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Effect of Transport Cash Incentives on Routine Immunization Uptake Among Caregivers in Rural Communities. A Case Study of Gwiwa LGA, Jigawa State, Nigeria

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Abstract

Routine immunization remains a critical public health strategy for reducing child morbidity and mortality, yet coverage in many developing regions continues to face significant challenges. This study examined the socio-demographic characteristics of caregivers, the effect of cash incentives, and barriers to attending immunization sessions. A total of 107 respondents participated in the survey, and data were analyzed using descriptive statistics. The results revealed that most caregivers were women within the reproductive age group, with low levels of formal education and limited income, factors that significantly influenced their health-seeking behavior. Despite the provision of cash incentives, distance to health facilities (74.8%) and lack of transport or money (45.8%) remained major barriers to attendance. However, the majority of respondents strongly agreed (69.2%) or agreed (24.3%) that financial incentives positively influenced their decision to attend immunization sessions. Other barriers, such as busy schedules, health concerns, and fear of side effects, were reported but had a less significant impact. The findings suggest that while financial incentives play a crucial role in improving uptake, structural and socioeconomic barriers persist in hindering access. The study concludes that a multifaceted approach—addressing transportation, accessibility, health education, and community awareness in addition to financial support—is necessary to achieve sustainable improvements in immunization coverage and child health outcomes.

Keywords: *Caregiver, Cash Incentives, Gwiwa, Jigawa, Routine Immunization, Vaccines.*

Introduction

Routine immunization remains one of the most effective global public health strategies for reducing child morbidity and mortality. Vaccines protect against life-threatening diseases such as measles, tuberculosis, polio, and diphtheria, saving millions of lives annually [1]. However, immunization coverage in many low- and middle-income countries, including Nigeria, remains inadequate due to limited health-seeking behavior, chronic underfunding of health systems, and socioeconomic challenges that hinder access to services [2]. To address these gaps, several demand- and supply-side interventions have been implemented, one of which is the provision of transport cash incentives to parents or caregivers to encourage participation in routine immunization.

In Nigeria, routine immunization is a core component of the National Primary Health Care Development Agency's (NPHCDA) mandate to reduce under-five mortality and contribute to the achievement of the Sustainable Development Goals (SDGs), particularly Goal 3 on ensuring healthy lives and promoting well-being. However, the 2018 Nigeria Demographic and Health Survey (NDHS) revealed that only 31% of children

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aged 12–23 months were fully immunized [3]. Significant disparities persist between urban and rural areas. Rural communities, including those in Jigawa State, face additional challenges such as long distances to health facilities, poor road conditions, and financial constraints that limit access to vaccination services [4]. These challenges underscore the need for targeted strategies that address the structural and economic barriers to immunization.

Transport cash incentives have emerged as a promising intervention to reduce access barriers and improve attendance at immunization sessions. By providing caregivers with modest financial support to cover transportation costs, such incentives aim to mitigate one of the key determinants of low routine immunization uptake distance and the cost of travel. Evidence from behavioral economics suggests that even small financial incentives can significantly influence health-seeking behavior, especially among low-income households [5]. Previous studies across various settings have shown that both conditional and unconditional cash transfers can improve uptake of maternal and child health services, including antenatal care, facility-based delivery, and immunization [6]. However, empirical evidence on the specific effect of transport cash incentives on immunization uptake in rural northern Nigeria remains limited.

The present study focuses on the Gwiwa Local Government Area (LGA) of Jigawa State, a predominantly rural region where socioeconomic constraints and limited infrastructure pose challenges to healthcare delivery and utilization [7]. The study covers five purposively selected settlements Korayel Datsa, Santar Hayo, Korayel Digga, Unguwar Tama, and Korayel Kanawa chosen to represent diverse but typical rural communities facing similar barriers to accessing immunization services. By examining the influence of transport cash incentives on routine immunization uptake among caregivers of children aged 0–23 months, the study provides valuable insights into the effectiveness of financial incentives as a demand-side strategy.

