

Community Engagement and Defaulter-Tracking Practices for Routine Childhood Immunization in Benin City, Nigeria: A Mixed-Methods Assessment

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Abstract

Background: Community participation and systematic follow-up of children who miss vaccination appointments are central to sustaining routine immunization. This study assessed community-engagement and defaulter-tracking practices in facilities in Benin City, Nigeria, and explored stakeholder perspectives on how these practices supported uptake.

Methods: A cross-sectional mixed-methods study was conducted from April 2023 to October 2024. A proportionately allocated sample of 112 routine-immunization facilities was selected across Oredo, Egor and Ikpoba-Okha Local Government Areas. Practices were assessed with a supportive-supervision checklist. Fifteen purposively selected programme managers, facility focal persons and community stakeholders participated in key-informant interviews. Descriptive statistics and thematic analysis were used. Coverage estimates from the parent survey of 620 children aged 12-23 months described the programme context.

Results: Most facilities registered children by settlement, conducted defaulter tracking, involved communities in organizing sessions and reported functional village development committees. Reconciliation meetings were less consistent. Tracking depended mainly on tickler boxes and routine-immunization registers, while few facilities reported mobilizer-assisted tracking. Stakeholders described town announcers, religious institutions, youth leaders and community meetings as channels for mobilization, trust building and outreach. Completion declined when the second measles-containing

vaccine dose was considered.

Conclusion: Community linkage and defaulter tracking were substantial, but tracking remained largely facility based. Programmes should connect register-based identification with named community actors, documented referral and feedback pathways, regular reconciliation meetings and monitoring of successful return to vaccination.

Keywords: Community Engagement, Defaulter Tracking, Routine Immunization, Vaccination Uptake, Primary Healthcare, Nigeria

INTRODUCTION

Routine childhood immunization requires repeated contact between families, health facilities and the communities in which children live. A child who begins vaccination may remain incompletely protected when later appointments are forgotten, services are missed, or the programme lacks a dependable mechanism for identifying and returning the child to care. Consequently, vaccination completion depends not only on caregiver willingness and vaccine availability but also on the continuity of relationships between households, community structures and health services.[1,2]

Community engagement includes the participation of local leaders, community-based organizations, mobilizers and residents in identifying underserved children, planning services, communicating accurate information and supporting accountability. The Immunization Agenda 2030 places people and communities at the centre of immunization programmes and emphasizes locally tailored strategies that enable communities to value, support and seek vaccination.[1,3] A mixed-methods systematic review found that community-engagement interventions produced a small but significant improvement in childhood immunization outcomes in low- and middle-income countries, with stronger effects when programmes created genuine community ownership or community-based structures.[4]

Defaulter tracking is the operational bridge between identifying a missed vaccination and restoring continuity. Registers, tickler boxes, appointment reminders, telephone calls, home visits and community mobilizers can be used to locate children who fail to return. Evidence from low- and middle-income countries indicates that reminder and recall interventions improve vaccination coverage and timeliness, although their effectiveness depends on accurate records, reachable caregivers, staff capacity and a clear follow-up workflow.[5-7] In Nigeria, incomplete vaccination has also been linked to weak service continuity, access constraints, misinformation and missed opportunities, suggesting that tracking should be integrated with responsive services and trusted community communication.[8-11]

Benin City contains established urban neighbourhoods, expanding peripheral settlements, urban slums and semi-urban communities. These settings may require different forms of mobilization and follow-up. However, local evidence on whether facilities maintain community linkages, how defaulters are identified and how community actors contribute to follow-up remains limited. This study therefore assessed community-engagement and defaulter-tracking practices in routine-immunization facilities in Benin City and explored stakeholder perspectives on how these mechanisms could support vaccination uptake.

From a programme perspective, community engagement and defaulter tracking form a linked pathway. Facility records first identify a child whose expected dose is overdue; health workers or designated community actors then contact the household, clarify the reason for the missed visit, and connect the caregiver to a fixed or outreach session. The pathway is completed only when vaccination is documented

and the defaulter record is closed. Breakdowns can occur at each stage, including incomplete settlement information, irregular review of registers, weak communication between facilities and community representatives, or failure to document the outcome of follow-up. Assessing both the tools available within facilities and stakeholder accounts of how follow-up occurs can therefore reveal implementation gaps that would be obscured by vaccination coverage estimates alone.

