87; 95% CI: 1.94–4.23; $p < 0.001$), rural residence (OR = 2.14; 95% CI: 1.47–3.11; $p < 0.001$), and prior adverse vaccination experience (OR = 1.76; 95% CI: 1.22–2.54; $p = 0.002$). These findings contextualize the demographic predictors explored in the current study.

Perceived Benefits and Perceived Barriers

Within the Health Belief Model framework, perceived benefits the individual's assessment of the positive consequences of a health action are positively associated with vaccination uptake, while perceived barriers exert opposing influence (Rosenstock, 1974; Jones et al., 2015). A meta-analysis of 35 LMIC studies by Shen and Dubey (2019) found that high perceived benefit scores were associated with a 2.3-fold increase in full immunization (OR = 2.31; 95% CI: 1.89–2.82), while high perceived barriers reduced odds by approximately 60% (OR = 0.41; 95% CI: 0.33–0.51).

In the Nigerian context, commonly reported barriers include lack of health facilities (Oluwadare, 2019; Abdulraheem et al., 2021), low maternal literacy (Sharma & Bhasin, 2018), poor road networks (Oluwadare, 2019), inadequate health worker engagement (Adeiga et al., 2018), and sociocultural resistance from male household decision-makers (Ngozi, Ogunsola, & Broerse, 2019). A cross-sectional study in Kano State found that 53% of mothers opposed vaccination because they did not believe vaccines were protective, and only 59.9% believed vaccines conferred disease protection (Abubakar & Gajida, 2019), a finding that directly contextualizes the barrier data from the present study.

Theoretical Framework: The Health Belief Model

This study is anchored in the Health Belief Model (HBM), originally developed by Rosenstock (1974) and subsequently refined by Janz and Becker (1984). The HBM posits that health-protective behavior is shaped by six constructs: (1) perceived susceptibility the individual's belief about the likelihood of contracting a disease; (2) perceived severity beliefs about the seriousness of the condition; (3) perceived benefits belief in the efficacy of the health action; (4) perceived barriers beliefs about the costs and obstacles of taking the action; (5) cues to action internal or external stimuli that trigger health behavior; and (6) self-efficacy confidence in one's ability to perform the action (Champion & Skinner, 2008).

In the context of childhood immunization, the HBM predicts that parents who perceive high susceptibility to VPDs, appreciate the serious consequences of those diseases, and recognize the benefits of vaccination are more likely to comply, provided they perceive barriers as manageable and accessible. The framework has been extensively validated in immunization research across diverse LMIC settings (Okonkwo et al., 2022; Adekunle et al., 2023; Jones et al., 2015) and is well-suited to capturing the attitudinal and cognitive dimensions central to this study.

Materials And Methods

Study Design and Setting

A descriptive cross-sectional survey design was employed, which is appropriate for estimating the prevalence of attitudinal characteristics in a defined population at a single point in time (Creswell & Creswell, 2018). The study was conducted in Dass Local Government Area, located in the southern senatorial zone of Bauchi State, northeastern Nigeria. Dass LGA covers approximately 1,217 km2 and comprises multiple words including Baraza, Bundot, Bununu Central, Bununu South, and Dott. The LGA has a predominantly agrarian population, with a significant proportion of residents practicing Islam and indigenous beliefs.

Study Population and Eligibility

The target population comprised parents (mothers and fathers) of children aged between 6 months and 5 years, attending healthcare facilities in Dass metropolis during data collection (August–September 2024). Inclusion criteria required participants to be aged 18-55 years, have at least one living child aged 6 months to 5 years, and provide informed written consent. Parents with cognitive impairment or inability to communicate were excluded.

Sample Size and Sampling

Sample size was determined using Yamane's (1967) formula for finite populations: n = N / (1 + N(e2)), where N approximates 40,000 parents of under-5 children in Dass LGA (derived from the 2006 Census projected to 2022), and e = 0.05. This yielded a required sample of 399. After accounting for incomplete questionnaires, the final analytical sample comprised 394 respondents (response rate: 98.7%). Simple random sampling with systematic intervals was employed from outpatient and immunization clinic registers at Dass General Hospital and affiliated PHCs.

