

Behavioural determinants of zero-dose and under-immunisation in conflict-affected Northwest and Southwest Cameroon: Findings from a doer/non-doer assessment

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Abstract

Background: Conflict in the Northwest and Southwest regions of Cameroon has disrupted routine immunisation, leaving many children without vaccines. To design better interventions, it was important to understand what had shifted in caregivers' perceptions of vaccines and what influences their decisions to immunise their children.

Purpose: This study was designed to explore behavioural, socio-cultural, and structural determinants of immunisation uptake among doers and non-doers in conflict-affected Northwest and Southwest Cameroon, and to generate evidence to inform the design of specific interventions and service delivery adaptations.

Material and methods: A qualitative Doer/Non-Doer analysis was conducted in four health districts (Konye, Kumba South, Bamenda, Nwa) from March to June 2025. The study included 140 semi-structured interviews with caregivers, healthcare workers, and community leaders, plus six focus group discussions. Thematic analysis was guided by the Social-Ecological Model, COM-B, and Health Belief Model frameworks.

Results: Nine behavioural determinants distinguished doers from non-doers. All doers were confident in immunising their children, versus 67% of non-doers. Doers (70%) perceived their children as vulnerable to vaccine-preventable diseases, compared to 33% of non-doers. Non-doers (71%) incorrectly believed immunisation ended at 9 months. Barriers included vaccine stockouts, poor cold chain, clinic hours conflicting with farm work, security constraints, and misinformation from non-state armed groups.

Conclusions: Increasing immunisation coverage in conflict-affected Cameroon requires addressing individual perceptions, family dynamics, community norms, and health system challenges through family engagement, trust-building, and service adaptations.

Keywords

- zero-dose children
- immunisation barriers
- conflict-affected populations
- social and behaviour change
- Cameroon

Contribution

- A – Preparation of the research project
- B – Assembly of data
- C – Conducting of statistical analysis
- D – Interpretation of results
- E – Manuscript preparation
- F – Literature review
- G – Revising the manuscript

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Conflict of interest

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Introduction

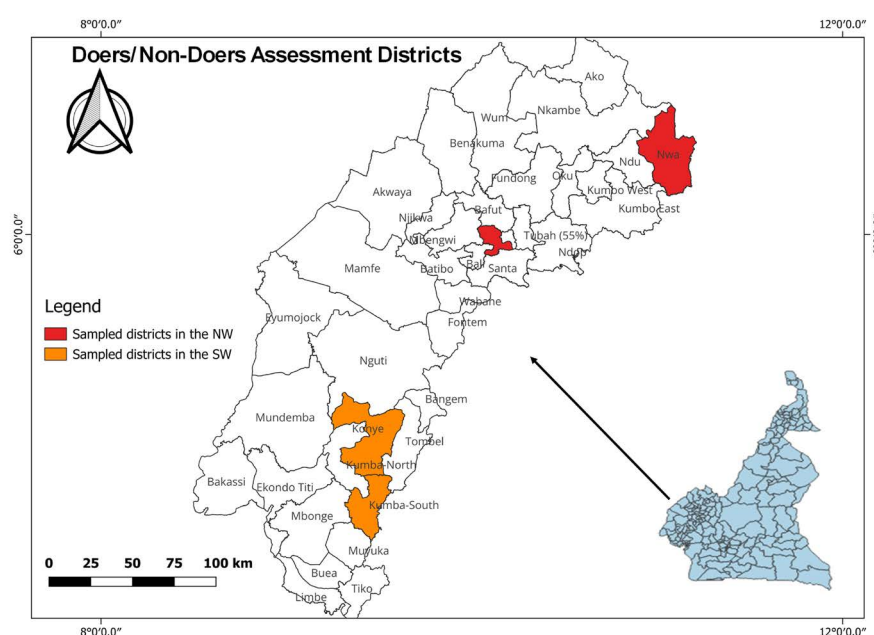
Immunisation is among the most cost-effective public health interventions, preventing an estimated 4–5 million deaths per year from vaccine-preventable diseases.¹ While significant progress has been made over the past 20 years, an estimated 14.3 million children worldwide were completely unvaccinated,¹ and another 6.5 million children did not receive all doses of their primary vaccination series. The existence of zero-dose children in a community is an indication of a failed health system and gross inequities in access to essential services.¹ These children comprise over 70% of all under-immunised children globally and are an essential population targeted for Immunisation Agenda 2030.

The geographic patterns of zero-dose children reflect a clear marginalization, 87% live in low- and middle-income countries (LMICs), and are disproportionately concentrated in conflict settings.² These findings are further supported by evidence that about 20% of zero-dose children live in 99 LMICs in fragile and conflict-affected settings, where access to

the immunisation activities is challenged by armed violence and long-standing insecurity.³ Amongst countries with chronic conflict, such as South Sudan, Somalia and Central African Republic, there are persistently low coverage levels that are not driven by the pandemic.⁴ Medium and high levels of conflict at subnational levels are associated with a high burden of unvaccinated children, indicating how violence impacts the ability of health systems to function, erodes community trust and affects access that goes beyond infrastructural damage⁵ (Figure 1).

The Cameroon Anglophone crisis and immunisation collapse

Cameroon's national Expanded Programme on Immunization (EPI) recommends a comprehensive vaccination schedule for children from birth through 15 months of age. The schedule includes BCG (Bacillus Calmette-Guérin) at birth, three doses of pentavalent



SW and NW denote South West and North WEST respectively.

