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ABSTRACT

Background

Nurse home-visiting programs can improve maternal and child outcomes, but integrating them into municipal primary health care (PHC) requires adaptation, coordination, and local legitimacy. Primeiros Laços (PL; “First Ties”), a Brazilian nurse-led home-visiting program for young first-time mothers in social vulnerability, is being integrated into Brazil's Unified Health System (SUS). We examined its early implementation using the EPIS framework (Exploration, Preparation, Implementation, and Sustainment).

Methods

We conducted a qualitative comparative case study nested within a hybrid type I randomized controlled trial in two municipalities in interior São Paulo state. Twenty purposely sampled stakeholders (researchers, municipal managers, PHC nurses, and visiting nurses) took part in individual or dyadic semi-structured interviews, with findings discussed in two feedback meetings. We used thematic analysis combining inductive coding with deductive interpretation guided by four EPIS domains—bridging, innovation, inner context, and outer context—followed by a cross-case comparison of the two municipalities.

Results

Bridging processes, such as shared values, co-ownership, and continuous communication between researchers, managers, and frontline teams, were central to building legitimacy. PL was initially perceived as complex given its intensity and specialized delivery requirements; adaptations improved feasibility, including reduced visit intensity, dedicated visiting nurses, and broadened eligibility. Within services, workload, turnover, and limited experience constrained recruitment: the first prenatal consultation, the intended point of invitation, was an overloaded moment for nurses and young women alike. Beyond services, dengue outbreaks, administrative transitions, and limited connectivity periodically shifted priorities. Although both municipalities received comparable bridging investment, only one initiated recruitment.

Conclusions

Early implementation of PL required more than transferring an evidence-informed intervention into routine care. Shared governance, negotiated roles, and active bridging between research and municipal management were conditions for implementation, not its byproducts. Bridging alone, however, did not translate into delivery: what distinguished the two municipalities was whether local services could absorb this work into existing routines, and whether delivery was

protected from competing demands. Nurses require protected time rather than an additional role, and readiness assessment should examine established service routines rather than expressed interest alone. These lessons apply to comparable PHC-integrated programs in low- and middle-income settings.

KEYWORDS

Nurse home visiting; Primary health care; EPIS framework; Bridging factors; Qualitative comparative case study; Young mothers; Unified Health System

CONTRIBUTIONS TO THE LITERATURE.

- Studies using the EPIS framework often treat bridging, the partnership work between researchers and health services, as a key driver of implementation; less is known about when this work leads to delivery.
- This study adds a two-site comparison from a public health system in a middle-income country, a setting under-represented in implementation science.
- It draws on absorptive capacity, a service's ability to take on new practices, to help explain why similar partnership efforts can lead to different outcomes across sites.
- It offers lessons for assessing readiness when research-led programs move into routine public services.

BACKGROUND

Investments during the first 1,000 days of life, a foundational period for developmental trajectories (1,2), especially in contexts of vulnerability, generate high social and economic returns across the life course (3). Early childhood interventions, such as home visiting programs, are among the most effective strategies for supporting child development and strengthening parenting (4). For these benefits to materialize at a population level, evidence-

based interventions must be incorporated and sustained within real-world health systems—a process of organizational decisions, contextual adaptation, and coordination across multiple actors that remains poorly understood once interventions move from research-led trials to routine implementation (5,6).

Brazil, an upper-middle-income country with 12 million children under 5 (7), has invested in early childhood policies, including Primeiros Laços (PL; “First Ties”), a nurse-led home visiting program for young first-time mothers living in social vulnerability. Inspired by the Nurse-Family Partnership and Minding the Baby (8,9), PL was developed in 2010 by Brazilian researchers to provide continuous support from pregnancy through the child's first two years, strengthening parenting competencies, promoting child development, and offering emotional and social support (10–12).

PL is situated within a broader Brazilian experience with home visiting, including Programa Criança Feliz (PCF; “Happy Child Program”), one of the world's largest such programs, which showed that parenting support can be incorporated into public-sector routines at scale (13). PL differs by targeting young first-time mothers with a more intensive, individualized, relational nurse-led intervention.

PL was previously tested in randomized trials in low-income neighborhoods, reporting positive effects on early child and caregiving outcomes, including improvements in children's expressive language and maternal responsiveness and indicators of more secure mother-infant attachment (10,11). Qualitative work with young mothers in the same context has shown how pregnancy and early motherhood reorganize identity and relationships, pointing to relational needs that routine services often struggle to address (14). From 2023 onward, PL has undergone a process aimed at integrating the program into primary health care, adapted into a hybrid type I randomized controlled trial in partnership with two municipalities in the interior of the State of São Paulo (15).

In this new stage, integrating PL into Brazil's Unified Health System (SUS) requires operational adjustments: strengthening partnerships with municipal managers and local teams, training primary care nurses as home visitors, and understanding the contextual determinants that shape implementation. The EPIS (Exploration, Preparation, Implementation, Sustainment) framework guided this process, specifying how outer context, inner context, innovation factors, and bridging factors informed decisions and adaptations during early implementation (16,17).

Despite PL's promising outcomes in earlier trials, known implementation barriers, such as reliance on personnel not embedded in the public health system, high staff turnover, difficulties with participant retention, and limited sustainability, are directly relevant here (15). The PCF experience shows that national scale-up does not ensure effective implementation: delivery quality depended not only on political prioritization but on stable funding, supervision, workforce conditions, and monitoring (18,19). Attrition and lower-than-planned dose are recurrent threats across the home-visiting literature (20,21).

Against this background, this study had two aims: primarily, to identify the determinants of PL's early implementation across the four EPIS domains—bridging factors, innovation factors, inner context, and outer context—and the adaptations they prompted; and secondarily, to compare the trajectories of two municipalities exposed to comparable bridging investment, examining what determines whether such investment converts into operational delivery. The study covers the exploration, preparation, and early implementation phases; sustainment was not addressed, as the program had not reached that stage.