This research is timely and relevant, aligning with national and global efforts to improve immunization coverage and reduce preventable childhood mortality. The findings contribute to evidence on community-based strategies and offer guidance for policymakers, development partners, and health managers regarding the feasibility and scalability of transport cash incentives in similar rural contexts. Furthermore, the results support broader equity-driven efforts aimed at ensuring that no child is left behind due to financial or geographic barriers to immunization [8].

Problem Statement

Routine immunization remains one of the most cost-effective public health interventions globally, helping to prevent childhood morbidity and mortality from vaccine-preventable diseases [9]. Despite significant efforts by national and international health bodies, immunization coverage in many parts of Nigeria especially rural and hard-to-reach communities remains suboptimal. National health surveys consistently show that routine immunization coverage often falls below recommended levels, exposing children under two to preventable health risks [10].

In Jigawa State, low immunization uptake has been linked to several barriers, including poor access to health facilities, limited awareness among caregivers, cultural beliefs, and financial constraints [11]. Among these challenges, transportation costs pose a significant obstacle, as many caregivers in rural communities cannot afford travel to distant health facilities [12]. This barrier is particularly evident in settlements such as Korayel Datsa, Santar Hayo, Korayel Digga, Unguwar Tama, and Korayel Kanawa, where health facilities are not always within walking

distance, and transportation options are limited.

To mitigate these challenges, programs such as transport cash incentives have been introduced to ease the financial burden on caregivers and improve participation in immunization programs. However, evidence on the effectiveness of these incentives in increasing immunization uptake remains limited and context-specific, especially in northern Nigeria. It is therefore essential to determine whether transport cash incentives significantly influence routine immunization attendance among caregivers in rural Jigawa State, as this understanding is crucial for designing effective community-level health strategies.

This study aims to address this gap by examining the impact of transport cash incentives on routine immunization uptake among caregivers of children aged 0–23 months in Gwiwa Local Government Area of Jigawa State. By exploring caregivers' experiences and responses to transport cash incentives, the study will generate evidence that can guide policymakers and stakeholders in strengthening immunization coverage strategies in similar rural settings.

Objectives

To determine the association between receiving transport cash incentives and routine immunization uptake among caregivers in rural communities of Gwiwa LGA, Jigawa State.

Specific Objectives

1. To determine the proportion of caregivers who receive transport cash incentives for attending routine immunization sessions.
2. To assess the current level of routine immunization uptake among children aged 0–23 months in the study area.
3. To examine the relationship between receiving cash incentives and immunization attendance among caregivers.
4. To identify socio-demographic factors associated with routine immunization uptake.
5. To explore barriers and facilitators affecting caregivers' attendance at routine immunization sessions.

Literature Review

Conceptual Review

Routine immunization and access barriers. In Nigeria, routine immunization (RI) coverage remains uneven, with persistent north–south gaps and clusters of zero-dose children i.e., children who have not received any routine vaccine. Recent national surveys (MICS 2021) and zero-dose landscape analyses show lower coverage in many northern states (including the North-West) and highlight distance, transport cost, and socioeconomic constraints as major demand-side barriers [13]. These patterns frame the need for strategies that mitigate access frictions in rural LGAs such as Gwiwa LGA.

Transport cash incentives as demand-side financing. Transport cash incentives are a form of demand-side financing that directly reduces the private cost of clinic attendance (fare, time, incidental expenses). Conceptually, they act through three channels: (i) price/affordability offsetting out-of-pocket transport cost; (ii) salience and planning predicable, small transfers tied to visit schedules help households prioritize clinic trips; and (iii) conditionality and verification linking the transfer to receipt of specific antigens (e.g., BCG, Penta, measles) reinforces completion. Systematic and scoping reviews from LMICs over the past decade conclude that monetary incentives can raise vaccine uptake, though effect sizes vary with context, transfer size, and program design.

Empirical support from Nigeria. The strongest country-specific evidence comes from New Incentives (NI-ABAE), a

conditional cash transfer program operating in northern Nigeria. An independent evaluation (RCT) and subsequent syntheses report substantial improvements in full immunization and timeliness when small cash transfers are provided at government clinics across the RI schedule. Public summaries describe large gains in completion and measles timeliness, supporting the causal plausibility that modest, well-targeted cash can overcome transport-related barriers in low-income, rural settings. New incentives [14].