METHODS

Study Design And Setting

This was a cross-sectional mixed-methods study conducted in Benin City, Edo State, Nigeria, from April 2023 to October 2024. Benin City comprises Oredo, Egor and Ikpoba-Okha Local Government Areas (LGAs). At the time of the parent study, 165 public and private health facilities implemented routine immunization across the three LGAs.

Study Population And Sampling

The quantitative component involved routine-immunization implementing health facilities and their focal persons. A minimum sample of 112 facilities was calculated from the finite population of 165 facilities. All three LGAs and their wards were included. Facilities were allocated proportionately: 44 in Oredo, 22 in Egor and 46 in Ikpoba-Okha. Within each LGA, eligible facilities were selected from the sampling frame by simple random sampling.

The qualitative component involved 15 purposively selected key informants: four officials from the Edo State Primary Health Care Development Agency, three LGA immunization officers, three routine-immunization focal persons and five community stakeholders comprising two traditional leaders, a religious leader, a market-women leader and a youth leader.

Data Collection

Trained data collectors used a routine-immunization supportive-supervision checklist adapted from the World Health Organization field tool. The community-linkage section assessed registration of children by settlement, recent reconciliation meetings with community leaders, defaulter tracking, tracking mechanisms, availability of a functional village development committee (VDC), community participation in organizing sessions and the presence of a working volunteer community mobilizer (VCM). Items that required verification were checked through records or direct observation where applicable.

For this analysis, community engagement was operationalized through evidence that facilities registered children by settlement, held reconciliation meetings with community or settlement leaders, maintained a functional VDC, involved the community in organizing routine-immunization sessions, and had a working VCM. Default tracking was defined as a reported routine process for identifying children who had missed scheduled vaccination, with the mechanism recorded as use of a tickler box or bag, the routine-immunization register, a combination of these tools, mobilizer involvement, or another mechanism. The checklist captured the presence of these practices but did not measure the number of defaulters successfully contacted or returned to vaccination.

Completed facility checklists were reviewed for completeness and internal consistency before entry. Frequencies were checked against the valid denominator for each item. For tracking mechanisms, the denominator was restricted to facilities that reported conducting defaulter tracking. The interview guide was administered consistently across participant categories while allowing probes on locally relevant practices. During qualitative analysis, codes relating to mobilization, trusted communication, community ownership, reconciliation, missed-child identification and follow-up were compared across programme,

facility and community informants. Convergence and divergence between the checklist findings and stakeholder accounts were considered during interpretation.

Key-informant interviews were conducted in participants' offices at convenient times and lasted approximately 30-45 minutes. A structured guide explored community involvement, mobilization, vaccination beliefs, service delivery and the tracking of children who missed vaccination. Responses were documented, transcribed and anonymized.

Vaccination-Uptake Context

The parent study also conducted a community survey of 620 mother-child pairs selected through a modified World Health Organization two-stage cluster design. Vaccination status was determined from home-based records and maternal recall when records were unavailable. For this manuscript, overall completion and dropout estimates were used only to describe the programme context; individual children were not linked to specific assessed facilities. No facility-level association or causal effect of community engagement on child vaccination status was estimated.

Data Analysis

Facility data were analysed using IBM SPSS Statistics version 25 and summarized with frequencies and percentages. Qualitative data were imported into QDA Miner Lite version 2.0.9, coded and grouped into themes. Integration occurred by using stakeholder accounts to explain how the observed facility practices operated in the local programme. Because the analysis was descriptive, no statistical significance threshold was applied.

Use Of Artificial Intelligence

Generative artificial intelligence was used only to support language editing, readability, manuscript structure and formatting. It was not used to generate data, conduct the statistical or thematic analyses, or determine the study findings. The authors reviewed and verified the manuscript, references, interpretations and conclusions and accepted responsibility for the final content.