METHODS

This is a qualitative comparative case study nested within a hybrid type I randomized controlled trial of PL, conducted in two municipalities in the interior of the state of São Paulo between 2024 and 2026. It addresses the implementation component of the trial, examining

143 determinants and adaptations during the integration of PL into primary health care (15). A full
144 description of PL following the TIDieR checklist is provided in **Additional File 1**.
145 The study was reviewed and approved by the Ethics Committee of the Faculty of
146 Medicine of the University of São Paulo (approval no. 7.253.183/2024) and followed the
147 Consolidated Criteria for Reporting Qualitative Research (COREQ) (Additional file 2) (22).

148 **Study Setting**

149 Primary care is organized largely through the Family Health Strategy, Brazil's
150 community-based model in which multiprofessional teams, including community health
151 workers, are responsible for a defined territory and conduct regular home visits as part of
152 routine care (23). Prenatal care is typically initiated early within primary health care (PHC)
153 (national guidance recommends starting by 12 weeks (24), with a minimum of seven visits)
154 and includes interprofessional follow-up.
155 PL is being integrated into PHC systems of two municipalities in the interior of São
156 Paulo state, referred to here as Municipality A (MA) and Municipality B (MB); municipalities
157 are not named in order to protect the identity of local stakeholders. These municipalities were
158 selected based on prior partnerships between local governments, funders, and the research
159 team. Both are located in an economically dynamic region of the state and present high
160 municipal human development indices (above 0.75), while still including pockets of social
161 vulnerability targeted by the program.
162 MA has approximately 250,000–300,000 inhabitants and 15–20 PHC units, with a more
163 established presence of home-visiting practices. MB is considerably smaller (fewer than
164 100,000 inhabitants, around 10 PHC units), has lower community health worker coverage, and
165 implemented the Family Health Strategy only recently, with less population exposure to home
166 visits (**Table 1**).

---INSERT TABLE 1 ABOUT HERE---

Key implementation milestones in each municipality are summarized in **Figure 1**.

---INSERT FIGURE 1 ABOUT HERE---

Participants engaged in developing, implementing, and delivering PL between 2024 and 2026 were categorized by role: research team, municipal public health professionals, and nurses. Twenty stakeholders were interviewed, 14 of them women, with characteristics reported at group level to preserve anonymity. The research team (R) comprised nine participants with diverse health-related backgrounds (nursing, medicine, psychology, physical education), including both the program's creators and researchers who joined during its newer phase. Seven municipal public health professionals (M) were included (health secretaries, municipal managers, and primary care unit coordinators; five from MA and two from MB). Four nurses (N) were included, all from MA: the two nurses hired to deliver home visits, corresponding to the entire delivery team, and two PHC nurses responsible for identifying and inviting eligible young women, whose participation was limited by availability.

Qualitative Data Collection

Research team's positionality

Two researchers (EAN and DTC), psychiatrists who are native Portuguese speakers and based in São Paulo, were responsible for data collection. They had no prior relationship with the program, the municipalities, or the participants, and began attending weekly administrative meetings once data collection started, progressively becoming part of the research team without taking part in program delivery. LB is a French child psychiatrist who also speaks Portuguese and, not being involved in the study setting, contributed an external perspective to data analysis.

Interviews

EAN and DTC conducted interviews with the 20 participants via Zoom, lasting approximately one hour, using a semi-structured interview guide (Additional File 3). Interviews were individual, except for the visiting nurses, interviewed as a dyad because they shared the same role and worked together in delivery. The guide did not directly address the EPIS framework, instead broadly assessing participants' relationship with the implementation process. Participants were purposively selected to maximize breadth across sectors involved in PL, with invitations sent via WhatsApp or email. Eight invited participants did not respond or repeatedly rescheduled; six were linked to MB. MB's thinner account is partly structural rather than a sampling artifact: because delivery had not begun there, no visiting nurses existed to interview, and non-response affects the municipal-professional group specifically. Sample sufficiency was appraised in terms of information power (25)).

All participants provided informed consent prior to the interviews, under the ethical approval granted to the project as a whole. Interviews were conducted at a single time point during early implementation and audio-recorded with permission. Recordings were transcribed verbatim using automated software, then checked against the audio, corrected, and deidentified; transcripts were not returned to participants. Field notes were taken after each interview, and EAN and DTC held debriefing discussions to review emerging content and refine subsequent probing.

Data Analysis

Analytical framework

Qualitative implementation research often uses deductive, framework-informed analysis to generate actionable findings (26). The EPIS framework, which organizes the adoption and sustainment of innovations in public service settings (16,17) and guided PL's integration into primary health care (15), also informed this analysis. Implementation outcomes

(acceptability, feasibility, appropriateness) follow Proctor et al. (27), as adopted in the trial protocol.

Thematic analysis approach

Transcripts in Portuguese were analyzed using thematic analysis (28), following a hybrid inductive–deductive approach (29). This approach is frequently used in implementation research because it allows inductive organization of content derived from the data while also supporting deductive structuring guided by an implementation framework, in this case EPIS (30).

In the first analytic stage, two researchers (EAN and DTC) independently coded all interview transcripts using Microsoft Word to open and track codes without additional software. Through consensus of discussed interpretations, codes were organized into an initial codebook consisting of defined domains, themes, and subthemes. The codebook was then presented to and discussed with the research team (R) in two one-hour virtual meetings held specifically for this purpose; these reflections informed the subsequent refinement of themes and, in some cases, adaptations to the intervention.

In the second analytic stage, three researchers (DTC, EAN and LB) discussed their interpretations and reached consensus, refining the initial allocation into EPIS domains and themes. Because participants held distinct roles, convergent and divergent perspectives could be compared. In a third stage, each municipality was analyzed separately and the two were then contrasted, restricted to dimensions supported by data from both. All findings were reviewed with coauthors, who refined interpretations and shaped the practice-oriented recommendations.

Illustrative quotations were translated from Portuguese into English by the research team and reviewed to preserve meaning and context. Quotes are identified by role group and participant number (R, researcher; M, municipal public health professional; N, nurse), keeping individuals unidentified to preserve anonymity.

