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Abstract

Problem Madagascar has a high number of unvaccinated (zero-dose) children. In 2023, an estimated 74% received any dose of the diphtheria–tetanus–pertussis (DTP) vaccine. In southern Madagascar, service gaps, poverty, drought and limited access leave many children unreached by routine immunization.

Approach Within the *Sorohy ny Aretina Manaova Ezaka Vaksiny* initiative, a community-based enumeration and vaccination-status verification was conducted in 16 districts in August 2024–June 2025 under health ministry authorization. A total of 3975 community health workers (CHWs) were recruited and trained to verify the vaccination status of all children younger than 5 years from available documentation in targeted fokontany (lowest administrative unit). Digital tools supported data collection, validation and CHW incentive payments.

Local setting The southern regions of Atsimo Andrefana, Androy and Anosy have about 3.7 million inhabitants, most in remote areas. Health indicators lag behind national averages. Volunteer CHWs lack training, supervision and financial protection, resulting in incomplete population data and weak microplanning.

Relevant changes Among the fokontany, 81% (3538/4347) completed registry updating. Overall, 58% (213 173/368 227) of the children enumerated had no documented DTP dose. District-level prevalence of no-dose children ranged from 25% (7956/32 015) to 86% (14 989/17 445). These data guided zero-dose mapping and targeted outreach. As of March 2026, 42 700 zero-dose children had received DTP vaccination, surpassing the programme target ahead of schedule.

Lessons learnt Locally led partnerships and CHW engagement, supported by simple digital tools and transparent financial mechanisms, produced actionable data on zero-dose children. Prior agreement on zero-dose case definitions ensures compatibility with national reporting.

Introduction

Routine childhood immunization is among the most effective and affordable public health measures for reducing child deaths.¹ Children who have not received even one dose of a diphtheria–tetanus–pertussis vaccine (DTP1) are considered zero-dose. This categorization is a practical measure to indicate exclusion from basic health services. By definition, the percentage of zero-dose children equals 100% minus DTP1 coverage.² In 2023, Madagascar’s estimated DTP1 coverage was at 74%.³

From 2019 to 2022, Madagascar was among the 10 African countries with the largest cumulative number of zero-dose children.⁴ The southern regions of the country are disproportionately affected by poverty, constrained transport access, recurrent drought and food insecurity.^{5,6} Weak health infrastructure and low community demand for vaccination contributed to recurrent outbreaks of vaccine-preventable disease including a 2018–2019 measles epidemic and circulating vaccine-derived poliovirus between 2020 and 2023.^{7,8} A key operational gap is the lack of disaggregated, village-level data on where zero-dose children live to guide targeted outreach.

In 2024, Doctors for Madagascar, a national nongovernmental organization, with the Ministry of Health’s Expanded Programme on Immunization (EPI) and an academic institution, launched *Sorohy ny Aretina Manaova Ezaka Vaksiny* (SOAMEVA) in Malagasy, meaning: prevent diseases, make an effort for vaccination. This initiative aims to reach 40 000 zero-dose children in 16 districts in three southern regions by mid-2026. We describe the initiative’s community-based listing and vaccination status verification designed to locate zero-dose children at household and village levels, thereby enabling targeted outreach and guiding vaccination efforts.

Local settings

Southern Madagascar (regions of Androy, Anosy and Atsimo-Andrefana) has about 3.7 million inhabitants, many living in remote rural areas with limited access to public services.⁹ Primary health care is delivered through *centres de santé de base* and is supported by community health workers (CHWs). CHWs are volunteer health workers periodically trained by district health authorities. Frequent gaps in training, supervision and financial protection contribute to incomplete paper-based community registers of children and vaccination status, and to unreliable data, complicating vaccination planning and outreach.¹⁰ SOAMEVA’s 2024 baseline assessment, including stakeholder interviews, a rapid assessment of 375 primary health facilities and a cross-sector workshop, confirmed that local immunization needs were underestimated and informed the design of the community-level enumeration.

The SOAMEVA programme has been scientifically evaluated by assessing the reach, effectiveness, adoption, implementation and sustainability of all programme components. This evaluation is ongoing and described in detail elsewhere.¹¹

Approach

The enumeration was designed as a programme tool, not a statistical survey, to generate data on where zero-dose children live to guide outreach and microplanning. Conducted between August 2024 and June 2025 in 16 districts, the activity was coordinated by Doctors for Madagascar with regional and district health authorities. CHWs were recruited to undertake the enumeration using the health ministry's standard community registry. Four steps were followed: registration, training and mobilization; household visits; verification and cross-checking; and digital validation and payment.