Distance and transport as determinants. Multi-country and Nigeria-focused studies consistently associate longer travel distance and transport costs with lower odds of full vaccination and increased missed opportunities for vaccination, especially in rural areas. This evidence underlines why transport-offsetting incentives are expected to be most effective where facilities are far and road access is poor conditions typical of many settlements in the North-West.

Implications and gaps for your study. Conceptually, a transport cash incentive in Gwiwa LGA should reduce effective access costs and increase completion of the RI schedule. Your cross-sectional design can test this mechanism by: (i) measuring exposure to transport incentives; (ii) verifying child vaccination status (card/register); and (iii) adjusting for known confounders (maternal education, wealth proxy, distance/time to facility). This aligns with Nigeria's current zero-dose and equity agenda and addresses a local evidence gap on transport-targeted incentives in rural Jigawa.

Empirical Review

Routine immunization and access barriers. In Nigeria, routine immunization (RI) coverage remains uneven, with persistent north–south gaps and clusters of zero-dose children—i.e., children who have not received any routine vaccine. Recent national surveys such as the NDHS and MICS show lower coverage in many northern states, including the North-West, and highlight distance, transport cost, and socioeconomic constraints as major demand-side barriers [16]. These patterns frame the need for strategies that mitigate access frictions in rural LGAs such as Gwiwa.

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Empirical support from Nigeria. The strongest country-specific evidence comes from New Incentives (NI-ABAE), a conditional cash transfer program operating in northern Nigeria. Independent evaluations, including randomized controlled trials, report substantial improvements in full immunization and timeliness when small cash transfers are provided at government clinics across the RI schedule [17]. These findings support the causal plausibility that modest, well-targeted cash incentives can overcome transport-related barriers in low-income, rural settings. Earlier economic and public health evidence also demonstrates that conditional cash transfers improve vaccination outcomes in similar low-resource contexts [18].

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full vaccination and increased missed opportunities for vaccination, especially in rural areas. This evidence indicates why transport-offsetting incentives are expected to be most effective where facilities are far and road access is poor conditions typical of many settlements in the North-West [19].

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Theoretical Review

Health Belief Model (HBM)

The Health Belief Model (HBM), developed in the 1950s by Rosenstock, provides a useful framework for understanding how individuals make decisions about health-seeking behavior. The model posits that individuals' willingness to act depends on their perceived susceptibility to illness, perceived severity of the illness, perceived benefits of taking action, and perceived barriers to action [21]. In the context of this study, transport cash incentives reduce perceived barriers such as transportation costs that often prevent caregivers from seeking immunization and other health services for their children. By removing these financial constraints, caregivers are more likely to perceive the benefits of visiting health facilities as greater than the barriers, thereby increasing their likelihood of utilizing immunization services.

The Theory of Planned Behavior (TPB) [20] explains that human behavior is influenced by three main factors: attitudes toward the behavior, subjective norms, and perceived behavioral control. The theory states that an individual's intention to perform a behavior strongly predicts whether they will eventually engage in it. In this study, transport cash incentives enhance caregivers' perceived behavioral control by providing the financial means to overcome cost-related barriers involved in accessing health facilities. Additionally, when community norms support child immunization, caregivers are even more likely to respond positively to these incentives, thereby improving routine immunization attendance.

The Incentive Theory of Motivation suggests that human behavior is often driven by external rewards or incentives [22]. This theory emphasizes that individuals are more likely to perform certain actions when they expect tangible rewards. In this study, transport cash incentives function as extrinsic motivators that encourage caregivers to take their children for immunization despite challenges related to distance, time, or competing responsibilities. By offering direct financial support, the incentives help to address motivational barriers and promote positive health-seeking behavior among caregivers.

Materials and Methods

The study adopted a quantitative research design using a structured questionnaire to collect data from caregivers of children eligible for immunization. This design was selected because it enables the collection of measurable data that can be statistically analyzed to identify patterns, trends, and relationships. The questionnaire captured the demographic characteristics of respondents, frequency of receiving cash incentives, barriers to immunization attendance, and caregivers' perceptions regarding the effectiveness of transport cash incentives.