Figure 1. Assessment district

vaccine (DPT-HepB-Hib) at 6, 10, and 14 weeks, three doses of oral polio vaccine (OPV) at 6, 10, and 14 weeks, two doses of measles-rubella (MR) vaccine at 9 and 15 months, and yellow fever vaccine at 9 months, among others. While vaccination is not legally mandated, it is a standard component of routine child health services provided free of charge at public health facilities.

Cameroon's Northwest (NW) and Southwest (SW) are a case in point of this humanitarian immunisation crisis. Since the onset of armed conflict in late 2016, triggered by peaceful protests over marginalisation of Anglophone populations, these regions have faced catastrophic health system breakdown.⁶ The crisis, which has a colonial background, culminating in the partition of the territory between France and Britain after World War 1, dividing it into different linguistic, legal, and administrative systems.⁷ Post-independence political centralisation and growing grievances over the imposition of the French legal system and economic marginalisation erupted in a violent conflict when the government regime violently suppressed teacher and lawyer strikes in October 2016, announcing the start of the crisis.⁸⁻⁹

Arm conflicts destroy infrastructure, cause shortage of qualified healthcare workers and disrupt supply chains. By 2019 in the Cameroon's Northwest and Southwest, the situation had resulted in a substantial decline in health service delivery, and the number of facilities providing immunisation services had decreased by up to 53 % in the Northwest and 30 % in the Southwest regions due to closures and staff departures caused by insecurity.¹⁰ In conflict-affected areas children often miss out on basic immunizations because of the increase in both demand and supply side barriers. Between 2016 and 2019, immunisation coverage in Cameroon's conflict-affected Northwest and Southwest regions had declined significantly for

several key antigens, with Bacillus Calmette-Guerin (BCG) coverage having decreased by about 22 pp in the North West (NW) region and up to 42 percentage points for DPT (Diphtheria-Pertussis-Tetanus) 3 in the South West (SW) region, demonstrating the chronic effects of insecurity on routine vaccination systems.⁶ As of 2023, this long-standing conflict had resulted in at least 6,000 civilian deaths, ongoing violence and displacement, and over 638,000 internally displaced persons and thousands of schools and health facilities rendered non-functional as attacks and insecurity continued.¹¹

The security context was spatially and temporally heterogeneous, with health districts operating on a spectrum from relatively stable urban centres to insecure rural areas. This zonation followed security changes resulting from military or separatist activities, which impacted patterns of service delivery.¹⁰ Cold chain infrastructure collapsed due to power cuts, fuel shortages and equipment looting. Supply chains for vaccines were continuously disrupted by blocked roads, delays caused by military and non-state armed group checkpoints, and health information systems collapsed in many areas, making it difficult to track population movements.¹²

Cameroon immunisation catchup schedule

In accessible and peaceful regions and communities in Cameroon with healthcare facilities, children are vaccinated following the routine immunisation schedule that covers 0–15 months. Zero-dose children that have never been vaccinated and under-immunised children are vaccinated following the catchup immunisation program that vaccinates children up to 5 years of age (Table 1).

Table 1. Catchup vaccination schedule in Cameroon

Contact	Antigen	3–11 months	12–23 months	24–59 months	Instructions
First	BCG	✓	✗	✗	Do not administer BCG from the age of 12 months
	OPV1	✓	✓	✓	–
	PENTA 1	✓	✓	✓	–
	ROTA 1	✓	✓	✗	Do not administer ROTA from the age of 2 years☑☑
	PCV-13 1	✓	✓	✗	Do not administer PCV-13 from the age of 2 years
	IPV 1	✓	✓	✓	–
	VitA	!	✓	✓	From the age of 6 months and administered every 6 months till the age of 5 years
	AMV 1	!	✓	✗	From the age of 6 months to 21 months
	MR 1	!	✓	✓	From the age of 9 months

Contact	Antigen	3–11 months	12–23 months	24–59 months	Instructions
Second (28 days after)	OPV 2	✓	✓	✓	–
	PENTA 2	✓	✓	✓	–
	ROTA 2	✓	✓	✗	Do not administer ROTA from the age of 2 years
	PCV-13 2	✓	✓	✗	Do not administer PCV-13 from the age of 2 years
	IPV 2		✓	✓	From the age of 9 months
	AMV 2	!	✓	✗	From the age of 7 months to 23 months
	MR 2		✓	✓	From the age of 12 months
Third (28 days after)	OPV 3	✓	✓	✓	–
	PENTA 3	✓	✓	✓	–
	ROTA 3	✓	✓	✗	From the age of 8 months to 23 months
	PCV-13 3	✓	✓	✗	Do not administer PCV-13 from the age of 2 years
	AMV 3	!	✓	✗	Administered 1 to 2 months after the 2nd dose
	YF		✓	✓	From the age of 9 months
Fourth (from 9 months)	MR 1	✓			–
	IPV 2	✓			–
	YF	✓			–

✗ – Do not administer the vaccine; ! – Read the instructions before administration; ✓ – Administer the vaccine.

Study aims and research questions

This study was designed to explore behavioural, socio-cultural, and structural determinants of immunisation uptake among doers and non-doers in conflict-affected Northwest and Southwest Cameroon, and to generate evidence to inform the design of specific interventions and service delivery adaptations.