In step 1, each primary health facility selected one CHW per served fokontany (lowest administrative unit) who was registered to Tsaracheck, a digital payment and verification tool using subscriber identity module (SIM) card-linked unique identifiers. These CHWs received a half-day training on household visits, vaccination status verification and registry updating, with training content aligned with national EPI protocols.

In step 2, CHWs visited all households over 5 days, listing every child younger than 5 years and recording vaccination status from available documentation. If no household member was present, CHWs asked neighbours about the family's whereabouts and left a message requesting a return visit. CHWs documented vaccination status for all pathogens in the national schedule. We report DTP as the main zero-dose indicator. Doctors for Madagascar undertook supervision by spot checks.

In step 3, Doctors for Madagascar staff, together with facility staff and CHWs where available, verified and cross-checked completed registries against facility vaccination records from the preceding 5 years. A child was classified as zero-dose only if no documentary evidence of DTP vaccination was found from all available sources. Doctors for Madagascar staff and the facility head co-signed a cumulative report summarizing, for each fokontany, the number of children and the number classified as zero-dose. Non-availability of facility heads necessitated repeated visits sometimes.

In step 4 Doctors for Madagascar staff scanned and uploaded validated registries to Tsaracheck. Aggregated data per fokontany were entered into CommCare® (Cambridge, United States of America) for analysis and mapping, conditional on the co-signed verification report. CHWs received 50 000 Malagasy ariary (Ar) – about 11 United States dollars

(US\$) – on successful completion, equivalent to the government’s monthly cap for CHW incentives. Payments were processed and transferred via Tsaracheck after validation by the nongovernmental organization’s claims and finance team. The mobile-money transfer fee per payment (Ar 1300; about US\$ 0.30) was covered by the programme and not deducted from the CHW incentive.

The enumeration was launched sequentially by district cohort: nine districts between August 2024 and April 2025 and seven districts between February and June 2025; no district appeared in both phases. A dedicated field team managed each district, supported by colleagues from districts that had already completed or not yet started enumeration. Vaccination status was recorded on the enumeration date.

The activity had a budget of 380 000 euros (€) – US\$ 418 000 – including all human resources and field expenses. Digital tools were additional costs, including a paid CommCare® Pro plan (monthly subscription €400; US\$ 430) and €30 000 (US\$ 33 000) for Tsaracheck set-up and maintenance. The enumeration was conducted as a routine public health activity formally authorized by the health ministry. Individual-level data are stored on a protected server accessible only to authorized staff; no personal identifiers are reported here.

Relevant changes

In total, 4407 people were mobilized for the enumeration: 82 nongovernmental organization staff, 22 government health officials, 328 facility-based health workers and 3975 CHWs.

The activity covered 97% (328/339) of planned primary care facilities. Of targeted fokontany, 81% (3538/4347) completed registry updating, confirmed by the fokontany head. Data reported hereafter reflect only these fokontany. Data from 74% (3217/4347) of all targeted fokontany were digitized. Verified mobile payments were made to 3514 CHWs totalling Ar 180 million (about US\$ 39 500) through Tsaracheck.

Overall, 58% (213 173/368 227) of the children enumerated had no documented DTP dose (operational definition of zero-dose). District-level prevalence ranged from 25% (7956/32 015) in Fort-Dauphin to 86% (14 989/17 445) in Beloha, with the largest numbers in Ampanihy (45 676 children) and Betioky (30 682 children; Table 1). These data guided local zero-dose mapping and targeted outreach.

Enumeration revealed a substantially higher zero-dose burden than anticipated by previous estimates. The resulting evidence guided targeted sensitization and mobile vaccination efforts across 16 districts. As of March 2026, 42 700 zero-dose children in all 16 districts had been reached with DTP1 vaccination, surpassing the programme target ahead of

schedule. Additionally, more than 90 000 children younger than 5 years had received at least one vaccine dose. While SOAMEVA's vaccination activities are ongoing until July 2026 and georeferenced data have been shared with local health authorities to guide routine services and campaigns, an extension to reach remaining zero-dose children is being pursued, pending funding approval.