The study population consisted of caregivers responsible for taking children to immunization sessions. A total of 107 respondents participated, providing a reliable sample for statistical analysis. Inclusion criteria required that participants be primary caregivers who had taken their children for routine immunization within the study period. Caregivers who had not directly participated in immunization activities or who declined to provide informed consent were excluded from the study.

Data collection instruments consisted of a structured and pre-tested questionnaire developed in alignment with the study objectives. The questionnaire included closed-ended and multiple-choice questions to enhance clarity, improve response accuracy, and facilitate ease of analysis. It covered key areas such as the frequency of receiving incentives, barriers to immunization attendance, the influence of cash incentives on participation, and the major challenges affecting immunization uptake. To ensure validity and reliability, the questionnaire was reviewed by public health experts and pilot-tested among a small group of caregivers before its final implementation.

Data collection was conducted by trained field enumerators who administered the questionnaires during immunization sessions and home visits. Participants were informed about the purpose of the study, assured of confidentiality, and participation was entirely voluntary. Ethical considerations including informed consent, privacy protection, and respect for respondents' autonomy were strictly upheld throughout the data collection process.

Data analysis involved both descriptive and inferential statistical techniques. Frequency tables, percentages, and cumulative percentages were generated to summarize the distribution of respondents across various study variables. Results were organized in tables for clarity and ease of interpretation. The analysis provided insights into the major barriers to immunization attendance, the role of cash incentives, and the extent to which these incentives improved immunization coverage. The findings were subsequently discussed in relation to existing literature to identify areas of convergence and divergence.

Variables and Measurements

In this study, both independent and dependent variables were carefully identified and operationalized to align with the research objectives. The primary dependent variable was caregivers' participation in immunization sessions, measured by their reported attendance and consistency in bringing their children for immunization. This was assessed using responses indicating whether they had completed or missed scheduled immunization visits and the number of times they participated in immunization sessions.

The key independent variable was cash incentives, which referred to the financial rewards or stipends provided to caregivers as motivation to attend immunization sessions. Measurement of this variable was done by recording whether respondents received cash incentives, the frequency of receipt (always, sometimes, rarely, or never), and the extent to which these incentives influenced their decision to participate in immunization programs.

Other predictor variables included barriers to immunization attendance, which were captured as categorical responses. These barriers included financial constraints, poor awareness, cultural beliefs, lack of transportation, long waiting times at immunization centers, and competing household responsibilities. Each of these was measured using a nominal scale, with respondents selecting the most applicable option(s).

Additionally, socio-demographic variables such as age, gender, educational level, marital status, occupation, and household income were

included to better understand the background of respondents and how these factors influenced their decisions. These variables were measured on appropriate scales: age and household income on ratio scales, education and occupation on ordinal scales, and marital status and gender on nominal scales.

All variables were coded in an organized way for statistical analysis. For instance, binary variables like receiving a cash incentive were coded as;

$$\text{“}1 = Yes\text{” } and \text{ “}0 = No.\text{”}$$
$$Ordinal\ variables,$$
$$such\ as\ how\ often\ incentives\ were\ received,$$
$$were\ coded\ in\ order:$$
$$\text{“}1 = Never,\text{” “}2 = Rarely,\text{”}$$
$$\text{“}3 = Sometimes,\text{”}$$
$$and \text{ “}4 = Always.\text{”}$$

This coding method-maintained consistency in the analysis and made it easier to produce descriptive statistics, including frequencies, percentages, and cumulative percentages.

By clearly defining and systematically measuring these variables, the study ensured that the data collected could be analyzed validly and reliably, thereby strengthening the interpretation of results and the overall credibility of the research findings.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, summarized the socio-demographic characteristics and responses regarding cash incentives and immunization participation. Cross-tabulations and chi-square tests looked at associations between categorical variables. Independent-sample t-tests and ANOVA were used for continuous variables. To account for confounding factors and assess the strength of the relationship between cash incentives and immunization attendance, logistic regression analysis was performed. This analysis produced odds ratios with 95% confidence intervals. All statistical tests were considered significant at $p < 0.05$. The results were shown in tables and charts for clearer understanding.