Ethical Considerations

Ethical approval was obtained from the University of Benin Teaching Hospital Health Research Ethics Committee (protocol number ADM/E 22/A/VOL.VII/14831706). Permission was obtained from the Edo State Primary Health Care Development Agency. All participants provided informed consent and were assured of voluntary participation, anonymity and confidentiality. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Facility And Community Context

All 112 selected facilities participated. Facilities were distributed across the three metropolitan LGAs and were predominantly publicly owned. More than half served semi-urban or village settlements, while smaller proportions served urban middle-class, urban-slum and rural-isolated settlements. A working volunteer community mobilizer was reported in three-quarters of the settlements (Table 1).

Table 1. Characteristics of assessed routine-immunization facilities and their settlements (n = 112)

Characteristic	n	%
LGA: Ikpoba-Okha	46	41.1
LGA: Oredo	44	39.3
LGA: Egor	22	19.6
Public ownership	97	86.6
Private ownership	15	13.4
Semi-urban/village settlement	60	53.6
Urban upper-/middle-class settlement	30	26.8
Urban-slum settlement	18	16.1
Rural-isolated settlement	4	3.6
Working volunteer community mobilizer	84	75.0

Community-Linkage And Defaulter-Tracking Practices

Registration of children by settlement and defaulter tracking were widely reported. Community participation in organizing routine-immunization sessions and functional VDCs were also common. However, recent reconciliation meetings between health workers and community or settlement leaders were not universal (Table 2).

Among facilities conducting default tracking, the dominant mechanisms were a combined tickler box or bag and routine-immunization register, followed by either tool used alone. Only a small minority explicitly reported combining facility records with volunteer community mobilizers. This pattern indicated that identification of missed children was more institutionalized than community-assisted follow-up.

Table 2. Community-linkage and defaulter-tracking practices in assessed facilities (n = 112)

Practice	n	%
Children registered by settlement	103	92.0
Reconciliation meeting with community/settlement leaders in previous month	85	75.9
Facility conducted defaulter tracking	106	94.6
Functional village development committee available	87	77.7
Evidence of community involvement in organizing RI sessions	95	84.8
Tracking: tickler box/bag plus RI register (n = 106)	54	50.9
Tracking: tickler box/bag only (n = 106)	24	22.6
Tracking: RI register only (n = 106)	23	21.7
Tracking: tickler box/bag, RI register and VCM (n = 106)	2	1.9
Other tracking mechanism (n = 106)	3	2.8

RI, routine immunization; VCM, volunteer community mobilizer. Percentages for tracking mechanisms use facilities conducting tracking as denominators and may not sum exactly because of rounding.

Stakeholder Explanations Of Community Engagement

Three interrelated themes explained how community structures supported routine immunization.

- Mobilization through trusted local channels. Traditional leaders described using town announcers and community meetings to notify caregivers about vaccination sessions. Religious leaders reported reinforcing vaccination messages during services and inviting health professionals to provide health education. These channels were perceived as credible because the messages came through familiar institutions.
- Community participation supported access and ownership. Youth and community representatives described helping health workers mobilize caregivers, preparing vaccination sites and participating in environmental sanitation around health facilities. Stakeholders believed that this practical support made services more visible and accessible while strengthening local responsibility for programme success.
- Reconciliation and follow-up required closer coordination. Programme stakeholders viewed dialogue between facilities, settlement heads and community mobilizers as necessary for identifying missed children and resolving local barriers. Nevertheless, the facility findings showed that recent reconciliation meetings and the explicit involvement of mobilizers in defaulter tracking were less consistent than register-based tracking.

Vaccination-Uptake Context

In the parent community survey, most children had received at least one vaccine, and approximately three-quarters had completed the vaccines scheduled within the first year of life. Completion was lower when the second measles-containing vaccine dose at 15 months was included. The reported dropout between the first and second measles-containing vaccine doses was substantially higher than dropout across the earlier infant series (Table 3). These contextual findings were not linked analytically to individual facilities.

Table 3. Vaccination-uptake indicators from the parent community survey (n = 620)

Indicator	n	%
Received at least one vaccine	594	95.8
Fully vaccinated by 12 months	476	76.8
Fully vaccinated by 15 months	383	61.8
Received first measles-containing vaccine dose	549	88.5
Received second measles-containing vaccine dose	423	68.2
Reported MCV1-MCV2 dropout rate	—	23.2

The caregiver survey and facility assessment were parallel components; these figures are contextual and were not linked to individual facilities.