Lessons learnt

The SOAMEVA initiative demonstrated how jointly defined district priorities, CHW engagement and digital systems can identify zero-dose children and guide programme activities at scale (Box 1). The integrated paper-based and digital data collection process provided a geographically disaggregated view of where zero-dose children were concentrated. In addition, the availability of digital scanned community registries created a unique database of individual immunization records, enabling an ongoing secondary analysis of factors associated with vaccination coverage.

CHW dedication was decisive as their community ties and commitment to child health ensured acceptance and completeness of the enumeration. Transparent incentive payments to personal accounts, initially viewed with hesitation, proved effective and built confidence. This approach offers a practical model for equitable compensation in large, community-based interventions. Joint needs assessment and alignment with district workplans secured ownership and ensured consistent validation by public health authorities.

Two main challenges emerged. First, when new data revealed substantially higher zero-dose figures than previous estimates, some health facility leads hesitated to report them. District health authorities conducted site visits to reframe higher figures as evidence of improved data quality (rather than poor past performance). We learnt that changing established views about data requires sustained engagement. Future activities should strengthen communication to help health workers recognize discrepancies as improved accuracy. Second, differences in zero-dose definitions created challenges. SOAMEVA classified a child as zero-dose only if no DTP vaccination evidence was found in household, community and facility records. This definition is more rigorous than approaches using only vaccination cards but can produce higher estimates of zero-dose children than recall-inclusive methods. Although the documentation-based zero-dose definition was initially approved by the EPI, it later shifted its definition to include caregiver recall. However, because Madagascar's community registry does not include recall, this information was not collected during enumeration. Consequently, the collected data and results were not integrated into the national DHIS2 system. Nevertheless, the georeferenced fokontany-level enumeration results

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directly guided SOAMEVA's and other local actors' targeted vaccination and community sensitization activities. Future activities should agree on case definitions at the start and, ideally, collect both documentation and recall data.

Several elements of our approach are transferable: documentation-based zero-dose identification; mobile money incentives; community registry updating for pathogen-level targeting; and joint planning between nongovernmental organizations and government. The logistical challenges of geographic dispersion and community dynamics are in part specific to Southern Madagascar.

Three limitations should be noted. First, children without any vaccination documentation were classified as zero-dose regardless of recall; true unvaccinated prevalence may be lower. Second, enumeration completeness was not independently verified, and the denominator was restricted to enumerated children in fokontany that completed registry updating; results therefore represent operational proportions, not population-level estimates. Fokontany where registry updating was not completed were likely more remote and harder to reach. The data may therefore underestimate the true zero-dose burden. Third, reporting bias cannot be excluded. However, as our zero-dose figures substantially exceed previous estimates, underreporting driven by institutional desirability at the facility level is a more plausible bias than overreporting.

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Competing interests:

None declared.

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Box 1. Summary of main lessons learnt

- Enabling community health workers and ensuring fair, direct payment via mobile money were decisive for success.
- Combining paper registries with simple digital tools provided precise evidence on where zero-dose children were located.
- Explicit prior agreement on zero-dose case definitions with national authorities is essential to ensure compatibility of results with national reporting systems.

Table 1. Percentage of children 0–59 months with zero doses of diphtheria–tetanus–pertussis vaccine, by region and district, Southern Madagascar, 2024–2025

Region and district	No. of children identified	No. of zero-dose children, (%)
Androy		
Ambovombe	18 681	12 075 (65)
Bekily	35 407	22 493 (64)
Beloha	17 445	14 989 (86)
Tsihombe	18 804	9 171 (49)
Subtotal	90 337	58 728 (65)
Anosy		
Amboasary	39 231	18 602 (47)
Betroka	17 484	13 956 (80)
Fort Dauphin	32 015	7 956 (25)
Subtotal	88 730	40 514 (46)
Atsimo Andrefana		
Ampanihy	62 584	45 676 (73)
Ankazoabo	7 077	2 398 (34)
Benenitra	3 842	2 379 (62)
Beroroaha	4 386	3 014 (69)
Betioky	44 611	30 682 (69)
Morombe	11 303	8 243 (73)
Sakaraha	10 499	8 713 (83)
Toliara I	5 163	2 239 (43)
Toliara II	39 695	10 587 (27)
Subtotal	189 160	113 931 (60)
Total	368 227	213 173 (58)

Note: Data included are from fokontany (lowest administrative unit) with complete updated registries as confirmed by the fokontany head (81%; 3538/4347 of targeted fokontany). The figures therefore represent operational proportions among enumerated children, not population-level estimates.