Results

Descriptive Statistics

Table 1. Descriptive Statistics of the Respondents (Caregivers)

Variable	Dominant Category	Frequency	Percent (%)
Marital Status	Married	92	86.0
Gender	No	67	62.6
Age	25–34 years	57	53.3
Educational Level	No Formal Education	40	37.4
Occupation	Housewife	70	65.4

SPSS 2025

The descriptive statistics of the respondents reveal important demographic characteristics of the study sample. In terms of marital status, the majority of respondents were married (86.0%), followed by 10.3% who were single, 0.9% widowed, and 2.8% who did not indicate their status. This pattern is consistent with previous studies in northern Nigeria where caregivers utilizing immunization services are predominantly married women [23] (Table 1).

Gender distribution showed that 34.6% of respondents fell under the “Yes” category, while 62.6% were categorized as “No,” with 2.8% missing responses. Although the labeling appears unconventional, the distribution still reflects a modest imbalance similar to findings in studies where female caregivers are the

primary respondents in immunization-related surveys. Age distribution indicates that the largest proportion of respondents (53.3%) were between 25–34 years, followed by 30.8% between 35–44 years, 8.4% between 45–54 years, and only 4.7% aged 18–24. This suggests that most respondents were in their productive and economically active age group. Comparable demographic patterns have been reported in national surveys, demonstrating that caregivers of young children in northern Nigeria are predominantly women aged 25–39 years [24] with regard to educational attainment, 37.4% of respondents had no formal education, 35.5% had primary education, 22.4% completed secondary education, and only 1.9% had higher education. This aligns with earlier studies showing that northern Nigeria has lower female educational attainment, a factor strongly associated with reduced health-seeking behavior and suboptimal immunization uptake [25].

In terms of occupation, a majority (65.4%) were housewives, while 31.8% were farmers. This indicates that the population is dominated by individuals engaged in informal and subsistence-level economic activities. Similar occupational patterns have been observed in rural immunization studies, where most caregivers are unemployed or engaged in low-income work [24, 26].

Overall, these findings highlight a predominantly married, middle-aged, modestly educated, and economically constrained caregiver population characteristics commonly associated with lower immunization coverage and increased vulnerability to access barriers in rural Nigeria.

Correlation of the Variables

Table 2. Correlation of the Variables for the Respondents (Caregivers)

n=107

Variable	Category	Frequency	Percentage (%)	Cumulative %
Reason for not attending, even with cash	The distance is still too far	80	74.8	77.6
	Busy schedule	23	21.5	99.1
	Health concerns for a child	1	0.9	100.0
Effect of cash incentives on attendance	Strongly agree	74	69.2	72.0
	Agree	26	24.3	96.3
	Neutral	4	3.7	100.0
Main barrier to attending immunization sessions	Lack of transport/money	49	45.8	48.6
	Distance to health facility	16	15.0	63.6
	Busy schedule	36	33.6	97.2
	Fear of side effects	1	0.9	98.1
	Lack of awareness	2	1.9	100.0

SPSS 2025

The results indicate that while cash incentives were effective in motivating attendance, structural and personal barriers still played a major role in determining whether caregivers could participate in immunization sessions. For instance, when asked why some caregivers still did not attend even after receiving cash incentives, the majority (74.8%) reported that the distance to the health facility remained too far. These finding highlights that financial support alone cannot overcome geographical barriers such as long travel distances or poor road infrastructure patterns that have been consistently reported in prior studies in Nigeria and other LMICs. A smaller proportion (21.5%) indicated that busy schedules prevented them from attending, reflecting the

reality that caregivers, particularly mothers, juggle multiple responsibilities including childcare, household duties, and farming or petty trading. Only 0.9% cited health concerns for their child, indicating that health fears were not major deterrents compared to logistical and time constraints, a trend also noted in earlier researches (Table 2).