RESULTS

Guided by EPIS, the results describe PL's development from consolidating the research team through negotiating with municipalities to program launch and the start of recruitment (themes: Table 2; adaptations: Table 3), organized into four domains—bridging factors (4 themes), innovation factors (3 themes), inner context (4 themes), and outer context (3 themes), beginning with bridging as the foundational process.

Divergent implementation trajectories across municipalities

MA and MB diverged sharply. Both trained PHC nurses and held a launch event, MB first (training late 2023, launch May 2024) and MA subsequently (training early 2024, launch June 2024). MA then hired nurses dedicated exclusively to home visiting and began recruitment and delivery in June 2024. MB consolidated no comparable arrangement and had initiated neither recruitment nor delivery by the time of analysis, despite a formal relaunch in August 2025 (Table 1, Figure 1). Findings below therefore reflect MA's experience primarily, with MB noted where specified; recruitment and delivery are reported separately, as they are distinct steps.

---INSERT TABLE 2 ABOUT HERE---

Domain 1: Bridging factors

This domain describes how shared values sustained collaboration amid tensions between scientific rigor and municipal feasibility, and how negotiation translated these values into shared commitments.

1A- Building a common good

Consolidating the research team and presenting the project to municipalities raised tensions examined below, sustained throughout by a shared expectation of making a positive difference in young mothers' and children's lives:

> "(The program's potential impact is) improving these people's lives, improving these children's trajectories and outcomes; and these children grow up and become adults with better physical and mental health, live better, contribute more, also make better choices, place less burden on the health system, go further in education". (R7)

1B - Balancing rigor and feasibility

An initial challenge was establishing governance that balanced scientific rigor with the flexibility municipal adoption required:

> "(The challenge is) doing this in a rigorous, scientific way, in a way that would produce results allowing us to draw scientific conclusions, but at the same time so that we could make a difference in the lives of the pregnant adolescents we are going to follow." (R1)

1C - Engaging municipalities

As preparation advanced, the team sought continuous communication with municipalities through periodic meetings with regional leaders and weekly administrative meetings. Initial reception varied, with early apprehension about novelty.

> "Everything new creates discomfort (…) in some places we see it's difficult to accept the new." (M3)

With ongoing dialogue, municipalities became more receptive and open to understanding what the program could bring locally.

284 “The municipality has been quite receptive, and I think it’s also taking a wait-
285 and-see approach, trying to see what this will bring to it.” (R4)

286 *1D - Translating values into commitments*

287 A key turning point was recognizing common ground that brought teams closer to
288 municipal realities. One shared value stood out—the desire for real impact on young mothers'
289 and children's lives—which sustained engagement and strengthened willingness to incorporate
290 PL into routines:

291 “We discovered more shared values among us, what is motivating us, which is,
292 ultimately, bringing an impact to people’s lives.” (M4)

293 Together, these bridging processes created the relational foundation for subsequent
294 decisions about feasibility and how delivery could be operationalized while protecting core
295 components.

296 **Domain 2: Innovation factors**

297 This domain describes how perceived complexity and operational commitment shaped
298 early reactions, and how the delivery model was adjusted to preserve core components.

299 *2A - Recognizing complexity and commitment*

300 During preparation, both the research team and municipal professionals raised concerns
301 about the intervention's complexity, requiring highly specialized professionals and a long
302 commitment:

303 “It requires a very well-trained professional, the nurse, for a long time, and I
304 think that goes somewhat against most of the trends in global mental health.”
305 (R2)

306 Municipal managers also worried that the program's scope, particularly the nurse's time
307 commitment, could intimidate PHC teams:

> "Making so many visits, following someone for such a long time, may end up being a bit intimidating." (M1)

2B - Reconfiguring the delivery model

PL's initial plan had PHC nurses combine delivery with regular duties, generating concern among coordinators and nurses given their already high workload:

> "I think this is the most important issue, (...) nurses are usually coordinators of their health teams; they have a wide range of responsibilities. So I think this model, in which the nurse, who already has 250 responsibilities, will take on this responsibility too, (...) I think this has always been the central issue, the central difficulty." (M2)

This tension clarified that feasibility depended on defining a delivery arrangement that fit municipal capacity while preserving PL's essential mechanisms.

2C - Protecting core components

To improve feasibility while preserving core components, visits were reduced from 66 in the original design to 38: pregnancy (13 biweekly), postpartum (3 biweekly), 2–12 months (12 biweekly), and 13–24 months (10 monthly). The figure drew on the team's accumulated experience of what schedule families and services could sustain, and closely approximates the mean dose actually completed in the earlier trial. Delivery through less specialized workers was also considered but judged likely to affect effectiveness:

> "Using professionals with much less training, such as community health workers, nursing technicians… leads to worse outcomes." (R3)

In MA, a key decision was hiring nurses dedicated exclusively to home visiting, limiting PHC nurses to presenting the program and inviting eligible young women, who

scanned a QR code to complete consent; the research team then initiated enrollment. This addressed a programmatic barrier:

> "Considering that there will be a nurse working full-time for this project, then yes, I think the program becomes implementable." (R5)

Once the delivery model was clarified, attention shifted to how PHC units could integrate recruitment workflows and sustain implementation within routine service conditions.

Domain 3: Inner context

Barriers were not limited to program design. This domain describes how staffing, workload, and how established home visiting already was shaped PHC capacity to absorb the program.

