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Why caregivers start but do not finish: a qualitative evidence synthesis of barriers and facilitators to malaria vaccine dose completion in sub-Saharan Africa

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Abstract

Background.

Two World Health Organization recommended malaria vaccines are being introduced across sub-Saharan Africa on a multi-dose schedule. Coverage of the primary series is comparatively high, but a substantial share of children do not return for the later dose. Existing systematic reviews are quantitative and describe how many caregivers accept the vaccine rather than why those who begin the series do not complete it. No qualitative evidence synthesis has addressed caregiver-level determinants of dose completion.

Methods.

Qualitative evidence synthesis reported per ENTREQ [18]. Four databases (PubMed, Scopus, CINAHL, African Journals Online) were searched from 2019 to 23 June 2026 for qualitative and mixed-methods studies of caregiver perspectives on malaria vaccine uptake or completion in sub-Saharan Africa. Eligibility followed SPIDER [16]. Two reviewers screened and coded independently. Included studies were appraised with the CASP checklist and synthesised thematically following Thomas and Harden [17]. Confidence was assessed with GRADE-CERQual [19].

Results.

Of 86 records identified and 43 screened, 13 studies met the criteria, from Ghana, Kenya, Malawi, Cameroon, Uganda, Nigeria, Sudan, and Sierra Leone, providing 11 independent data sources. Three analytical themes were developed. First, earned confidence: caregivers began and continued the early doses as trust in frontline workers was reinforced by visibly less malaria in their children (high confidence). Second, premature satisfaction: completion eroded through a quiet drift, as satisfaction that the child was already protected, a final dose outside routine immunisation contact, and a sense that the schedule was too long combined so that even motivated caregivers did not finish (moderate confidence). Third, willing but blocked: caregivers who intended to complete were prevented by disrespectful providers, unavailable services, travel, cost and burden, and household authority beyond the mother (moderate confidence).

Conclusions.

The central determinant of dose completion is not whether caregivers accept the vaccine but whether the health system, the schedule, and the household sustain them across it. Programmes should shift from securing initial acceptance to supporting completion, above all by aligning the final dose with an

existing immunisation contact, strengthening late-schedule reminders and defaulter tracking, supporting respectful frontline communication, and engaging household decision-makers.

Registration

This review was registered on the Open Science Framework (DOI 10.17605/OSF.IO/4H79A https//osf.io/4h79a). Registration was concurrent with the review rather than prospective the database searches were run on 23 June 2026.

Background

Malaria remains concentrated in sub-Saharan Africa, where the large majority of global cases and deaths occur and where young children carry the greatest share of mortality. Despite the scale-up of vector control and chemoprevention, progress in several high-burden settings has slowed, and additional tools are needed to protect children most at risk.

The arrival of two World Health Organization recommended malaria vaccines has added such a tool. RTS,S/AS01 (Mosquirix) was recommended in October 2021 for the prevention of Plasmodium falciparum malaria in children in areas of moderate to high transmission, and R21/Matrix-M was subsequently recommended on similar grounds [1]. Both vaccines are delivered on a multi-dose schedule comprising a three-dose primary series from around five months of age, followed by a later dose given roughly 12 to 18 months after the third dose to prolong protection.

This schedule structure creates a distinctive vulnerability. The protective value of the vaccine depends on a child returning, often more than a year after the primary series, for a dose that frequently falls outside established Expanded Programme on Immunization contact points. Programmatic and pilot data show that completion is precisely where coverage breaks down. Across early routine introduction, coverage of the first three doses reached roughly 70 to 75 percent, while fewer than half of eligible children received the later dose [1]. In Ghana, national fourth-dose coverage reached only about 51 percent by 2022, far below the roughly 74 percent achieved for the third dose, and the fourth dose was subsequently rescheduled to 18 months to coincide with an existing immunisation contact [21, 15]. The fall-off is therefore shaped not only by attitudes but also by where and when the dose is offered and by what caregivers experience across a long series.