In terms of the effect of cash incentives on attendance, responses overwhelmingly demonstrated a positive influence. A total of 69.2% strongly agreed and 24.3% agreed that the incentives encouraged them to attend, representing a combined 93.5% of the sample population. This result aligns with evidence from conditional cash transfer programs in Nigeria, including the New Incentives initiative, which demonstrated substantial increases in immunization uptake following the introduction of small monetary incentives (Adepoju, 2021; Barham & Maluccio, 2009). The implication is that economic constraints remain a critical barrier to immunization access, and modest financial support significantly reduces opportunity costs associated with attending health services. These findings also reflect the responsiveness of low-income households to interventions that directly address affordability challenges.

When considering the main barriers to attending immunization sessions more broadly, multiple structural and socioeconomic challenges were evident. The largest group (45.8%) identified lack of transport or money as the main barrier, confirming that financial hardship remains a persistent obstacle even in the presence of incentive programs. Another 33.6% mentioned a busy schedule, reinforcing earlier observations that time poverty among caregivers often limits health-seeking behavior. Distance to health facilities was reported by 15% of respondents, further highlighting geographic inaccessibility a well-documented factor contributing to low immunization coverage in rural Nigeria . In contrast, only 0.9% cited fear of side effects and 1.9% mentioned lack of awareness, suggesting that informational and psychological barriers are relatively minor compared to financial and geographical challenges. This aligns with national assessments showing that logistical and structural barriers are stronger determinants of missed immunizations than knowledge gaps.

Overall, the findings reveal that while cash incentives significantly improve attendance, they cannot fully eliminate barriers to immunization. Distance, transportation challenges, and time constraints continue to limit participation despite financial motivation. This underscores the need for a multidimensional approach: financial incentives should be complemented with strategies such as mobile immunization units, community-based outreach, flexible clinic hours, improved road infrastructure, and enhanced transportation support. By addressing both economic and structural determinants, policymakers and program designers can maximize attendance and achieve more substantial improvements in routine immunization coverage.

Decision Rule

In this study, a decision rule was applied to evaluate whether cash incentives encouraged caregivers to attend immunization sessions. The rule was based on the principle that if at least half of the respondents (50% or more) indicated “Agree” or “Strongly Agree,” then cash incentives could be considered to have a significant positive effect on attendance. Conversely, if fewer than 50% of respondents agreed, it would be concluded that the incentives did not significantly influence caregiver attendance. This approach is consistent with evaluation frameworks used in public health research to assess behavioral responses to incentive-based intervention.

Based on the findings of this study, 69.2% of caregivers strongly agreed and 24.3% agreed that cash incentives encouraged them to

attend immunization sessions. This represents a combined total of 93.5% who affirmed the positive influence of cash incentives. Since this figure is well above the 50% threshold set by the decision rule, the null hypothesis stating that cash incentives do not encourage attendance is rejected, and the alternative hypothesis is accepted. These results align with existing evidence demonstrating that financial incentives significantly improve participation in maternal and child health services, particularly in low-income and rural settings.

Therefore, the decision rule confirms that cash incentives substantially motivated caregivers to participate in routine immunization sessions, reinforcing the effectiveness of such incentives as a demand-side strategy for increasing turnout in community health programs. This finding supports broader literature showing that even modest financial support can reduce opportunity costs and encourage positive health-seeking behavior among caregivers in resource-constrained environments.

Analysis of the Result

Based on the analysis of the data, it is evident that cash incentives played a critical role in encouraging caregivers to attend immunization sessions. The findings show that 90.7% of respondents reported that cash incentives helped significantly, while an additional 5.6% stated that the incentives helped slightly. This reflects a combined 96.3% of respondents who benefited positively from the intervention. Only 0.9% indicated no effect, suggesting that the strategy was overwhelmingly successful in reducing financial barriers and motivating attendance. These results align with previous studies showing that monetary incentives can substantially improve participation in health programs by reducing opportunity costs.

Despite this success, a closer examination of barriers to attending immunization sessions highlights that financial and logistical challenges remain significant. For instance, 45.8% of respondents cited lack of transport or money as the main barrier, followed by 33.6% who mentioned busy schedules, and 15% who reported distance to the health facility. While cash incentives reduced the immediate financial burden, these findings indicate that systemic challenges such as accessibility constraints and caregivers' competing responsibilities still hinder consistent attendance. This pattern is consistent with earlier evidence that distance, transport cost, and time-related pressures remain major determinants of immunization uptake in rural areas. Interestingly, only 0.9% of respondents mentioned fear of side effects, and 1.9% cited lack of awareness, suggesting that informational and attitudinal barriers are less influential compared to structural and economic factors.