3A - Managing PHC workload

Even after hiring dedicated visiting nurses, many PHC professionals still voiced workload concerns, since PHC nurses retained responsibility for inviting and engaging young women—an addition to already-central routines:

> "A professional who, in eight hours [of work], has to handle everything from chronic diseases to compulsory notification diseases, management and coordination of the PHC unit, it's really a lot of demand for a nurse here in the municipality." (M1)

3B - Recruitment workflow

Inviting young women at the first prenatal encounter was repeatedly described as pivotal; acceptance depended on how well PHC nurses understood and endorsed the program. In practice, that appointment involves multiple competing demands, so nurses sometimes forgot to offer it:

354 "Because nursing staff already had a full prenatal routine, ordering tests and
355 following the standard care pathway, they might end up forgetting to offer the
356 program at the first [prenatal] visit." (N1)

357 Others noted this is also an overloaded moment for young women; some suggested a
358 later invitation, an adaptation discussed but not yet implemented:

359 "At the first prenatal visit there is a lot of information for them, so I believe that
360 if it were offered at a second moment, it would give her a little more time to
361 organize herself psychologically." (N3)

362 *3C - Staffing and turnover pressures*

363 Variation in staffing and turnover affected how easily PHC units incorporated new
364 workflows; reduced staffing intensified the perception of PL as an added task. With both public
365 servants and outsourced workers, replacing staff is slow, requiring repeated orientation:

366 "Professional turnover is very high; we're in a period where there are still many
367 outsourced professionals, and turnover is very high." (M5)

368 *3D - Limited culture of home visiting*

369 Although home visiting is an established strategy within the municipal health system,
370 home visits for pregnant women specifically are not institutionalized as routine practice:

371 "We have never done home visits for pregnant women." (N3)

372 Because home visiting for young mothers was not routine in some territories, readiness
373 depended on how families perceived receiving a professional at home:

374 "Our patients, even because we didn't have a culture of the Family Health
375 Strategy, our patients are not used to home visits. Receiving the professional at
376 home is still something very new for us, for our population." (N2)

Adaptations to the inner context

Several strategies improved fit with PHC workflows (Table 3). Communication emphasized that PL could support rather than add to routine work:

> "From the moment they (PHC nurses) understand that this will reduce the work because there will be health education for these pregnant adolescents, and they will have closer follow-up from that moment on, they start to find it a bit easier to join the project." (M6)

The research team maintained presence within PHC to prevent the program becoming invisible amid turnover; staff who saw early results became more engaged:

> "It really took off; the girls were very committed to it and they started to realize the meaning and importance of the program for our pregnant adolescents, and I think that helped a lot." (M4)

Further adaptations included coordinating new hires to balance staffing, flexible scheduling for visiting nurses including Saturdays, posters in PHC units, and follow-up with young women who scanned the QR code without completing enrollment. A visitation center and a later invitation were also under consideration.

Even with strengthened internal workflows, implementation remained sensitive to municipal-level disruptions and structural constraints lying largely outside service routines, described below.

Domain 4: Outer context

This domain describes external municipal contexts—disruptions and broader factors that reordered priorities and affected continuity during early implementation.

4A - Competing municipal priorities

Municipal health services faced periods when urgent demands, such as dengue outbreaks, redirected attention away from the program, temporarily displacing PL from PHC teams' agenda and slowing recruitment:

> "These last two months have been terrible for the PHC units because of dengue fever in the municipality."(M2)

Administrative changes tied to the electoral cycle also caused discontinuities in planning, requiring renewed negotiation and, at times, temporary pauses. In MB, the program was subsequently relaunched under the incoming administration in August 2025.

4B - Territorial infrastructure

In some territories, limited internet access created operational barriers, since young women could not reliably scan the QR code to complete consent—a recurring constraint in peripheral neighborhoods, requiring alternative pathways:

> "Another difficulty we had was related to the internet; it's a neighborhood with a lot of difficulty accessing the network, and patients had that difficulty." (N3)

4C - Sociodemographic profile

Intramunicipal sociodemographic heterogeneity shaped the eligible pool: despite pockets of vulnerability, high human development indices meant lower-than-anticipated adolescent pregnancy rates in some territories, encouraging broader eligibility.

> "Our adolescent pregnancy rate is not among the most alarming; I'm concerned whether we will have enough patients to carry out the project." (M5)

Adaptations to outer context variability

The research team monitored municipal priorities and service conditions, prioritizing adaptations that protected core delivery while accommodating temporary pauses (Table 3):

continuous communication with municipal leadership, reinforced shared responsibilities with PHC teams, and fallback enrollment options where connectivity was limited. Eligibility was expanded from 14–19 to 14–24 years, and community-facing outreach was developed through social media and public campaigns.

> "This expansion of the pregnant adolescent's age range was what caught my attention the most, because I thought it was very restricted." (M2)

---INSERT TABLE 3 ABOUT HERE---

DISCUSSION

Early implementation of PL required more than transferring an evidence-informed intervention into routine services. It depended on relational alignment across partners, targeted adaptations to protect core components under real-world constraints, and sustained investment in recruitment and service readiness. Our findings indicate that this relational groundwork—comprising shared governance, negotiated roles, and continuous bridging between the research team and municipal management—operated as a condition for implementation rather than as its byproduct.

Divergent implementation trajectories

The most instructive finding, however, concerns the limits of that groundwork. As Table 1 summarizes, comparable bridging strategies were deployed in both municipalities, yet only one progressed to delivery. Because bridging was present in both cases, this comparison cannot test whether it is a necessary condition; that premise is imported from theory. What the contrast can speak to directly is what had to accompany it (31) (Table 4, Figure 2).

What differed was the capacity of each inner context to absorb this work. MA's longer-established Family Health Strategy meant home visiting was already intrinsic to routine care,

so services had workflows, professional roles, and population expectations broadly compatible with PL (23). In MB these conditions were still being built.

A second, more operational difference reinforced this asymmetry. In MA, negotiation secured nurses dedicated exclusively to home visiting, leaving PHC nurses to identify and invite eligible young women. In MB no comparable arrangement was consolidated, and delivery would have depended on nurses carrying other responsibilities—the arrangement participants identified as the central obstacle to feasibility. With two cases, this association is suggestive rather than explanatory.

Read together, these differences suggest that bridging work converted into operational arrangements where the inner context could accommodate them, and remained at the level of negotiation where it could not—consistent with absorptive capacity, an organization's ability to assimilate new practices as a function of pre-existing knowledge and routines (32,33).

The asymmetry appeared self-reinforcing. Access to senior managers in MB was more intermittent, limiting opportunities to convert general endorsement into decisions about staffing and referral routines. Leadership engagement is a consistently identified determinant of implementation (34), and its absence compounded the weaker inner-context conditions.

Our sample composition is consistent with this process: six of the eight invited participants who did not take part were linked to MB. This remains a methodological limitation rather than evidence of disengagement, since non-response may reflect individual circumstances. Read alongside independently reported evidence of thin institutional bandwidth in MB, however, it is more parsimoniously read as part of the same pattern.