The existing evidence syntheses on the malaria vaccine are quantitative. They pool caregiver acceptance and willingness, generally reporting high positive intent across sub-Saharan Africa, with variation between settings [20]. These reviews describe the proportion of caregivers expressing positive intent, but they do not explain why caregivers who start the series do not finish it, and they call for qualitative research to explore the barriers and facilitators behind missed doses [20].

Qualitative evidence syntheses have been produced for other vaccines, including human papillomavirus vaccination and vaccination in pregnancy, but no comparable synthesis exists for the malaria vaccine. Primary qualitative studies that could answer the completion question now exist, including a longitudinal qualitative evaluation that tracked caregivers across the four-dose schedule in the pilot countries [6], a health-system study from western Kenya [4], and a study of vaccine defaulters in Ghana [7]. Their findings are scattered and have not been brought together.

This review addresses that gap. It identifies, appraises, and synthesises qualitative evidence on caregiver-level barriers and facilitators to malaria vaccine dose completion in sub-Saharan Africa, in order to inform programme design that sustains caregivers across the full schedule rather than only at first contact.

Research question. What are the caregiver-level barriers and facilitators to completing the multi-dose RTS,S/AS01 and R21/Matrix-M malaria vaccine schedule for eligible children in sub-Saharan Africa, as reported in qualitative studies?

Specific objectives were to:

1. identify factors that prevent caregivers from returning for and completing successive doses;
2. identify programmatic, social, economic, and contextual factors that facilitate completion;
3. map how these factors operate across the dose journey, with attention to the transition from the primary series to the later dose; and
4. translate the synthesised evidence into actionable recommendations for national programmes.

Methods

Protocol and registration

This review was conducted and reported in accordance with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement [18]. The review was registered on the Open Science Framework (DOI: 10.17605/OSF.IO/4H79A; https://osf.io/4h79a). Registration was concurrent with the conduct of the review rather than prospective; the database searches were run on 23 June 2026. A protocol specifying the search strategy, eligibility criteria, and analysis plan was prepared to guide the review.

Eligibility criteria

Studies were selected using the SPIDER framework, which is designed for qualitative and mixed-methods evidence syntheses (Table 1). Studies examining the broader uptake journey were eligible provided that findings relating specifically to dose completion or dropout could be separated and extracted. Studies were excluded if they were purely quantitative with no extractable qualitative data,

centred only on health-worker, manager, or policymaker perspectives, concerned vaccines other than the malaria vaccine, were set outside sub-Saharan Africa, or were editorials, commentaries, modelling papers, protocols, or conference abstracts without primary qualitative data.

Table 1
SPIDER eligibility criteria.

SPIDER	Criteria
Sample	Caregivers (mothers, fathers, guardians, or other primary carers) of children eligible for or receiving a malaria vaccine in sub-Saharan Africa.
Phenomenon of Interest	Barriers and facilitators to completion of, and dropout from, the multi-dose malaria vaccine schedule, with attention to the fall-off between the primary series and the later dose.
Design	Primary qualitative studies (focus group discussions, in-depth interviews, key informant interviews, ethnography) or mixed-methods studies with distinct, extractable qualitative caregiver data.
Evaluation	Caregiver experiences, perceptions, beliefs, and decision-making about returning for and completing successive doses.
Research type	Peer-reviewed original research in English, published from 2019 onward.

Search strategy

Four electronic databases were searched from 2019 to 23 June 2026: PubMed, Scopus, CINAHL, and African Journals Online. Web of Science was not searched because it was not accessible through the institution's subscription. Reference lists of included studies and relevant reviews were hand-searched. The search combined terms for the intervention, the caregiver population, the dose-completion phenomenon, and the sub-Saharan African setting. The full strategy for each database is provided in Additional file 1; the PubMed strategy is shown in Table 2.

Table 2
PubMed search strategy.