Primary research questions:

1. What behavioural determinants differentiate caregivers who complete their children's full immunisation schedules (doers) from those who do not (non-doers) in conflict-affected settings?
2. How do individual, household, community and health system factors interact to enable and/or constrain immunisation behaviour?
3. What are the mechanisms through which conflict and insecurity affect immunisation decision-making and access?

Material and methods

Study design and theoretical framework

This was a qualitative comparative case study using the Doer/Non-Doer analytical framework to analyse determinants of immunisation behaviour in conflict-affected settings. The Doer/Non-Doer approach involves a systematic comparison of individuals who do (doers) and do not (non-doers) adopt the desired health behaviour, yet share similar environmental circumstances, to identify specific enablers and barriers that distinguish between the two groups (Methods Fact Sheet 1 - RANAS (Risk, Attitude, Norms, Ability, and Self-regulation) Approach, n.d.).

The framework included three complementary theories of social and behaviour change; The Social-Ecological Model was adopted as the overarching framework to understand how factors at the individual, interpersonal, community, organisational and policy levels interact to influence the immunisation behaviour.¹³ It was also considered relevant for conflict settings where disruptions happen at all ecological levels.

The COM-B Model (Capability, Opportunity, Motivation → Behaviour) was used to analyse whether caregivers possessed the psychological and physical capability, social and physical opportunity, reflective and automatic motivation to engage in immunisation behaviour.¹⁴ This model was used to identify intervention functions to address identified barriers.

The Health Belief Model was used to analyse perceived susceptibility to vaccine-preventable diseases, perceived severity of diseases, perceived benefits of vaccination, perceived barriers to action, cues to action, and self-efficacy. This cognitive-perceptual framework was useful in exploring differences in risk perception and outcome expectations between doers and non-doers.

Study setting and population

The study was carried out in four health districts in Northwest and Southwest Cameroon: Konye, Kumba South, Bamenda and Nwa (Bamenda and Nwa health districts are located in the Northwest region, while Konye and Kumba South health districts are in the Southwest region). These were purposively selected to represent ≥ red, yellow, and green security contexts, ≥ urban, peri-urban, and rural population densities, and health system functionality. Each health district had several health areas that had different patterns of immunisation coverage. Three stakeholder groups were targeted: (1) Primary caregivers of children aged 0–5 years, including doers and non-doers from general populations, Internally Displaced Person (IDPs) and marginalised ethnic minority communities; (2) Facility-based nurses, vaccinators and community health workers (CHWs); and (3) Traditional leaders, religious leaders and representatives of women's groups and community-based organisations.

Sampling strategy

Purposive sampling was used to recruit 25–40 participants per health district (over 140 participants in total) to achieve a range of perspectives and experiences. Each health area within the selected health districts (3 per district) had one respondent per stakeholder group (caregivers, health workers, community leaders) to ensure geographic, and demographic diversity. Sampling of caregivers ensured an equal number of doers and non-doers, women and men (women were a majority group as primary caregivers), displaced and host community, and ethnic minority groups including pastoral Fulani. Healthcare worker sampling included facility based staff, outreach team members and CHWs.

Community influencer sampling focused on individuals identified through community mapping as having influence on health-related decision-making.

Participants were recruited through multiple channels to ensure diversity and access. Healthcare workers and community health workers (CHWs) were identified through district health authorities and facility lists. Caregivers were recruited through health facility vaccination registers (for doers) and community-based case finding, including door-to-door visits and snowball sampling through community leaders and CHWs (for non-doers). Community leaders and influencers were identified through community mapping exercises conducted in collaboration with local authorities and humanitarian organisations. Recruitment materials were adapted to local languages and literacy levels, and community entry protocols were followed, including engagement with traditional and religious leaders to facilitate access and build trust. All recruitment was conducted with attention to security considerations, avoiding high-risk areas and times.

Data collection methods

Data collection occurred between March 2025 and June 2025 through multiple qualitative methods:

Key Informant Interviews (KIIs): Semi-structured interviews (n = 140) were conducted with caregivers, healthcare workers and community leaders. The sample size was derived from a finite population estimation approach ensuring adequate representation of key stakeholders. Interview guides were developed around behavioural determinants and provided flexibility to explore while ensuring coverage of key domains. Interviews took 45–90 minutes in participants' own language (English, Pidgin English or local dialect) and audio-recorded with participants' consent.

Focus Group Discussions (FGDs): A total of 6 FGDs were carried out with 6–8 participants each, stratified by care-giver status (doers vs non-doers) and population group (general community, IDPs, marginalised groups). FGDs took 90–120 minutes and allowed exploration of social norms, community perceptions and collective problem solving around immunisation barriers.

Interview guides used semistructured, open-ended questions at the beginning of the interview, allowing participants to use their own words. Probe questions were used to further investigate responses. The research questions addressed seven domains:

1. Knowledge and understanding of immunisation.
2. Impact of conflict and insecurity on vaccine behaviour.

3. Perceptions of benefits and risks of vaccines.
4. Influence and trust within the community.
5. Access to immunisation services.
6. Motivations and barriers to receiving vaccination.
7. Information and awareness needs.

Data management and analysis

Audio recordings were transcribed verbatim within 48 hours to minimise recall bias, with bilingual staff translating local language transcripts into English. Transcripts were systematically organised and coded using Microsoft Excel and Word, employing a hybrid coding approach that combined deductive codes derived from theoretical frameworks with inductive codes emerging from the data.