DISCUSSION

Community Engagement Was Established But Not Uniform

The study found that community participation in routine-immunization delivery was well established across many facilities, although important gaps remained in reconciliation meetings and the availability of

functional community structures. This pattern may reflect long-standing use of VDCs, volunteer mobilizers, traditional leadership and faith institutions in primary healthcare, combined with variation in how actively these structures function across settlements. The public-health importance is that community structures can extend the reach of health facilities, legitimize vaccination messages, identify local access problems and create shared responsibility for reaching missed children. Evidence from a mixed-methods systematic review similarly showed that community-engagement interventions improve routine childhood immunization outcomes, particularly when programmes generate community buy-in or establish community-based structures.[4] Nigerian participatory research has also demonstrated that locally led problem identification and service redesign can improve immunization utilization in communities with pockets of unimmunized children.[12] Facilities should therefore maintain an updated map of community actors, define their routine-immunization roles and hold documented monthly reconciliation meetings with settlement representatives.

Defaulter Identification Was Stronger Than Community-Assisted Follow-Up

Defaulter tracking was widely reported, but it relied predominantly on facility tools rather than explicit linkage to community mobilizers. A plausible explanation is that registers and tickler boxes are embedded in routine facility documentation, whereas home follow-up requires staff time, transport, telephone credit, accurate addresses and active community personnel. This distinction is important because identifying a missed child does not improve protection unless the information triggers contact, referral and successful vaccination. Recent Nigerian catch-up activities similarly emphasize combining records, local community data, mass call-backs, outreach and strengthened defaulter tracking to reach zero-dose and under-immunized children.[3] Reminder evidence also shows that telephone or SMS systems can improve vaccination completion, but such systems depend on valid caregiver contact information and must be connected to available services.[5-7] Each facility should maintain a defaulter line list with an assigned follow-up person, date of contact, referral outcome and closure status, while unresolved cases should be transferred to a VCM, VDC member or settlement focal person.

Trusted Leaders Supported Vaccination Confidence And Mobilization

Traditional, religious and youth leaders were described as active channels for health education and mobilization. Their influence may arise from repeated contact with families, cultural legitimacy and the ability to adapt messages to local language and concerns. The public-health value extends beyond increasing attendance: trusted leaders can counter misinformation early, normalize catch-up vaccination and help programmes reach households that rarely interact with formal services. Nigerian qualitative studies have similarly identified community leaders, caregivers and health workers as essential partners in addressing misinformation, service barriers and vaccine confidence.[8,10,13] However, engagement should not be limited to one-way announcements. Health authorities should equip leaders with accurate messages, provide a route for escalating community concerns and include them in reviewing local missed-child data.

Later-Dose Continuity Remained A Vulnerability

Vaccination completion declined when the later measles dose was considered, despite extensive community and facility engagement. This may occur because caregiver contact becomes less frequent after infancy, the later appointment is more easily forgotten and existing mobilization may focus more on campaign periods or early infant doses. The public-health implication is that a programme can report strong community participation yet still lose children at later scheduled milestones when reminder and recall systems are weak. Similar Nigerian evidence has shown that practical constraints, unsuccessful service encounters and limited schedule awareness contribute to incomplete vaccination.[9-11] Trials and

reviews indicate that reminder messages can improve completeness and timeliness.[5-7] Routine programmes should therefore include the later measles dose in community microplans, appointment reminders, defaulter line lists and monthly reconciliation indicators rather than treating early-series completion as the endpoint.

Implications For Programme Implementation

Taken together, the findings suggest that strengthening routine immunization does not require creating an entirely new community system. The more immediate need is to make existing structures function as a coordinated missed-child pathway. Settlement-based registration, tickler tools, routine-immunization registers, VDCs and volunteer mobilizers were already present in many settings, but the interfaces between them were less visible. A practical model would begin with weekly review of due and overdue doses, followed by assignment of each unresolved child to a named health worker or community focal person. The outcome of telephone contact, home follow-up, referral, vaccination or inability to locate the household should then be returned to the facility register. Monthly reconciliation meetings could examine unresolved cases by settlement and identify recurring service barriers that require outreach, changes in session timing or targeted communication.