(("malaria vaccine"[tiab] OR "malaria vaccines"[Mesh] OR "RTS,S"[tiab] OR RTSS[tiab] OR Mosquirix[tiab] OR R21[tiab] OR "Matrix-M"[tiab]) AND (caregiver*[tiab] OR mother*[tiab] OR parent*[tiab] OR guardian*[tiab] OR household*[tiab] OR carer*[tiab]) AND (dose[tiab] OR doses[tiab] OR "fourth dose"[tiab] OR booster[tiab] OR completion[tiab] OR complete*[tiab] OR dropout[tiab] OR "drop out"[tiab] OR adherence[tiab] OR uptake[tiab] OR default*[tiab] OR "missed dose*"[tiab] OR series[tiab] OR schedule[tiab] OR continuation[tiab]) AND (qualitative[tiab] OR "focus group"[tiab] OR interview*[tiab] OR ethnograph*[tiab] OR "in-depth"[tiab] OR "key informant"[tiab] OR perception*[tiab] OR experience*[tiab] OR "mixed method*"[tiab]) AND ("Africa South of the Sahara"[Mesh] OR "sub-Saharan Africa"[tiab] OR Ghana[tiab] OR Kenya[tiab] OR Malawi[tiab] OR Cameroon[tiab] OR "Burkina Faso"[tiab] OR Uganda[tiab] OR Nigeria[tiab] OR Benin[tiab] OR "Cote d'Ivoire"[tiab] OR Mozambique[tiab] OR Tanzania[tiab] OR "Sierra Leone"[tiab] OR Liberia[tiab] OR Niger[tiab] OR "Democratic Republic of the Congo"[tiab]))

Study selection

All records were imported into a reference manager (Zotero) and de-duplicated prior to screening, with screening decisions managed in a structured spreadsheet. Two reviewers (KCN and AN) independently screened titles and abstracts against the eligibility criteria, and independently assessed the full texts of records advancing to full-text review. Discrepancies were resolved through discussion between the two reviewers until consensus was reached. The selection process is reported in a PRISMA flow diagram (Fig. 1).

Data extraction

A structured extraction form was developed a priori and piloted on two studies. Extracted fields were study citation (author, year, country); aim and design; participant characteristics; vaccine and schedule details; data collection methods; caregiver-reported barriers to completion; caregiver-reported facilitators of completion; and author-reported conclusions. Two reviewers extracted data independently and cross-checked for completeness and accuracy, and discrepancies were resolved by discussion. Coding and synthesis were managed in ATLAS.ti.

Quality appraisal

Two reviewers independently appraised each included study using the Critical Appraisal Skills Programme qualitative checklist, a 10-item tool covering research design, recruitment, data collection, the researcher and participant relationship, ethics, analytical rigour, and clarity of findings. Appraisal informed interpretation and the confidence assessment rather than serving as an exclusion threshold. Full results are provided in Additional file 2.

Data synthesis

Thematic synthesis followed the three-stage approach of Thomas and Harden. Stage one was line-by-line coding of the findings sections of all included studies to generate descriptive codes close to caregiver accounts. Stage two grouped related codes into descriptive themes. Stage three developed analytical themes, higher-order constructs that moved beyond individual studies to explain the determinants of dose completion. Both reviewers independently coded all extracted finding segments line by line, assigning descriptive codes to each segment; the reviewers then compared their coding and resolved discrepancies through discussion until consensus was reached, maintaining a shared codebook of descriptive codes that was refined iteratively. Descriptive codes were subsequently grouped into higher-order analytical themes through discussion between the two reviewers. Where data allowed, the synthesis examined how determinants shifted across the dose journey, distinguishing factors affecting initiation from those driving late dropout.

Confidence in the findings

Confidence in each review finding was assessed using the GRADE-CERQual approach, considering methodological limitations, coherence, adequacy, and relevance. Each finding was graded as high, moderate, low, or very low confidence and presented in a summary of qualitative findings table.