The coding structure included five levels: Question number (organizing by interview guide section); Respondent code (identifying role and district); Descriptive coding (single phrase encapsulating the general idea); In vivo coding (exact participant language).

Thematic analysis involved familiarisation with the data, coding, theme identification, theme review, and the definition and naming of final themes. Constant comparison was used to identify similarities, variations, and contradictions between doers and non-doers. Particular attention was paid to displaced and marginalised groups to identify barriers to access, trust, and awareness. Evidence from KIIs and FGDs sources was triangulated to cross-validate results. A framework matrix was developed comparing doers and non-doers across nine determinants: perceived self-efficacy, perceived consequences, perceived social norms, access to support, knowledge of vaccination schedule and cues to action, perceived susceptibility to risk, divine will, gender and household dynamics, and effect of insecurity.

While data saturation was not formally assessed using a predefined stopping criterion, the sample size of 140 participants, distributed across four health districts, was considered sufficient to capture the diversity of perspectives, consistent with established qualitative research guidelines for thematic saturation in multi-site studies.¹⁵ The research team observed that recurring themes emerged consistently across districts by the latter stages of data collection, suggesting that informational redundancy had been achieved.

Ethical considerations

Under the program implemented, the study received ethical clearance and conformed to humanitarian research ethics guidelines. Written or verbal informed consent

was obtained from participants, in a language appropriate for their literacy levels, with participants being informed that their participation was voluntary and could be withdrawn at any time with no negative consequences.

To enhance accessibility and cultural relevance, interviews were conducted in local languages and facilitated by gender-matched facilitators for the discussion of sensitive topics. FGDs were organised in private community spaces to minimise social desirability bias and stigma.

To ensure confidentiality, audio recordings and transcripts were stored in secure locations and identifying information was removed from transcripts. In presenting findings, participants' anonymity was protected through the use of aggregate values and generic location terms. In this conflict-sensitive context, names of specific villages or any identifying details about individuals that could put participants at risk were not disclosed.

Results

The assessment found that conflict and insecurity are cross-cutting factors that have intensified the existing barriers, resulting in unique restrictions. Nine essential behavioural determinants identified worked at the individual, household, community and health system levels and interacted in complex, reinforcing ways.

Security and crisis

Armed conflict and insecurity acted as cross-cutting factors that amplified all other barriers and created unique constraints specific to humanitarian settings. Armed conflict, roadblocks, and attacks on health facilities interrupted routine vaccination activities. Healthcare workers reported: "Many health facilities in red zones had shut completely or were open only sporadically, when security allowed. Outreach immunisation was something we completely shelved for our own security."

However, caregivers were afraid to go to health facilities, fearing violence, abductions, or armed encounters: "There's insecurity in the movement. One can be raped, kidnapped or killed along the road. It's risky out there." Days of ghost town i.e., stay-at-home orders imposed by non-state armed groups meant that people were not allowed to move within the zone, even to functioning health facilities.

Displacement drove families to areas where they did not know about available health services or where vaccines were not available. Most critically, many displaced persons were not aware that they could continue

the vaccination schedule even though they had started elsewhere: “Some of them think that, as you have started vaccines in this particular facility, you must only continue there, and since some of them flee conflict areas overnight, they hardly have documentations which discourage many.”

Insecurity caused health worker attrition, with some remote and insecure regions experiencing an attrition rate of 50–90%. The remaining health workers were overburdened and at risk of attacks, especially French-speaking health workers. Insecurity disrupted vaccine supply chains, causing stockouts and expiration of vaccines in some remote areas. Poor road conditions worsened, military checkpoints increased, while non-state armed groups consolidated activities in their controlled areas, making navigation with vaccines into some communities extremely difficult. “Since the district is far away from our community, when there is a stockout, quickly getting there within the shortest possible time is extremely difficult.”

Political disputes over health services during conflict caused severe trust deficits. Non-doers relied on informal sources of information, especially from non-state armed groups who actively discouraged vaccination through disinformation: “We were told by the boys that over 30 community members died after receiving vaccines, which made us deny vaccines.” Another caregiver indicated, “When we learned that it was from the government, we refused to vaccinate our children. How can the same government that killed our husbands claim to protect our sons?” In most of these conflict-affected communities, the identity of those providing the vaccines mattered: “When we see strange Non-Governmental Organisation (NGOs) and people forcing us to take vaccines, we say no to protect our children.” They trusted established providers with long-standing presence in their communities, like the Cameroon Baptist Convention Health Services.

Perceived information

Misinformation, disinformation, malinformation and rumour severely affected how caregivers perceived immunisation, especially amongst non-doers. Indeed, 61% of non-doers believed that vaccines caused serious adverse effects, including fever, measles, convulsions and death, whereas doers held no such beliefs. If a doer believed that immunisation could cause side effects such as fever, they understood that this was a temporary condition and that they would seek treatment if it lasted. Non-doers built their behaviour after receiving information from multiple sources. From a lack of

trust in government intentions, to questioning the existence of particular vaccines especially for the Human Papillomavirus (HPV) and malaria vaccine, questions about the potency of vaccines, and rumours of vaccine-induced death shaped decisions. One non-doer stated, “Yes, and there are also vaccines that are created by man to put sickness in somebody’s body instead of treating it.” Also, another added, “Ambas (Non-state armed groups) are the people we trust the most, if they tell us to move, we move, if they want us not to vaccinate our children, I will do as indicated.” Indeed, in the most highly affected conflict-affected areas, the notion that vaccines were a tool of population control or political machination seemed to resonate strongly, to the extent that caregivers were quoted saying: “You cannot kill us and wish us well at the same time. That is why we will reject vaccines when it comes from some places.” Additionally, 12% of non-doers did not view vaccination as an immediate priority, often due to false beliefs downplaying risks of vaccine-preventable diseases.