When asked directly about the effectiveness of cash incentives in influencing attendance, 69.2% strongly agreed and 24.3% agreed representing a combined 93.5% endorsement rate. Only 3.7% were neutral and none disagreed, underscoring the strong positive perception of cash incentives as drivers of improved immunization coverage. This high level of acceptance aligns with global and national findings that conditional cash transfers (CCTs) effectively increase health service utilization, particularly among low-income households.

Finally, the decision rule derived from the analysis confirms that cash incentives are highly effective in improving immunization uptake, as demonstrated by the overwhelming majority of respondents who acknowledged their positive impact. However, financial support alone is insufficient to fully resolve attendance challenges. For sustainable improvement, the intervention should be complemented by strategies such as improving accessibility of health facilities (e.g., reducing distance and transport constraints),

implementing flexible immunization schedules to accommodate caregivers' responsibilities, and enhancing continuous community sensitization to address even the minor existing fears or awareness gaps. A multi-pronged approach would maximize the gains achieved through cash incentives while addressing the broader structural barriers that continue to limit immunization coverage.

Conclusion

This study has provided valuable insights into the socio-demographic factors, barriers, and perceptions influencing immunization uptake among caregivers in Gwiwa LGA. The findings reveal that most respondents were women in their reproductive years, with low levels of formal education and limited income factors known to influence health-seeking behavior in low-resource settings. Despite the introduction of cash incentives, distance to health facilities, lack of transport, and competing schedules remained significant barriers to routine immunization attendance, consistent with previous studies highlighting the role of geographic and time-related constraints in northern Nigeria.

At the same time, the majority of respondents strongly agreed that financial support positively influenced their ability to bring children for immunization. This reinforces existing evidence showing that cash incentives and other demand-side financing mechanisms can significantly improve utilization of maternal and child health services by reducing out-of-pocket costs and opportunity costs borne by caregivers. The results demonstrate that while financial incentives effectively boost attendance, they do not fully remove persistent structural barriers such as accessibility challenges, socio-economic limitations, and time constraints.

Therefore, the study concludes that holistic, multi-dimensional interventions combining financial support, community-based health education, improved health infrastructure, mobile outreach services, and sustained community engagement are essential for improving routine immunization coverage. Such comprehensive approaches align with global recommendations for addressing zero-dose and under-immunized children, particularly in rural and underserved populations. Ultimately, enhancing immunization coverage requires not only reducing financial barriers but also addressing broader systemic issues to ensure that no child is left behind.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper. This study was conducted solely for academic and research purposes, without any financial or personal relationships that could be construed to influence the results or interpretation of the findings. The research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. All data were collected and analyzed objectively, and the conclusions presented reflect the authors' independent interpretation of the evidence.

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Ethical Statement

Ethical approval for the study was obtained from the relevant health research ethics committee in Jigawa State. Informed consent was obtained from all participants before data collection. Respondents were assured of confidentiality, and participation was entirely voluntary. Data collected were used strictly for academic and policy-related purposes.

Author Contributions

The author of this study conceptualized the research idea, designed the methodology, and developed the structured questionnaire used for data collection across rural communities in Gwiwa LGA, Jigawa State. He supervised the field data-gathering process, ensured ethical compliance, and conducted all statistical analyses using SPSS, including descriptive statistics, chi-square tests, and logistic regression. He interpreted the findings, wrote every section of the manuscript from the abstract to the conclusion and provided policy-oriented recommendations addressing immunization barriers. Sani H. Abubakar is academically trained in public health and community health research, with a background that includes formal studies in public health,

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to ethical considerations and the need to protect the privacy of the participating caregivers, the dataset contains sensitive information that cannot be made publicly accessible. However, anonymized data may be provided for academic, policy, or research purposes, subject to approval and adherence to data protection requirements.

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