Results

Study selection and characteristics

The search identified **86** records. After de-duplication, **43** records were screened, **14** full texts were assessed, and **13** studies met the inclusion criteria (Fig. 1). Included studies were conducted in **Ghana, Kenya, Malawi, Cameroon, Uganda, Nigeria, Sudan, and Sierra Leone** and used **in-depth interviews, focus group discussions, and mixed-methods designs with extractable qualitative caregiver data**. Study characteristics are summarised in Table 3.

Table 3
Characteristics of included studies.

Author (year)	Country	Aim	Method and participants	Key facilitators	Key barriers
Bam (2023)	Ghana	Caregiver perceptions and acceptance of RTS,S	Descriptive qualitative; 10 mothers, IDIs	Trust in nurses; perceived protection; time and cost saved	Knowledge gaps; some adverse-effect concern
Bugase (2024)	Ghana	Influence of trust on RTS,S acceptance	Explanatory mixed methods; 15 IDIs (mothers, health workers) plus survey	Trust built through ANC education and prior vaccine experience	COVID-era constraints on engagement
Hoyt (2023)	Kenya	Barriers and motivators to RTS,S uptake over time	Qualitative longitudinal; 11 caregivers, 3 rounds (HUS cluster)	Growing confidence in benefit; provider screening as activation	Provider attitudes; strikes and stockouts; missed eligibility window
Darkwa (2022)	Ghana	Willingness to pay for RTS,S	Descriptive qualitative; 20 caregivers, IDIs	Appreciation of services; perceived effectiveness	Affordability; belief vaccine fully effective before completion
Price (2023)	Ghana, Kenya, Malawi	Facilitators and barriers to 4-dose adherence	Longitudinal qualitative; 198 caregivers, 3 rounds (HUS cluster, primary)	Trust trajectory; perceived benefit; family and provider prompts	Post-dose-3 drop-off; complacency; service gaps; information gaps
Okyere (2023)	Ghana	Why caregivers default on RTS,S	Exploratory qualitative; defaulting caregivers, FGDs	(focus on barriers)	Schedule timing gap; provider disrespect; adverse reactions; travel; too many visits
Hamid (2026)	Sudan	Caregiver awareness and acceptance	Cross-sectional mixed methods; caregivers at PHC centres	Awareness and willingness in early rollout	Safety and information concerns (thin qualitative data)

Author (year)	Country	Aim	Method and participants	Key facilitators	Key barriers
Achieng (2020)	Kenya	Caregiver and community perceptions of a PfSPZ trial	Qualitative; 12 FGDs and 28 IDIs (trial context)	Malaria prevention motive; household support enabled continuation	Household-head objection to blood draws drove withdrawal
McCoy (2021)	Sierra Leone	Acceptability of a transmission-blocking vaccine	Mixed methods; parent FGDs and key-informant interviews (hypothetical vaccine)	High stated acceptability; community-benefit motive	Cost; fear of needles and side effects; supply reliability
Price (2025)	Ghana, Kenya, Malawi	Recommendations to mitigate 4-dose barriers	Secondary synthesis of HUS evidence (HUS cluster, companion)	(interpretive, bound to Price 2023)	(interpretive, bound to Price 2023)
Anye (2025)	Cameroon	Caregiver awareness, attitudes, and experiences	Exploratory qualitative; 20 caregivers, 2 FGDs	Perceived reduced severity enhanced confidence	Community misconceptions; communication gaps (thin)
Puleh (2026)	Uganda	Caregiver knowledge, attitudes, perceptions of R21	Mixed methods; 574 caregivers, qualitative themes	Generally positive attitudes	Incomplete knowledge; misconceptions; fear (survey-dominant)
Adamu (2025)	Nigeria	Caregiver readiness and willingness in a non-pilot setting	Concurrent mixed methods; 293 caregivers, one open-ended item	Readiness and willingness to accept	Trust and acceptance concerns (single open-ended item)

Thematic synthesis

Synthesis of the 13 included studies generated three analytical themes that together explain why caregivers who begin the malaria vaccine series do not complete it. The first theme concerns how caregivers come to accept and begin the vaccine; the second concerns how completion is quietly eroded after the early doses; and the third concerns the external forces that prevent willing caregivers from finishing the schedule. To avoid over-weighting a single cohort, the three studies drawing on the multi-country Healthcare Utilization Study (Hoyt 2023, Price 2023, and Price 2025) were treated as one data source in the synthesis and the confidence assessment.