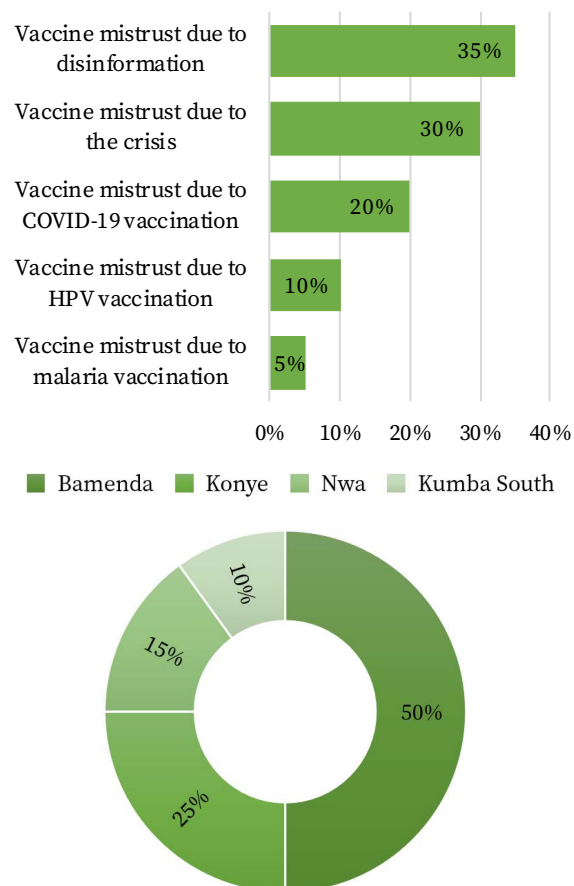


Figure 2. Vaccine mistrust

Vaccine mistrust was more pronounced in districts with large cities like Bamenda (50%). Caregivers in these large cities were more prone to misinformation

and propaganda from the media and different institutions including the non-state armed groups (NSAGs)

Perceived knowledge gap – misconceptions about vaccination completion

Knowledge gap on the vaccination schedule was identified as a main driver of dropout, especially post 9-month. Although 100% of doers were aware that the last critical dose for measles-rubella (MR 2) is given at 15 months, there was a huge lack of knowledge among non-doers:

- 71% of non-doers believed vaccination ended at 9 months;
- 23% thought it ended at 3 months 2 weeks (after the primary series);
- 6% had no clear understanding of when vaccination should be completed.

This knowledge gap was reinforced by the health system's practice of offering the 9-month "completion certificates" which, implied to caregivers that the vaccination journey had ended, despite the critical 15-month MR 2 dose. Adding to the problem, many non-doers didn't know that missed vaccinations could be caught up anytime: "I didn't know my child could still be vaccinated even after his second birthday." And some caregivers didn't know that vaccination could continue in a different health facility after moving to a new area.

Doers, however, clearly understood: "I understand the immunisation calendar well and I know the period of vaccinating. Even if I miss the vaccination date, I know I can still catchup later."

The knowledge gap was widened due to the shift of the vaccination calendar from 9 months to 15 months in 2020 during the crisis. Community education was not properly conducted, given the the weak health system, especially in the high-crisis areas. Hence, the knowledge gap increased the non-doers.

Perceived susceptibility to risk – differential disease risk awareness

Doers and non-doers had divergent perceptions regarding vulnerabilities to vaccine-preventable diseases. More than 70% of doers considered their children to be at high risk of serious diseases such as measles, polio, pneumonia, tuberculosis and diphtheria. This risk perception was a strong driver for timely vaccination. In contrast, more than half of non-doers (67%) reported

relatively low levels of concern about these diseases, categorized in several different ways (Figure 3).

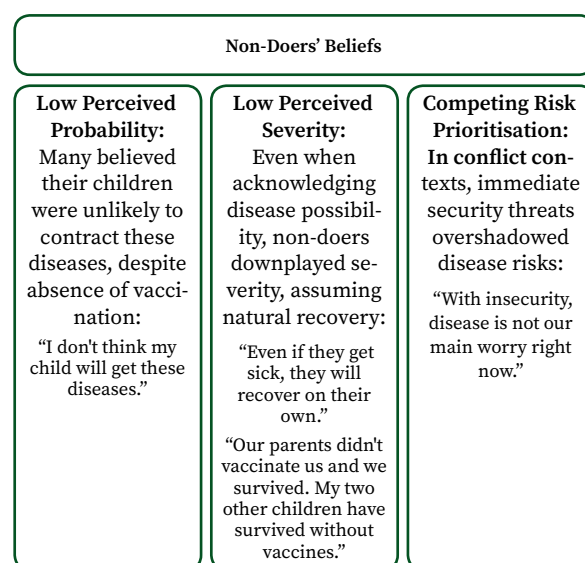


Figure 3. Non doers' belief system

Perceived self-efficacy – confidence in ensuring full immunisation

Self-efficacy, or a person's confidence in their ability to successfully complete a task, was one of the key differentiators between doers and non-doers. All doers (100%) felt confident that they could ensure their children receive the full vaccination schedule based on their knowledge, skills, resources and problem solving skills. In contrast, only 67% of non-doers felt that they could ensure full immunisation and 33% explicitly reported no ability to do so.