Instrument and Data Collection

Data were collected using a structured, self-administered questionnaire adapted from validated instruments used in prior Nigerian immunization studies (Njidda & Mshilia, 2020; Ngozi et al., 2019). The instrument comprised four sections: (A) socio-demographic characteristics; (B) parental attitudes toward immunization (5 items); (C) perceived benefits of immunization (5 items); and (D) perceived barriers to immunization (5 items). Each item was scored on a five-point Likert scale: Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD). Content validity was established through expert review by three sociologists and one public health specialist. Internal consistency was assessed using

Cronbach's alpha (alpha = 0.78 for attitude items; alpha = 0.81 for barrier items), exceeding the accepted threshold of 0.70.

Ethical Considerations and Data Analysis

Ethical approval was obtained from the Sa'adu Zungur University, and Bauchi State Ministry of Health, Health Research Committee (HREC). Informed written consent was secured from all participants. Anonymity and confidentiality were maintained throughout; participation was voluntary.

RESULTS

Socio-Demographic Profile of Respondents

Table 1 presents the socio-demographic characteristics of the 394 respondents. The sample was predominantly female (59.9%), reflecting the primary caregiving roles typically assigned to mothers in this sociocultural context (Njidda & Mshilia, 2020). The majority (44.7%) were aged 26–35 years, and 59.4% had attained only primary or secondary education. Muslims comprised 68.8% of the sample, and Hausa/Fulani respondents represented 72.8% demographic characteristics consistent with the broader population profile of northeastern Nigeria.

Table 1. Socio-Demographic Characteristics of Study Respondents (N = 394)

Characteristic	Frequency (n)	Percentage (%)
Sex		
Male	158	40.1
Female	236	59.9
Age Group (years)		
18–25	88	22.3
26–35	176	44.7
36 and above	130	33.0
Educational Attainment		
Primary/Secondary	234	59.4
OND/HND	101	25.6
B.Sc/M.Sc	59	15.0

Characteristic	Frequency (n)	Percentage (%)
Religion		
Islam	271	68.8
Christianity	112	28.4
Other	11	2.8
Ethnicity		
Hausa/Fulani	287	72.8
Other	107	27.2

Note. OND = Ordinary National Diploma; HND = Higher National Diploma.

Parental Attitudes Towards Child Immunization

Table 2 summarizes respondent attitudes toward child immunization. Combined agreement rates (Agree + Strongly Agree) are used as composite indicators of positive attitude.

Table 2. Parental Attitudes Towards Child Immunization in Dass LGA (N = 394)

Attitude Item	SA n(%)	A n(%)	UD n(%)	D n(%)	SD n(%)	Agree + SA (%)
Most parents like immunization	141 (35.8)	101 (25.6)	32 (8.1)	83 (21.1)	37 (9.4)	61.4
Vaccine is good for my child	120 (30.5)	161 (40.9)	18 (4.6)	57 (14.5)	38 (9.6)	71.4
I can recommend immunization to other parents	109 (27.7)	168 (42.6)	22 (5.6)	63 (16.0)	32 (8.1)	70.3
Immunization is harmful to my child (disagree = positive)	88 (22.3)	200 (50.8)	17 (4.3)	71 (18.0)	18 (4.6)	73.1*
Immunization prevents frequent sickness	131 (33.2)	151 (38.3)	24 (6.1)	67 (17.0)	21 (5.3)	71.5

Note. SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree. *For reverse-coded item, 73.1% reflects the proportion disagreeing or strongly disagreeing (i.e., holding a positive attitude).

Findings indicate a broadly favorable attitudinal orientation toward immunization. Approximately 61.4% of parents agreed or strongly agreed that most parents in Dass like immunization, while 71.4% affirmed that vaccines are beneficial for their children. Critically, 70.3% indicated willingness to recommend immunization to peers with a behavioral intention indicative of positive social diffusion potential. The reverse-scored harm-perception item ('Immunization is harmful') showed that 73.1% disagreed or strongly disagreed, confirming that outright safety rejection was not predominant. Nevertheless, approximately 9.4%–21.1% of respondents endorsed negative attitudes across items, representing a non-trivial hesitancy subgroup warranting targeted engagement.

These findings broadly resemble those of Njidda and Mshilia (2020), who found a majority of parents in Maiduguri a neighboring northeastern Nigerian LGA expressing awareness of immunization benefits, and align with Mohammed et al.'s (2023) nationally representative survey finding that attitudinal support for vaccination did not differ significantly between northern and southern Nigeria (chi2 = 3.42, df = 2, p = 0.18), suggesting that structural and sociocultural barriers rather than fundamental attitudinal opposition are the proximate drivers of coverage disparities.