Theme 1. Earned confidence: how trust and visible benefit drive initiation

Across countries, caregivers did not begin the vaccine because they held detailed knowledge of it, but because they trusted the health system and the frontline workers who delivered it, and because that trust was reinforced over time as they observed their own children falling sick less often. Initial acceptance was frequently provisional and grew into conviction as the perceived benefit became visible. Information delivered by nurses, often during antenatal and child welfare visits, was the dominant route through which caregivers came to accept the vaccine.

They said there is going to be a new malaria vaccine and we mothers should not panic. The nurses have gone to school and know what they are talking about. So we became calm and accepted it. (Price 2023, Ghana)

She used to get sick almost every month. After the first dose it started reducing slowly to the second then the third and fourth. From January she has not been sick. (Price 2023, Kenya)

It is the education given by the nurses during weighing. For every vaccine the child is taking we are told the benefits, and when our children take the vaccine they do not easily fall sick. (Bugase 2024, Ghana)

This theme was supported by nine independent data sources with consistent accounts across diverse settings, and was judged to be of high confidence.

Theme 2. Premature satisfaction: how early protection undermines the final dose

Completion was eroded less by outright refusal than by a quiet drift away from the schedule. The same visible benefit that motivated initiation could undermine completion, as caregivers who saw their children improve after the early doses concluded that the child was already protected and that the later dose was unnecessary. This satisfaction combined with a schedule structure that worked against completion: the final dose fell long after the primary series and outside the routine immunisation contact points that ordinarily prompt a return, so it was simply forgotten or deprioritised. A recurring sense that the four-visit schedule was excessive compounded the drift.

I know she was supposed to take four doses, but I travelled. If not for that I would have taken her. However, I think three doses are protecting her because she has never been sick with malaria since she started the vaccine. (Price 2023, Ghana)

Sometimes, we forget that the child has to come for the vaccine. Especially during the last dose, by then we would have completed all the other vaccines given to children. So it is very easy for us to forget. (Okyere 2023, Ghana)

The vaccinations are too much for the children. Can they make the vaccine so that the child will take it just once or twice? Because the four times that you have to come is emotionally damaging. (Okyere 2023, Ghana)

This theme drew on rich but more concentrated data, anchored in the Healthcare Utilization Study cohort and the Ghanaian defaulter study, and was judged to be of moderate confidence.

Theme 3. Willing but blocked: system failures and life barriers to completion

A third group of caregivers wanted to complete the schedule but were prevented by forces beyond their control. These operated at three levels. At the level of the health system, disrespectful or scolding provider behaviour deterred caregivers from returning after a missed appointment, and strikes, stockouts, and service closures repeatedly frustrated those who did attend. At the practical level, the cost and burden of reaching the facility, and travel out of the pilot implementation areas, made attendance impossible at the scheduled time. At the household level, decision-making authority frequently lay beyond the mother, so that a partner or elder could block a willing caregiver from returning.

When you sincerely forget and report there later than scheduled, some nurses can insult you and speak to you disrespectfully. To save themselves that embarrassment, some who delay coming for the vaccine will not continue with it. So they automatically become the defaulters. (Okyere 2023, Ghana)

Some mothers become defaulters because they travelled away from the district. Besides, the vaccine was only provided in some selected districts. Thus, if you travel with your vaccination card, you will still not find a place to get the shot. (Okyere 2023, Ghana)

I could not force, because when the partner you are staying with does not approve of something, I cannot do it against his will. Although I was interested to enrol my child, since they refused, and the child is also theirs, I could not force things. (Achieng 2020, Kenya)

This theme drew on seven independent data sources spanning distinct barrier types. Because two contributing sources were only partially relevant to routine dose completion, the theme was judged to be of moderate confidence.