Doers were five times as likely as non-doers to mention vaccine availability and accessible immunisation posts, as key enablers that would make it easier to complete schedules. In contrast, non-doers were six times more likely than doers to mention perceived adverse effects of vaccines (including fears of illness, fever, convulsions or death) as barriers that would make it difficult to ensure full immunisation. One non-doer commented: "I am afraid my child can develop fever and die as a result of the side effects of vaccination."

Vaccine literacy (50%) stood out as a contributing factor for defaulting. If the calendar and the importance of vaccination was understood most caregivers would adhere to their schedules. The defaulting resulting from self-efficacy was more common in Nwa (54%)

and Konye (23%) with geographically difficult terrain that hinders frequent displacements to community and health facility (Figure 4).

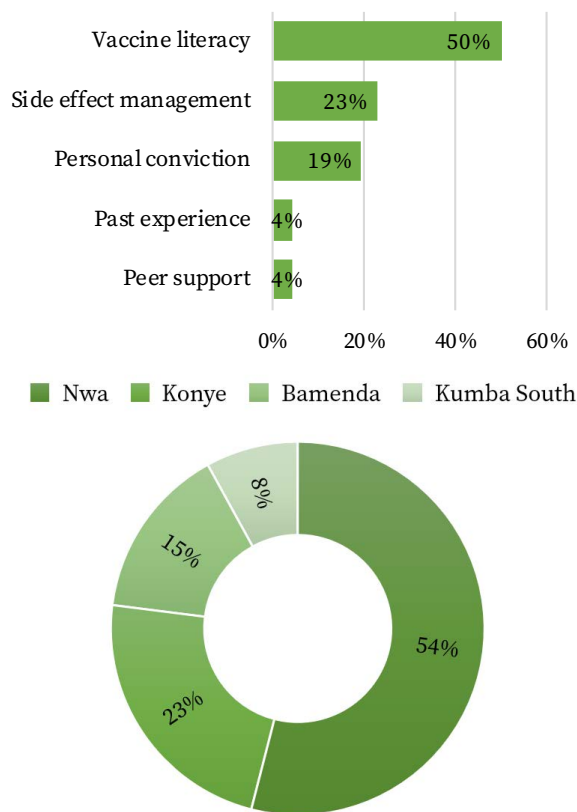


Figure 4. Perceived self-efficacy

Perceived divine will – fatalistic beliefs versus medical prevention

Religious beliefs strongly affected immunisation decisions and varied significantly between doers and non-doers. Non-doers were 5.6 times as likely as doers to attribute the occurrence of diseases such as measles, polio, meningitis and disabilities to God's will rather than being preventable through medical intervention: "God already protects. It's okay, we don't need these extra things to put in our body". These beliefs had tangible effects as caregivers who believed that health outcomes were largely in the hands of God were less likely to seek preventive medical interventions and considered vaccination unimportant or even contrary to their faith.

Though most religious leaders approved vaccination, a handful of denominations rejected vaccination, causing their followers to do the same. Hence, it is not simply religious beliefs that are anti-vaccination, but

specific theological interpretations and the positions of particular religious leaders which determine the relationship between faith and immunisation.

Access to support – navigating logistical and systemic barriers

Differences in the availability of support that included transport, information, social networks and responsive services distinguished doers from non-doers. Obtaining support for immunisation was judged to be very difficult or somewhat difficult by the majority of non-doers, 84%. These difficulties fell within 3 main domains as illustrated in Table 2.

Table 2. Domains of support for non-doers

Domains of support for non-doers	
Transportation and distance	Long travel distances to health facilities, absence of reliable transportation, and inability to afford transport costs created formidable barriers. Poor road infrastructure, particularly in rural areas, compounded these challenges. "The roads are extremely narrow and the only possible means on the tiny footpaths are by motorbikes which are very expensive."
Insecurity constraints	Security concerns impeded movement with fear of encountering armed actors at checkpoints or during travel. "I prefer to stay alive and with an unvaccinated child rather than risk our lives to be vaccinated."
Health system responsiveness	Vaccine stockouts, inflexible clinic schedules, and multi-dose vial policies that required minimum numbers before opening vials all contributed to access difficulties. Non-doers reported. "When I go, they say I should come on Friday, when I go on Friday they will say I should come on Tuesday."

Gender and household dynamics – decision-making power and autonomy

In many rural communities, husbands and male elders often made the final decisions about child health and immunisations. Women's ability to make independent choices about immunisation was typically limited, despite most childcare duties. Those who vaccinated their children (doers) were more likely to mention

influential family members such as husbands, mothers, sisters, and other relatives. These family members offered both tangible support, including transportation and childcare during clinic visits, and intangible support, such as encouragement and stressing the importance of vaccination.

In contrast, non-doers were 9.4 times more likely to report that their key family members, especially decision-makers like the husband and in-laws, disapproved of or did not support immunisation. This disapproval or lack of support was a significant barrier. One woman stated: “My husband is lukewarm about it; he doesn’t mind if I go or not, but he would not support me to stay with the elder child, nor provide transportation money.”