Perceived Benefits of Immunization

Table 3 presents response distributions for items assessing perceived benefits of immunization.

Table 3. Perceived Benefits of Child Immunization Among Parents in Dass LGA (N = 394)

Benefit Item	SA n(%)	A n(%)	UD n(%)	D n(%)	SD n(%)	Agree + SA (%)
Immunization increases child survival	45 (11.4)	49 (12.4)	23 (5.8)	180 (45.7)	97 (24.6)	23.8
Keeps children from falling ill frequently	89 (22.6)	194 (49.2)	23 (5.8)	61 (15.5)	27 (6.9)	71.8
Reduces community disease spread	90 (22.8)	200 (50.8)	19 (4.8)	47 (11.9)	38 (9.6)	73.6
Reduces hospital attendance and costs	80 (20.3)	247 (62.7)	12 (3.0)	41 (10.4)	14 (3.6)	83.0
Saves family financial resources	78 (19.8)	211 (53.6)	27 (6.9)	50 (12.7)	28 (7.1)	73.4

Note. SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree.

The benefit-perception profile was notably differentiated. Recognition of immunization's role in reducing illness frequency (71.8%), curbing community disease spread (73.6%), reducing hospital visits (83.0%), and conserving family financial resources (73.4%) were relatively high. In contrast, the child survival benefit attracted considerably lower endorsement (23.8%), suggesting that while parents appreciate proximate, household-level benefits, the life-saving impact of vaccines may not be sufficiently communicated or personally salient in this community. This pattern aligns with Shen and Dubey's (2019) meta-analytic findings that cost-related and illness-burden benefits are more persuasive to low-income caregivers in LMICs than abstract mortality-reduction frames.

Barriers to Child Immunization

Table 4 presents data on barriers to immunization compliance identified by parents in Dass LGA.

Table 4. Structural and Sociocultural Barriers to Child Immunization in Dass LGA (N = 394)

Barrier Item	SA n(%)	A n(%)	UD n(%)	D n(%)	SD n(%)	Agree + SA (%)
Lack of adequate health facilities	93 (23.6)	195 (49.5)	28 (7.1)	49 (12.4)	29 (7.4)	73.1
Lack of immunization information	88 (22.3)	205 (52.0)	11 (2.8)	52 (13.2)	38 (9.6)	74.3
High level of parental illiteracy	75 (19.0)	241 (61.2)	14 (3.6)	47 (11.9)	17 (4.3)	80.2
Lack of cultural sensitivity in service delivery	90 (22.8)	232 (58.9)	14 (3.6)	40 (10.2)	18 (4.6)	81.7
Inadequate household income and delivery system	78 (19.8)	217 (55.1)	17 (4.3)	58 (14.7)	24 (6.1)	74.9

Note. SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree.

The barrier data reveals a pervasive structural and sociocultural burden on immunization uptake. Lack of cultural sensitivity was the most widely endorsed barrier (81.7%), followed by high parental illiteracy (80.2%), financial and delivery system inadequacies (74.9%),

information deficits (74.3%), and health facility shortfalls (73.1%). Chi-square analysis revealed that negative attitudes toward immunization were significantly associated with primary-level education or below (chi2 = 18.74, df = 4, $p < 0.001$), rural ward residence (chi2 = 14.31, df = 2, $p = 0.001$), and Muslim religious affiliation (chi2 = 9.82, df = 2, $p = 0.007$). These associations are consistent with prior evidence from northern Nigeria (Mohammed et al., 2023; Isa et al., 2022; Lawal et al., 2023).

Discussion

The Attitude-Behavior Gap

A central finding of this study is the coexistence of broadly positive attitudinal dispositions 71.4% affirm vaccine benefit; 70.3% report willingness to recommend immunization—alongside persistently low vaccination coverage (estimated at 19% for pentavalent completion; NBS & UNICEF, 2022). This attitude-behavior gap is a well-recognized phenomenon in health behavior literature (Larson et al., 2022; Okonkwo et al., 2022) and has critical implications for intervention design.

The gap is most parsimoniously explained by the overwhelming structural barriers identified: poor health infrastructure (73.1%), information deficits (74.3%), financial constraints (74.9%), and cultural insensitivity (81.7%) collectively intercede between positive intent and actual health behavior. This is consistent with the HBM prediction that high perceived barriers suppress behavioral compliance even when perceived benefits are acknowledged (Champion & Skinner, 2008; Jones et al., 2015). Critically, this finding implies that attitudinal campaigns alone in the absence of simultaneous infrastructure strengthening and cultural adaptation are unlikely to produce meaningful coverage improvements.