Confidence in review findings

Table 4
GRADE-CERQual summary of qualitative findings.

Summary review finding	CERQual confidence	Explanation of assessment
Caregivers initiate and continue the early doses when trust in the health system and frontline workers is reinforced over time by the visible reduction of malaria in their own children; acceptance is earned and grows rather than given at the outset.	High	Nine independent data sources; consistent across diverse settings; predominantly well-conducted studies; data drawn directly from caregivers of vaccine-eligible children in sub-Saharan Africa.
Completion erodes not through refusal but through a quiet drift: satisfaction that the child is already protected after the early doses, a final dose falling long after the primary series and outside routine immunisation contact, and a sense that the four-visit schedule is excessive, so that even motivated caregivers do not finish.	Moderate	Rich but concentrated data anchored in the Healthcare Utilization Study cohort (counted once) and the Ghanaian defaulter study; highly coherent; downgraded for adequacy given reliance on fewer independent sources.
Caregivers who intend to complete are frequently prevented by forces beyond their control: disrespectful providers, unavailable services, stockouts and strikes, travel out of pilot areas, the cost and burden of attendance, and household decision-making authority that lies beyond the mother.	Moderate	Seven independent data sources across distinct barrier types; coherent; downgraded for the partial relevance of two sources (a hypothetical transmission-blocking vaccine and a trial-withdrawal context) to routine dose completion.

Discussion

This qualitative evidence synthesis set out to explain why caregivers in sub-Saharan Africa who begin the malaria vaccine series often do not complete it. The principal finding is that the central problem is not initial acceptance but the sustaining of caregivers across a long, multi-dose schedule. Caregivers in the included studies were, on the whole, willing: they trusted the health system, came to believe in the vaccine as they saw their children fall sick less often, and wanted to protect them. Completion nonetheless broke down, and it did so through a combination of premature satisfaction with early protection, a schedule structure that placed the final dose outside routine immunisation contact, and external barriers that prevented even motivated caregivers from returning.

Interpreted against the existing quantitative literature, this reframes the problem. Pooled reviews report high caregiver acceptance and willingness for the malaria vaccine in sub-Saharan Africa, yet programmatic data show that completion of the final dose lags far behind the primary series. Our synthesis explains that gap: stated intent measured at a single point does not capture the slow erosion of follow-through across more than a year. Caregivers who would answer an acceptance survey positively still did not finish, because the determinants of completion are different from the determinants of initiation. Programmatic data from the pilot bear this out: coverage of the first three doses reached roughly 70 to 75 percent, while fewer than half of eligible children received the fourth dose. This distinction, between why caregivers start and why they finish, is the core contribution of the review and is

consistent with the high-confidence finding that acceptance is earned and grows, set against the moderate-confidence findings that completion drifts and that willing caregivers are blocked.

The dose-journey dimension is central. Dropping out before the primary series and dropping out before the later dose appear to have different drivers. Early non-adoption in the included studies was more often linked to initial rumours, fear of adverse events, and first-dose eligibility confusion, whereas late non-completion was more often linked to premature satisfaction that the child was already protected, the long gap to the final dose, competing demands, and the final dose falling outside the Expanded Programme on Immunization contact points that ordinarily prompt a return. This matters because interventions effective at boosting initial uptake, such as one-off sensitisation, may do little for completion, which appears to require structural prompts late in the schedule.

These findings carry clear implications for practice and policy. First, aligning the timing of the final dose with an existing immunisation contact appears important; Ghana's rescheduling of the fourth dose to 18 months, to coincide with an existing immunisation visit, illustrates the value of embedding the dose in a visit caregivers already make. Second, reminder and defaulter-tracking systems that reach caregivers late in the schedule could counter the quiet drift identified in this review. Third, the prominence of provider conduct as a deterrent, and of trust in frontline workers as a facilitator, points to interpersonal communication and respectful care as levers for completion, not only for initiation. Fourth, because household decision-making authority could override a willing mother, demand-generation efforts may need to engage partners and other household decision-makers rather than caregivers alone.