Ethnic minorities and displaced populations encountered additional challenges. For example, pastoral Fulani groups exhibited unique behaviors: “With the Fulani, they deny vaccination entirely, especially when meeting women without their husbands.” The intersection of gender roles, minority status, and displacement created multiple hardships, significantly increasing risks for marginalized children. In conflict zones, gender-based violence also hindered immunization efforts. A healthcare worker explained: “We are in a war zone. Children from taboo relationships (rape) are often poorly treated and not vaccinated.”

Perceived social norms — differential patterns of approval and disapproval

Both doers and non-doers generally agreed there was community approval for immunization, with 100% of doers and 73% of non-doers expressing support. However, approval patterns varied significantly among community influencers. Doers more frequently reported that healthcare, religious, and community leaders endorsed and actively promoted immunization, viewing them as trustworthy sources of information and social support. Non-doers interacted less with healthcare workers and were less likely to consider them influential, possibly due to less engagement with health services or barriers such as distance or security concerns. Some Non-State Armed Group Leaders also opposed immunization, spreading fears about government-provided vaccines. “Our army general told us that the government put some things in the vaccines to kill our children or make them sterile.”

Cues to action— reminders and follow-up systems

Cues to action, reminders and triggers that prompt caregivers to seek immunization, functioned very differently for doers and non-doers. Doers had multiple reinforcing reminder systems (Figure 5)

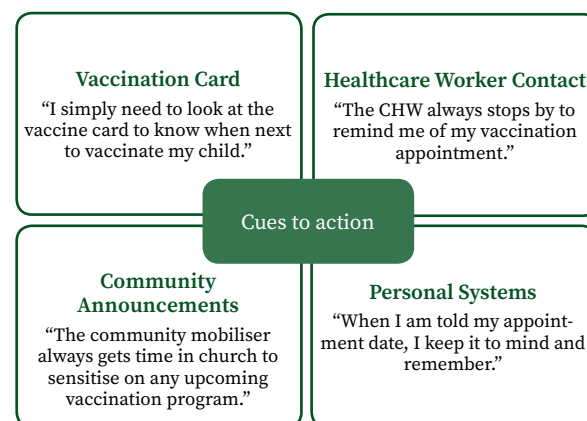


Figure 5. Cues to action

These cues created redundancy, so if one system failed, others would trigger action. Doers also said remembering appointments was “not difficult at all,” showing cues are embedded in routines and support health-seeking practices.

Non-doers, in contrast, expressed that recalling the schedule for child vaccinations was challenging. This difficulty stemmed from the absence of organized reminder systems, irregular interactions with health services, and a lack of follow-up mechanisms. In conflict zones, health information systems were weak, with minimal or no tracking of defaulters or follow-up processes; as a result, non-doers lacked consistent prompts to aid their actions.

Programmatic and policy implications

The results generate actionable implications for immunisation programming in conflict-affected settings, organised across strategic levels as seen in Table 3.

Table 3. Programmatic and policy implications

Implications/ strategies	Recommended interventions
Security-Adapted Access Strategies	Facilitate access with all stakeholders (those working with local authorities, traditional leaders, humanitarian coordinators) to ensure safe passage and determine safe windows based on community information on security patterns (days/times of reduced risk).
Address information gaps	Train trusted actors such as religious, traditional authorities, and respected community elders as vaccine champions and create active social listening platforms and put in place strong feedback mechanisms to collect, educate and timely counter specific myths around vaccines.
Engage male decision-makers directly	Create separate discussion groups for men away from the health facility, where male peer educators or religious leaders can discuss and address the gaps in vaccination and address injunctive norms around decision-making.
Capacity building of health workers and CHWs [*]	Train health workers and CHWs to provide community and caregiver education as per on the catch-up and routine vaccination calendar, gender sensitivity awareness, rumour research and response and interpersonal communication strategies to build trust and rapport in communities.
Implement Multi-Channel Reminder Systems	Implement SMS ^{**} reminders where possible, enhance CHW community visits, use church/mosque announcements for vaccination days, and employ town crier alerts in traditional communities. Reminders should be at 3–5 days prior to the appointment, with multiple channels employed.
Integrate immunisation with high-demand services	Nutrition screening, supplementation and other humanitarian packages should go hand in hand with bundle vaccination to draw in caregivers and solve food insecurity problems.
Strengthen cold chain and vaccine availability	Provide solar-powered refrigeration, 72-hour cold boxes to remove dependency on electricity and mobile sessions to remote communities.

Implications/ strategies	Recommended interventions
Prioritise displaced and minority populations	Engagement with minority groups and indigenous peoples, with an emphasis on selecting culturally appropriate, gender-matched staff, particularly for minority and displaced populations.
Promote gender-transformative approaches	1. Gender dialogues that challenge the harmful norms that underline male authority and female subservience. 2. Economic empowerment interventions that increase women's power to decide and financial independence. 3. Engage with male community leaders who can signal change in masculinity norms. 4. Intensify legal and protection frameworks to address gender based violence as a health system concern.

^{*}CHW – Community health work; ^{**}SMS – Short message service.

Discussion

The comparison between doers and non-doers shows that immunisation behaviour in conflict-affected Cameroon is shaped by complex interactions across various socio-ecological levels and not just by single factors. This supports the Social-Ecological Model's idea that health behaviors are influenced at different levels, highlighting how personal actions are influenced by the crisis at the community and policy levels.