For scale-up, readiness assessment should not rely on expressed interest alone: municipalities may endorse a program enthusiastically while lacking the routines through which endorsement becomes operational. Where structured home visiting is not already

embedded, bridging work may need explicit capacity-building and early clarification of who will deliver.

Bridging factors and linkage processes

Bridging factors were central because they aligned divergent institutional priorities around a shared purpose. Municipalities prioritized feasibility and visible results; the research team emphasized fidelity and long-term sustainability. Implementation advanced only once PL was understood by both as a shared good.

---INSERT FIGURE 2 ABOUT HERE---

This process can be read through a values-based lens: good decisions depend not only on evidence but on recognizing the diverse values of those involved, especially where these conflict (35,36). In PL, shared values were actively constructed through meetings, negotiation, and repeated clarification of expectations—relational work that recent specifications of the bridging construct identify as a distinct implementation mechanism rather than a preliminary courtesy (37).

Scaling PL therefore requires values alignment as much as technical adaptation, through structured early spaces where each group articulates what it understands as success.

Innovation Factors

The decision to preserve nurse delivery shaped implementation more than any other design choice. Trial evidence from the Nurse-Family Partnership shows more consistent outcomes for nurse-delivered than paraprofessional-delivered visits (38), a rationale participants invoked when rejecting less specialized delivery. Retaining it, however, relocated the problem rather than resolving it: it required either a demanding new role for overburdened PHC nurses or funding dedicated personnel.

These characteristics also make PL more demanding than programs designed for breadth. Compared with PCF, PL involves a longer and more intensive schedule, a specific professional profile, a narrower eligible population, and relational continuity across more than two years; its constraints center on workforce specificity and duration rather than coverage (13,18).

Reconciling these demands with municipal capacity required adaptation rather than deviation. The visit schedule was reduced from 66 to 38, drawing on the team's accumulated experience of what families and services could sustain; the resulting figure closely approximates the mean dose actually completed in the earlier trial (14). This, with dedicated visiting nurses and a clarified interface with routine PHC teams, improved fit while preserving nurse-delivered relational continuity as the intervention's defining feature (39,40). A reduction of this magnitude is not trivial where effects are plausibly dose-dependent.

One limit should be acknowledged: the evidence supporting nurse delivery concerns outcomes rather than how care is experienced, and our data captured those designing and delivering the program rather than those it serves. A companion study of mothers in the original trial offers a partial answer: participants valued continuity of care, a non-judgmental stance, and gradually paced information—needs plausibly met through sustained nurse visits (14). Whether this generalizes here bears on which components are genuinely core.

---INSERT TABLE 4 ABOUT HERE---

Inner context factors

A central inner-context challenge concerned the timing and quality of invitations. Recruitment depends on how professionals explain the intervention, whether families trust its purpose, and whether referral routines are embedded in everyday workflows (41). Our findings

suggest a further condition: recruitment quality also depended on how well PHC nurses understood and endorsed the rationale.

This is consequential in overburdened services, where competing demands crowd out the time and confidence that inviting a young woman to a multi-year program requires (42,43). Recruitment therefore cannot rest on individual motivation; it requires recurring reinforcement and feedback as ongoing support rather than one-off dissemination (44,45).

Outer context factors

Outer-context conditions shaped implementation less through dramatic disruption than through competition for institutional bandwidth. Dengue outbreaks and administrative transitions did not oppose the program; they displaced it, absorbing the managerial attention on which decisions about staffing and referral routines depended. What matters is less whether such events occur than whether the program is anchored in arrangements that survive them.

Political change proved double-edged. In MB the electoral cycle first suspended decision-making, and the program was subsequently relaunched under the incoming administration. Decisions about funding, workforce arrangements, and inclusion in municipal planning instruments determine whether a program becomes routine, so policy operates as an active element of implementation rather than a distant contextual variable (46); sustainability depends less on preserving the intervention intact than on embedding it in instruments that outlast any single administration (40). Notably, the relaunch had not translated into recruitment by the time of analysis, suggesting that renewed institutional commitment does not by itself resolve the operational conditions required for delivery.

Whose implementation problem?

PL was developed in São Paulo, adapting models designed in the United States, and presented to both municipalities as a completed intervention. Local actors were consulted on

how it might be delivered, but not on whether it addressed a problem they recognized as theirs. The asymmetry is familiar from debates on knowledge transfer in global health, where agendas and evaluation criteria are set at a distance from the settings expected to absorb them (47,48); the same structure can operate within a single country. Read this way, MB's trajectory is less a failure of local capacity than a limit of the approach: engagement was sought after the design was fixed. What would be done differently is not a further adaptation of PL, but an earlier conversation about what a municipality's services and families need.

Practical recommendations mapped to EPIS phases

Based on these findings, we propose an initial set of practical recommendations to support implementation of PL in new municipalities and comparable programs in low- and middle-income settings, organized by EPIS phase (Table 5); these are prospective and complement the adaptations documented in Table 3.

---INSERT TABLE 5 ABOUT HERE---

Limitations and future directions

Findings reflect two municipalities with specific partnership histories, which may shape transferability. The two cases are unequally represented—nine participants from MA and two from MB, with no nurses from MB because delivery had not begun there—so the comparison is asymmetric by design and presented as contrasting rather than matched. MB is also less than half MA's size, with roughly half as many PHC units, so institutional routines and municipal scale are not fully separable here; scale is a plausible contributing rather than competing explanation. Participation was limited among frontline professionals, and researchers formed a substantial share of the sample; although essential for understanding design and bridging processes, this may have amplified the perspective of intervention developers, including

possible social desirability in interviews conducted by colleagues. Preliminary findings were discussed with the research team only, not with municipal professionals or nurses.

The study did not include the perspectives of the young women themselves, whose experience is central to refining PL and strengthening acceptability, engagement, and equity; their participation began only at recruitment, without formal co-design. This perspective is examined in a companion phenomenological study of the original PL trial (14), drawn on above; a study of participants' experience within this newer implementation phase specifically remains a priority for future work.