This review has strengths and limitations. Its strengths include a registered protocol, dual independent screening and coding, a transparent treatment of an overlapping multi-country cohort as a single data source to avoid over-weighting, and the use of GRADE-CERQual to grade confidence in each finding. Limitations include the restriction to studies published in English, which may have excluded relevant Francophone and Lusophone work from high-burden settings; uneven country coverage, with several findings weighted toward Ghanaian and multi-country pilot data; reliance on caregiver self-report; and the inclusion of two sources of partial relevance to routine completion, a transmission-blocking vaccine acceptability study and a vaccine trial, which informed the willing-but-blocked theme and were reflected in its moderate confidence rating. The richest longitudinal narratives from one included study were available only in figure form and could not be fully extracted, which may have limited the depth of the completion analysis.

Several research gaps follow. Evidence specific to R21/Matrix-M and to countries newly introducing the vaccine outside the original pilot is still thin; most completion-relevant data come from the RTS,S pilot countries. Prospective qualitative work that follows caregivers specifically across the transition from the third to the final dose, and that engages household decision-makers, would directly address the determinants this review identifies as least well understood.

Actionable recommendations

The following recommendations follow directly from the synthesised facilitators and barriers and are intended for national malaria vaccine programmes.

Align the final dose with an existing immunisation contact. Schedule the last dose to coincide with a visit caregivers already make, so that completion does not depend on a separate, easily forgotten appointment that falls outside routine contact.

Introduce reminders and defaulter tracking late in the schedule. Target prompts at the period between the primary series and the final dose, when premature satisfaction and competing demands cause the quiet drift away from completion.

Invest in respectful, consistent frontline communication. Because provider disrespect deterred return and trust in nurses drove acceptance, train and support frontline workers in interpersonal communication and in clearly conveying that the full schedule is needed for protection.

Engage household decision-makers, not only caregivers. Where partners or elders hold authority over whether a child returns, extend demand-generation and sensitisation to those decision-makers so a willing caregiver is not blocked.

Communicate that early protection is not full protection. Counter the belief that three doses suffice by explaining, at each contact, that the final dose materially extends protection.

Conclusions

The principal determinants of malaria vaccine dose completion in sub-Saharan Africa lie not in whether caregivers accept the vaccine but in whether the health system, the schedule, and the household sustain them across it. Caregivers earn confidence in the vaccine and want to protect their children, yet completion is eroded by premature satisfaction with early protection, by a final dose that falls outside routine immunisation contact, and by system and household barriers that block willing caregivers. The central programmatic shift required is from securing initial acceptance to sustaining caregivers to the end of a long schedule, above all by embedding the final dose in an existing contact point and supporting caregivers through the months that separate the primary series from completion.

Abbreviations

CASP, Critical Appraisal Skills Programme; CERQual, Confidence in the Evidence from Reviews of Qualitative research; ENTREQ, Enhancing Transparency in Reporting the Synthesis of Qualitative Research; EPI, Expanded Programme on Immunization; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; OSF, Open Science Framework; SPIDER, Sample Phenomenon of Interest Design Evaluation Research type; WHO, World Health Organization.

Declarations

Competing interests.

The authors declare no competing interests.

Ethics approval and consent to participate.

Not applicable. This study is a synthesis of previously published literature and did not involve direct human subjects research.

Consent for publication.

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Author Contribution

KCN conceived and designed the review, developed the protocol and search strategy, conducted the searches, screened and extracted data, coded and synthesised the findings, assessed confidence in the findings, and drafted the manuscript. AN independently screened and extracted data, independently coded the findings, contributed to the thematic synthesis and confidence assessment, and critically revised the manuscript. MN contributed to data verification, interpretation of findings, and critical revision of the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials.

All data supporting the synthesis are included in the article and its additional files.