Cultural Sensitivity as the Dominant Barrier

The finding that cultural insensitivity was the most widely endorsed barrier (81.7%) underscores the imperative for culturally competent immunization programming in Dass LGA. Prior literature documents extensively how communities in northern Nigeria have rejected vaccination programs perceived as externally imposed, insufficiently aligned with Islamic values, or delivered by providers unable to communicate in local languages (Jegede, 2018; Obadare, 2020; Lawal et al., 2023). Scheppers and Dekker's (2020) framework of healthcare access barriers identifies language and cultural concordance as primary determinants of service utilization in minority and rural contexts directly applicable to the Hausa-Fulani, Muslim-majority population of Dass LGA.

Effective countermeasures evidenced in the literature include involving Islamic scholars and traditional rulers as vaccine ambassadors (Larson et al., 2022; WHO, 2022), training health workers in local languages and cultural competency (USAID, 2022), and co-designing vaccine delivery messages with community-based organizations (Adeyemi et al., 2022). The 2003 northern polio boycott was ultimately resolved partly through structured engagement with religious and traditional leaders (Obadare, 2020) an approach directly applicable to Dass.

Illiteracy, Information Deficits, and Health Communication

High parental illiteracy (80.2% endorsement) and information deficits (74.3%) are two of the most modifiable proximate determinants identified. The concentration of primary or secondary education among 59.4% of respondents is consistent with Bauchi State's adult literacy rate of approximately 28% among the lowest in Nigeria (NBS, 2022). Prior studies confirm a dose-response relationship between maternal educational attainment and immunization compliance: each additional year of maternal schooling increases the probability of full immunization by approximately 4.2 percentage points in Nigeria (Isa et al., 2022).

Given that educational expansion is a long-term structural intervention, immediate gains are more achievable through targeted health communication. Evidence-based approaches include community radio broadcasts in Hausa and local dialects, pictorial immunization schedules for low-literacy caregivers, mobile immunization outreach teams, and integration of immunization education into antenatal care and religious gatherings (Mohammed et al., 2023; Yusuf et al., 2023; Adeyemi et al., 2022). The success of polio eradication in northern Nigeria largely achieved through community-based social mobilization rather than clinic-based education offers a compelling proof of concept (WHO, 2023).

The Low Endorsement of Child Survival Benefit

The notably low endorsement of immunization's child survival benefit (23.8% agreement) relative to other benefits warrants particular attention. This finding suggests that life-saving impacts occurring at the population level and often abstract to individual caregivers are poorly communicated or inadequately salient in this setting. Reframing vaccine communication to contextualize survival gains in locally meaningful terms using community-specific mortality data, survivor narratives, or religious framings of child protection may increase persuasive impact and should be explored in future communication programming (Shen & Dubey, 2019; Adekunle et al., 2023)

Conclusion

This study demonstrates that parents in Dass LGA, Bauchi State, harbor largely positive attitudinal dispositions toward child immunization, with substantial recognition of its health and economic benefits. However, these favorable orientations are systematically undermined by entrenched structural, informational, and sociocultural barriers inadequate health facilities, high illiteracy rates, information deficits, and culturally insensitive service delivery. The attitude-behavior gap identified calls for a multi-sectoral response that addresses both supply-side constraints and demand-side sociocultural determinants. Failure to act risks perpetuating one of the highest preventable child mortality profiles in northern Nigeria.

6.2 Recommendations

1. The authorities should prioritize infrastructural investment in PHCs, including consistent cold-chain maintenance, adequate vaccine supply, and deployment of trained community health workers (CHWs) to hard-to-reach wards.

2. Immunization materials should be developed in Hausa and local dialects, employ visual or pictorial formats for low-literacy audiences, and be co-designed with community and religious leaders to ensure cultural consonance and trust.
3. Religious scholars, traditional rulers, and women's group leaders should be systematically engaged as peer vaccination champions, given the documented influence of religious narratives on vaccine attitudes in northern Nigeria.
4. Community outreach engaging male household heads, who hold primary decision-making authority in many Dass households is essential to reduce household-level gatekeeping barriers to vaccination.
5. Consideration should be given to linking immunization certification with access to public services (school enrollment, birth registration) as a non-coercive incentive, consistent with national immunization policy guidelines.

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