Data were generated at a single time point during early implementation, limiting inference about how determinants evolve and introducing possible recall bias. The study could not assess effectiveness, fidelity, costs, or sustainment. Future work should examine how these mechanisms develop during later phases—how financing, policy alignment, workforce stability, and participant engagement interact with bridging factors over time—and whether comparable processes operate in municipalities with different readiness or political continuity.

Conclusions

Integrating a nurse home-visiting program into primary health care depended less on the quality of the intervention than on whether local services could absorb it. Three conditions emerged as decisive.

First, nurses need protected time. What distinguished the municipality that began delivering was not enthusiasm or institutional endorsement, present in both, but an arrangement in which delivery was shielded from competing demands. This is not simply a staffing question: what must be secured is time that existing responsibilities cannot erode, which may mean relieving nurses of other duties rather than adding a role to a saturated routine.

Second, the program is an investment rather than an additional service. Its costs are concentrated in workforce time and its returns accrue over years—a framing municipalities needs to be made explicit if the commitment is to appear proportionate.

Third, what the program delivers is a relationship. Continuity with a known and available professional is the mechanism through which its content becomes usable for young mothers; adaptations that preserve schedule and content but erode that continuity would retain the form of the intervention while losing its function.

ABBREVIATIONS

COREQ: Consolidated Criteria for Reporting Qualitative Research

EPIS: Exploration, Preparation, Implementation, Sustainment

FAPESP: São Paulo Research Foundation

FRAME: Framework for Reporting Adaptations and Modifications-Enhanced

PCF: Programa Criança Feliz ("Happy Child Program")

PHC: primary health care

PL: Primeiros Laços ("First Ties")

SUS: Unified Health System (Sistema Único de Saúde)

TIDieR: Template for Intervention Description and Replication

DECLARATIONS

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee of the Faculty of Medicine, University of São Paulo (approval no. 7.253.183/2024; CAAE 74833323.0.0000.0068) as part of the parent trial. All participants provided written informed consent before taking part, including consent for audio recording.

Consent for publication

Not applicable.

Availability of data and materials

The interview transcripts analysed during the current study are not publicly available because, given the small number of professionals in each role and municipality, they could allow participants to be identified. De-identified excerpts are available from the corresponding author on reasonable request, subject to approval by the Research Ethics Committee. The intervention description, the completed COREQ checklist and the interview guide are provided in Additional files 1 to 3.

Competing interests

The authors declare no financial competing interests.

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Authors' contributions

EAN and DTC conducted the interviews, coded and analysed the data and drafted the manuscript. LB contributed to the analysis and supervised the study. All authors contributed to the interpretation of findings, critically revised the manuscript, and read and approved the final manuscript.

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781

782 **TABLES AND FIGURES**

783

784 **Table 1. Comparison of implementation trajectories across municipalities**
785 **EPIS domains, themes and implementation determinants**

786

Dimension	Municipality A	Municipality B	Implementation implication
Prior home-visiting practice	Family Health Strategy longer established; home visiting part of routine care; population familiar with receiving professionals at home	Family Health Strategy implemented recently; lower community health worker coverage; home visits unfamiliar to much of the population	Existing routines and population expectations eased incorporation of PL

Dimension	Municipality A	Municipality B	Implementation implication
Delivery arrangement	Nurses hired exclusively for home visiting; PHC role limited to recruitment	A comparable arrangement was not consolidated; delivery would depend on nurses holding other responsibilities	A protected delivery role appears to be a condition for initiating delivery
Leadership engagement	Continuous contact with municipal managers; participation in weekly administrative meetings	More intermittent contact; fewer opportunities to convert endorsement into operational decisions	Sustained access to decision-makers enables workflow-level decisions
Participation in this study	Five municipal professionals and four nurses interviewed	Two municipal professionals interviewed; six of eight non-participants were linked to this municipality	Difficulty accessing local actors both reflected and reinforced stalled implementation
Implementation status at analysis	Recruitment initiated; home visits under way	Recruitment not initiated	Comparable bridging investment produced divergent outcomes

MA = Municipality A; MB = Municipality B; PHC = primary health care.

Table 2.
EPIS domains, themes and implementation determinants

EPIS domain	Theme	Determinants identified
Bridging factors	1A Building a common good	Shared expectation of impact sustained collaboration through early tensions between the research team and municipalities
	1B Balancing rigor and feasibility	Tension between preserving methodological rigour and responding to municipal demands for uptake
	1C Engaging municipalities	Apprehension about novelty; need for continuous dialogue to understand local needs and constraints
	1D Translating values into commitments	Recognition of common ground enabled co-ownership and local willingness to incorporate PL into routines
Innovation factors	2A Recognizing complexity and commitment	Specialised workforce and long, intensive visit schedule perceived as barriers by both researchers and municipal professionals
	2B Reconfiguring the delivery model	PHC nurses' existing workload incompatible with combining routine duties and program delivery
	2C Protecting core components	Trade-off between improving feasibility and preserving the mechanisms considered essential to effectiveness
Inner context	3A Managing PHC workload	Recruitment tasks added to already saturated routines, even after dedicated visiting nurses were hired
	3B Recruitment workflow	First prenatal visit overloaded for both professionals and young women; invitation quality dependent on nurse understanding and endorsement

EPIS domain	Theme	Determinants identified
	3C Staffing and turnover pressures	Reliance on outsourced workers; slow replacement; heterogeneous caseloads across units within the same municipality
	3D Limited culture of home visiting	Home visiting for pregnant women not institutionalised as routine practice; unfamiliar to part of the local population
Outer context	4A Competing municipal priorities	Epidemiological emergencies and electoral cycle displaced PL from local agendas, slowing recruitment
	4B Territorial infrastructure	Limited internet access prevented QR-code enrolment in peripheral and newer neighbourhoods
	4C Sociodemographic profile	Smaller eligible pool than anticipated, given high human development indices in parts of both municipalities

PHC = primary health care; PL = Primeiros Laços. Themes were derived inductively and subsequently allocated to EPIS domains. Sustainment was not addressed in this study.