Monitoring should move beyond counting facilities that report defaulter tracking. Useful indicators include the proportion of overdue children with complete contact and settlement information, the proportion assigned for follow-up within a defined period, the proportion successfully contacted, the proportion returning for the missed dose, and the median time from identification to vaccination. These measures would distinguish record keeping from effective recall and would permit programme managers to compare performance across settlement types without attributing differences solely to caregiver behaviour. Digital reminders may complement this process where telephone access is reliable, but low-technology options, including paper line lists, town announcers and mobilizer home visits, remain necessary to avoid widening inequities among households with unstable phone access.

Implementation should also be adapted to the characteristics of each settlement. In densely populated urban and slum communities, high mobility, rented accommodation and changing telephone numbers may rapidly make household information obsolete; frequent updating of contact details and flexible session points may therefore be needed. In semi-urban and village settings, community leaders and established social networks may make household tracing easier, but distance, transport costs and irregular outreach can still delay return. The small number of rural-isolated facilities in this assessment also caution against assuming that the dominant metropolitan model will meet the needs of less accessible populations. Microplans should specify who can reach each settlement, how often outreach will occur and how missed children will be transferred between facilities when families relocate.

The findings further indicate that engagement quality matters as much as the presence of a committee or mobilizer. A VDC may be recorded as functional while having limited access to current missed-child information, and community participation in session organization may not include responsibility for follow-up. Programme reviews should therefore assess whether community representatives receive timely, confidentiality-conscious line lists; understand the vaccination schedule; can refer caregivers to an operating session; and receive feedback on whether referred children were vaccinated. Supportive supervision can test this pathway by selecting a small sample of recent defaulters and tracing each case from identification through attempted contact to documented outcome. This would convert community engagement from a general programme attribute into a measurable component of service continuity. Routine feedback to participating communities may also sustain trust by showing that locally reported barriers lead to visible programme action.

Strengths And Limitations

This study combined a proportionately selected sample of routine-immunization facilities with perspectives from programme managers, facility providers and community leaders across all three metropolitan LGAs. The mixed-methods approach clarified the difference between having a tracking tool and operating a community-linked follow-up system. Nevertheless, facility practices were partly self-reported and may have been affected by social-desirability bias. The cross-sectional design captured practices at one period and cannot establish sustainability or causality. The caregiver survey and facility assessment were parallel components and were not linked at child-facility level; therefore, the study does not estimate the effect of a specific facility's engagement practices on individual vaccination completion. Hard-to-reach and physically inaccessible settlements were underrepresented. Future research should prospectively follow defaulters from identification to return, measure timeliness and completion, and compare outcomes across different tracking models.

CONCLUSION

Routine-immunization facilities in Benin City demonstrated substantial community linkage, settlement-based registration and defaulter tracking. However, tracking was driven mainly by facility records, while regular reconciliation and explicit community-assisted follow-up were less consistent. Strengthening the pathway from identification to successful return requires named community focal persons, documented referral and feedback processes, regular reconciliation meetings and outcome-based monitoring. Later vaccine doses, particularly the second measles-containing vaccine dose, should receive specific attention in reminder, mobilization and defaulter-tracking activities.

DECLARATIONS

Ethics approval and consent to participate: Approval was obtained from the University of Benin Teaching Hospital Health Research Ethics Committee (ADM/E 22/A/VOL.VII/14831706). Permission was obtained from the Edo State Primary Health Care Development Agency. All participants provided informed consent.

Consent for publication: Not applicable.

Availability of data and materials: Data are available from the corresponding author on reasonable request, subject to ethical and institutional requirements.

Competing interests: The authors declare no competing interests.

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Authors' contributions: EDO conceived the study, collected and analysed the data, interpreted the findings and drafted the manuscript. ANO supervised the study, contributed to the methodology and interpretation, and critically revised the manuscript. OOT contributed to interpretation of the findings, literature synthesis and critical revision of the manuscript. All authors approved the final manuscript.

Artificial intelligence disclosure: Generative artificial intelligence was used only to support language editing, readability, structure and manuscript formatting. The authors reviewed and verified all content, references, analyses and conclusions and took responsibility for the final manuscript. No AI-generated data, tables or figures were used.

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