Using the COM-B lens it is understood why non-doers are poorly prepared to make informed decisions about immunization, with deficits in all three domains: Psychological capability (knowledge deficits such as 71% being unaware vaccination schedules ended at 9 months; failure to assess disease risks; lack of health system navigation skills), Physical capability (mobility and transport costs), and Opportunity (vaccine stockouts, health facilities closed, poor infrastructure, insecurity and inflexible service delivery) – Social opportunity with 9.4 times higher levels of disapproval by family decision makers; absence of supportive community norms in some contexts; and physical isolation from health information sources; and Reflective motivation (low perceived disease susceptibility with over 50% of non-doers; fatalistic view of disease causation with 5.6 times higher tendency to attribute disease to

divine will; and misconceptions about vaccine safety with 61% of non-doers fearing adverse side effects). Critically, the COM-B theory shows that interventions must work in all three domains to support non-doers' decision to immunise. Neither information interventions alone can overcome opportunity barriers (no vaccines to receive) nor entrenched automatic motivations, nor the availability of vaccines without addressing capability and motivation gaps.

Applying the Health Belief Model lens revealed stark differences in doers' and non-doers' perceptions of susceptibility and severity. Doers displayed the prototypical profile for preventive health behaviour: high perceived susceptibility (children at risk of serious disease), high perceived severity (diseases are life-threatening), high perceived benefits (vaccines prevent disease, save money, improve growth), low perceived barriers (can access services despite barriers), frequent cues to action (multiplied systems of reminders), and high self-efficacy (confident of ability to complete schedules). Non-doers displayed the inverse profile in most dimensions. A finer point, however, emerged that non-doers tended to acknowledge the general benefits of vaccines, implying that perceived benefits alone without addressing barriers, perceived susceptibility and severity, self-efficacy, and cues to action were insufficient to change behaviour.

The systematic reinforcement of misconceptions through the 9-month "completion certificate" illustrates how health system practices can undermine even well-meaning caregivers' perceived benefits by providing contradictory cues about when protection is complete.

The differential effects of family approval, especially spousal approval, is evidence of the potency of injunctive norms (what others approve or disapprove). Non-doers were 9.4 times more likely to experience spousal disapproval, despite the fact that both doers and non-doers believed communities were generally supportive of vaccination. Thus, household-level injunctive norms may have overridden community-level descriptive norms (what most people do). While community sensitisation may produce supportive descriptive norms, spousal disapproval persists if male decision-makers are not actively engaged. The success of doers with spousal support suggests that targeted male engagement that changes household-level norms could potentially turn non-doers into doers, even in difficult settings.

Limitations

There are a number of methodological and contextual limitations to this study that should be taken into

account when interpreting results and considering transferability:

1. Impacts of self-report bias include overstatement of vaccination commitment and under-reporting of opposition, especially among males, influenced by social desirability and interviewer perceptions.
2. Limitations of sampling include potential exclusion of hard-to-reach populations, especially those never interfacing with healthcare systems. Despite efforts to gather diverse views, findings may be biased toward caregivers already within immunisation reach, even if only partially vaccinated, rather than the completely unreachable.
3. Variability in data collection teams may have caused slight differences in interview style across health districts, but all teams were trained together and used the same interview guides.
4. The study recorded perceptions and behaviors at one point (March–June 2025) in a changing conflict environment. Factors like security, health, community attitudes, and information may have shifted before, during, or after, limiting the transferability of results even within the same regions.
5. Conflict and security are dynamic, with changing territorial control, behaviour, and community perceptions. Programming recommendations from this assessment must be regularly revised in line with changing situations, security conditions, and peace processes.

Nonetheless, the study employed rigorous methodological approaches such as triangulation of data sources, iterative analysis, team interpretation and constant comparison to increase the rigour of findings.

Conclusion

This Doer/Non-Doer assessment indicates that vaccine availability, access to healthcare, correct knowledge of schedules, awareness of child vulnerability, confidence in vaccine safety and efficacy, family support, reminders, trust in providers and overcoming insecurity issues are all indispensable to successful vaccination. Nine behavioural determinants distinguish Doers from Non-Doers and Doers score better on all domains, greater self-efficacy, greater family support, better knowledge, greater risk awareness, lower fatalistic beliefs and fewer access barriers, whereas Non-Doers suffer compounded marginalisation issues in several domains at once.

Conflict is a cross-cutting factor that aggravates and compounds barriers and creates new ones. Health

services become politicised, creating deep trust gaps in which vaccine decisions are based not on the vaccine but on provider identity. Insecurity creates barriers to physical access, population displacement and service disruption, and temporal barriers that hamper routine health-seeking behaviours. Gender inequities are compounded by conflict with male decision-maker opposition becoming an absolute barrier for many girls and women. Compound marginalisation of minority ethnicities and displaced populations leaves already marginalised and vulnerable children at greatest risk. Converting non-doers into doers requires simultaneously addressing capability (knowledge, skills), opportunity (access, social support) and motivation (risk perception, benefits, self-efficacy).

Immunisation in fragile settings is a social challenge requiring understanding of local power dynamics, cultural sensitivities, and community trust. Cameroon's success in reaching zero-dose children shows strategies adaptable elsewhere. The doer/non-doe framework can guide efforts, as about 20% of zero-dose children live in conflict zones. Without addressing how conflict influences behavioural drivers, traditional methods won't work in these high-burden areas. Recognizing conflict's impact on community decisions is vital for saving millions of children.

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