Table 3.
Adaptations introduced during early implementation

Adaptation	Reason	EPIS domain	Core function preserved	Possible trade-off
Visit schedule reduced from 66 to 38 visits	Long, intensive schedule perceived as unfeasible within municipal service capacity	Innovation factors	Thematic content and follow-up to 24 months retained	Reduced dose may attenuate effects
Nurses hired exclusively for home visiting	PHC nurses unable to absorb delivery alongside routine duties	Innovation factors / Inner context	Nurse delivery and relational continuity preserved	Depends on dedicated funding; uncertain sustainability
PHC role limited to presenting the program and inviting eligible young women	Need to reduce burden on PHC teams while retaining service-based recruitment	Inner context	Recruitment remains embedded in routine prenatal care	Program visibility depends on continued PHC engagement
Delivery through less specialised health workers considered and rejected	Proposal to improve feasibility by broadening the delivery workforce	Innovation factors	Professional profile maintained as a core component	Higher cost and narrower scalability
Eligibility expanded from 14–19 to 14–24 years	Eligible pool smaller than anticipated in higher-income territories	Outer context	Focus on first-time mothers in vulnerable situations retained	Population less homogeneous than in earlier trials
Flexible scheduling, including out-of-hours and Saturday visits	Young women's routines incompatible with standard working hours	Inner context	Visit frequency and content unchanged	Additional demands on visiting nurses
Community-facing outreach through social media and public campaigns	Recruitment through routine services alone insufficient	Outer context	Eligibility criteria and enrolment procedures unchanged	Reaches beyond the PHC-linked population

Adaptation	Reason	EPIS domain	Core function preserved	Possible trade-off
Recruitment support: posters, WhatsApp and phone follow-up	Invitations sometimes not offered or not completed at the first prenatal visit	Inner context	Consent procedures unchanged	Requires continued research-team involvement
Later invitation in the prenatal pathway (under consideration)	First prenatal visit overloaded for young women receiving multiple information	Inner context	Recruitment during pregnancy retained	May delay enrolment and shorten antenatal exposure

PHC = primary health care. Adaptations are reported following the principles of the Framework for Reporting Adaptations and Modifications-Enhanced (39)(FRAME). All adaptations were decided jointly by the research team and municipal stakeholders.

Table 4.
Conditions for implementation: theoretically posited and empirically differentiating, by domain and municipality

Condition	Standing in this comparison	Municipality A	Municipality B
Bridging factors (shared values, co-ownership, continuous communication)	Posited by theory — creates legitimacy and willingness to engage; present in both cases, so not tested here	Present	Present
Absorptive capacity (home-visiting routine already embedded in PHC practice)	Differentiating — determines whether bridging converts into operational arrangements	Present (longer-established Family Health Strategy)	Emerging (Family Health Strategy implemented recently)
Protected delivery arrangement (dedicated visiting nurses vs. PHC nurses absorbing the role)	Differentiating — operational precondition for delivery	Achieved (nurses hired exclusively for home visiting)	Not yet achieved (delivery predicated on PHC nurses' routine duties)
Leadership engagement (sustained access to senior municipal managers)	Reinforcing — sustains conversion of endorsement into decisions	Continuous	Intermittent
Implementation status at analysis	—	Recruitment initiated; delivery under way	Recruitment not initiated

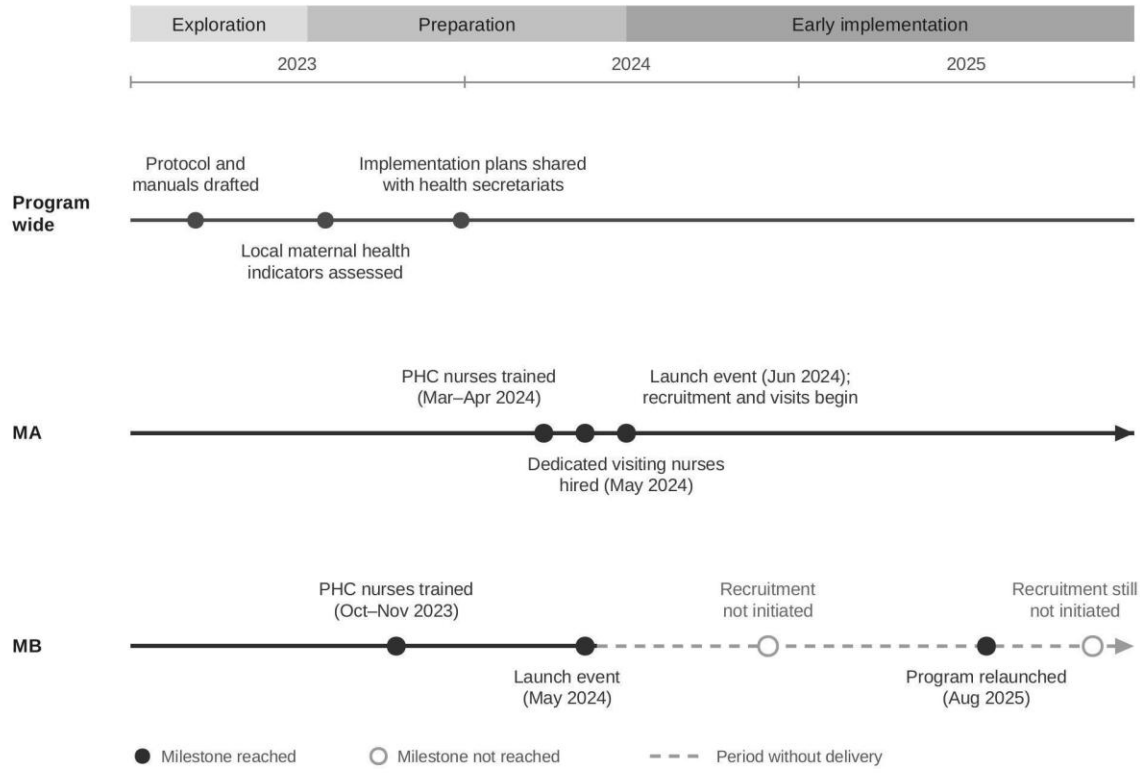
PHC = primary health care. Bridging factors were present in both municipalities; because no case in this comparison lacked them, their standing as a condition for implementation is posited by theory rather than tested here. The conditions that varied between the cases—absorptive capacity and a protected delivery role—are those this contrast can speak to directly. See Figure 2 for a schematic representation.