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Figures

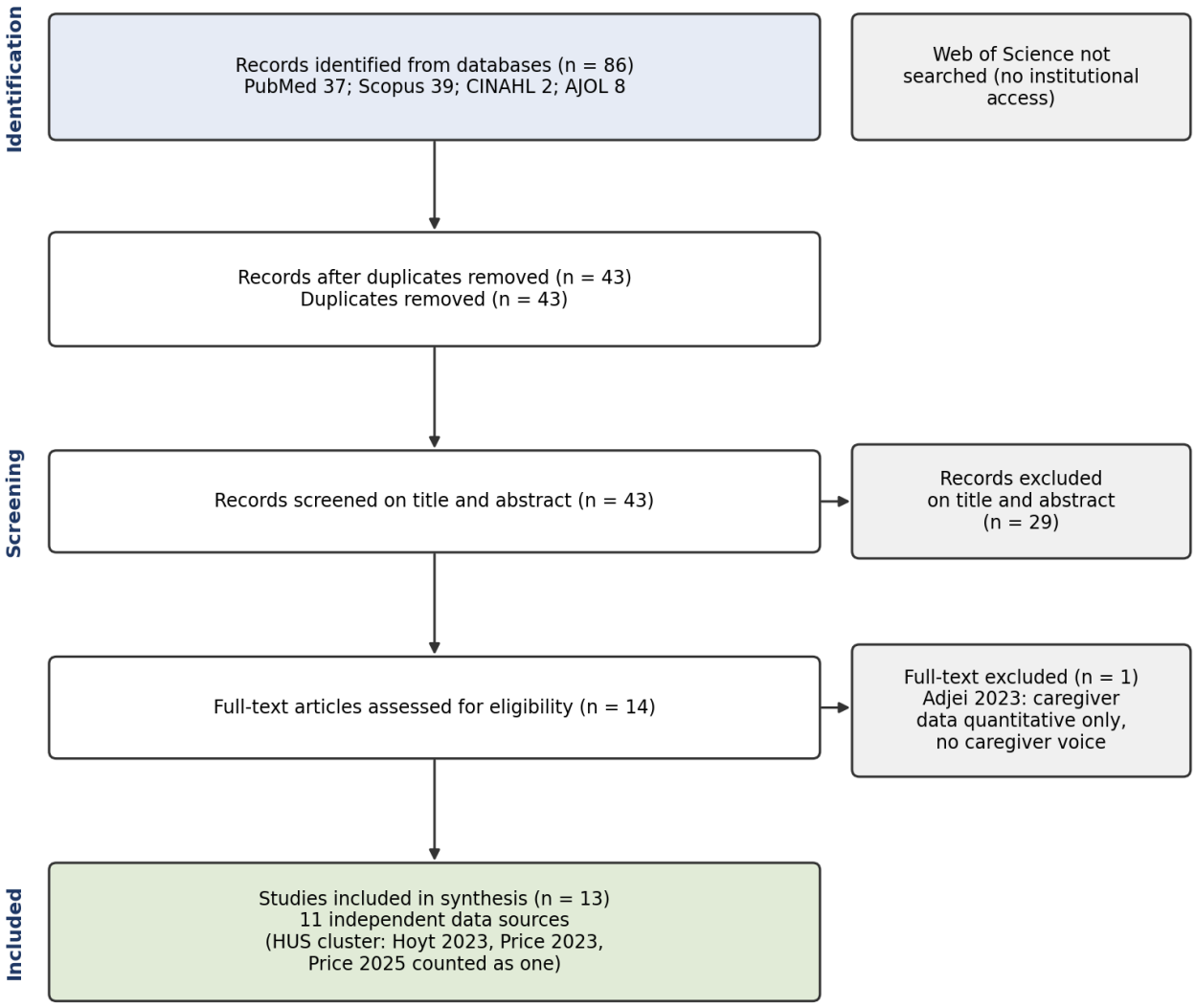


Figure 1

PRISMA 2020 flow diagram.

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