Table 5.
Practical recommendations mapped to EPIS phases

EPIS phase	Recommendation
Exploration	Assess local maternal health, adolescent pregnancy, early childhood and home-visiting policies, identifying whether home-based care is already embedded in municipal planning

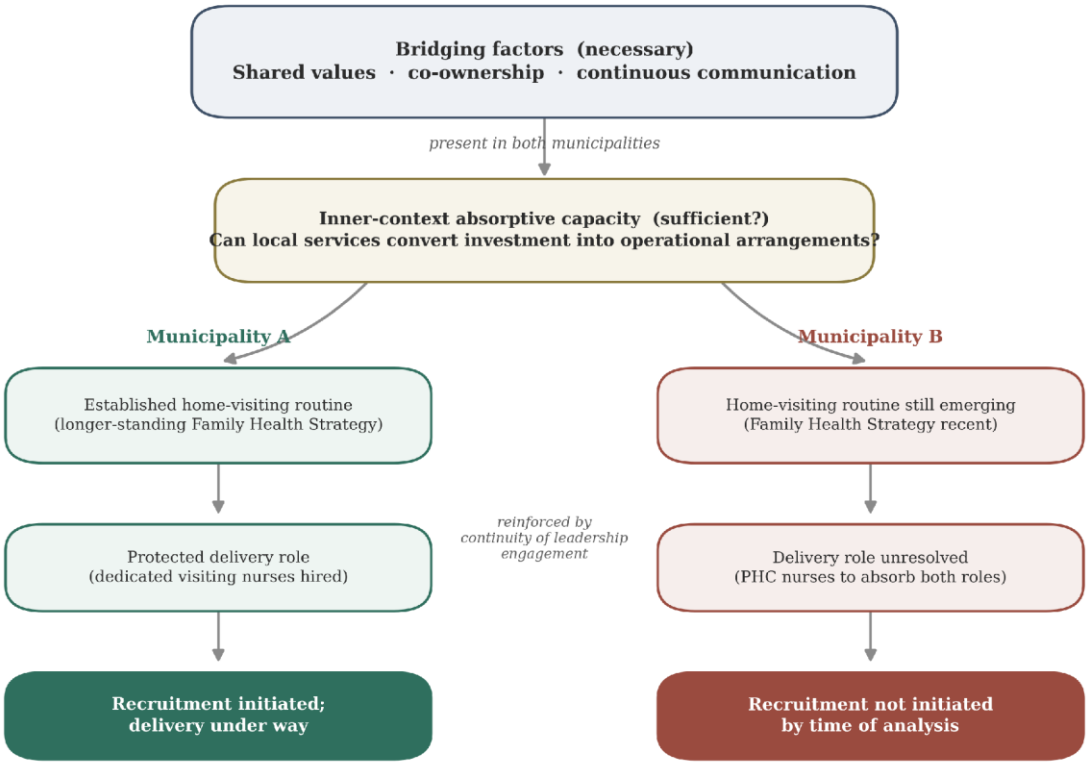
EPIS phase	Recommendation
	Map prenatal routines and bottlenecks to identify realistic entry points for recruitment, enrolment and follow-up
	Map local realities, including young maternal pregnancy rates, vulnerable territories, internet access barriers and gaps in PHC coverage
	Examine actual PHC workflows, especially nurses' clinical, managerial, administrative and territorial responsibilities beyond formal policy descriptions
	Conduct rapid exploratory qualitative work with managers, PHC nurses, frontline professionals and young mothers to identify local perceptions and feasible entry points
Preparation	Involve people with lived experience in adapting recruitment materials, consent procedures and communication strategies
	Create structured spaces for researchers, managers and frontline teams to articulate what each understands as success and what constraints each faces
	Define early who will deliver the intervention, and secure a protected delivery role where routine staff cannot absorb it
	Co-design recruitment workflows with PHC services, defining who invites eligible participants, when invitations occur, and how second invitations or alternative enrolment routes are offered
	Train PHC teams specifically for recruitment, emphasising how to present the program, communicate its value and respond to doubts or hesitation
	Establish unit-level feedback loops and sensitization routines that maintain visibility and reinforce shared ownership
	Use preparation meetings to reinforce shared values and the short- to medium-term benefits for families, PHC teams and municipal health systems
Implementation	Protect core components while enabling targeted adaptations that improve feasibility, such as flexible scheduling, reminders and alternative delivery settings, documenting the rationale and possible trade-offs of each
	Reduce burden on PHC teams through staffing coordination and technical supports
	Provide regular feedback to PHC teams and municipal managers on recruitment, enrolment, visit initiation, retention and early acceptability indicators
	Maintain active recruitment support through reminders to PHC teams, WhatsApp or phone follow-up, and contact with young women who start but do not complete enrolment
	Develop community-facing awareness strategies, including posters in PHC units, public-space campaigns and digital media directed at eligible young women and families
	Monitor barriers in real time and adapt operations when needed, including alternative enrolment pathways and renewed sensitization in services affected by turnover or competing priorities

Figure 1.
Key implementation milestones in each municipality



Timeline of key milestones by EPIS phase. Filled circles indicate milestones reached; open circles, milestones not reached; dashed line, period without delivery. MA = Municipality A; MB = Municipality B; PHC = primary health care.

Figure 2.
Conditions for implementation across the two municipalities



Bridging factors were present in both municipalities; their necessity is posited by theory rather than tested by this comparison. Whether bridging converted into delivery tracked each municipality's absorptive capacity (an embedded home-visiting routine and a protected delivery role), reinforced by continuity of leadership engagement. PHC = primary health care

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- ADDITIONALFILESIntegratingahomevisitingprogramintoBrazilianPHCAQualitativeStudyISfinal.docx