RAÍCES

Addressing Challenges in the future of work

REIMAGINING COMMUNITY HEALTH CARE THROUGH WORKER-GOVERNED ARTIFICIAL INTELLIGENCE

TEAM: LATIN AMERICA

THE GENEVA CHALLENGE 2026

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ABSTRACT: The future of work will be shaped not only by what artificial intelligence can do, but by who has a voice in governing it. Care work sits at the center of this debate: deeply relational, performed predominantly by women, and persistently undervalued. Community health workers form one of the largest yet least recognized workforces in global health, and the World Health Organization projects a shortfall of 11.1 million health workers by 2030. In Colombia, more than 40,000 community mothers (madres comunitarias) have sustained early childhood care for over four decades under precarious conditions; in 2025, the State began formalizing them as public employees, opening a rare policy window. Yet three global agendas, the formalization of care work, the digital transformation of health, and the ethical governance of AI, advance along separate tracks, risking a future in which workers are formalized on paper but subordinated to AI systems designed without them. RAÍCES responds with a worker-governed model of AI. Its central innovation is institutional rather than technological: a new paid occupational role, the Community AI Steward (Gestora Comunitaria de IA), and a Community AI Governance Council with binding authority over the system. Structured as a nine-month public innovation laboratory in rural Nariño, and using chronic child malnutrition as its demonstration case, the pilot follows five participatory phases under a Type II hybrid effectiveness-implementation design, with success thresholds defined in advance. Designed in a territory representative of much of rural Latin America, RAÍCES turns the abstract principle of human oversight into a concrete job, offering a replicable pathway so that those who sustain care have a voice in the technologies that will transform it.

KEYWORDS: care work, community health workers, worker-governed AI, future of work, participatory governance, human oversight, just transition, Colombia

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Note: Artificial Intelligence model (Claude, by Anthropic) was used as a support tool for writing, style correction, translation into English, and generation of supporting images.

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1. INTRODUCTION

Over the next decade, the future of work will be shaped not only by AI's capabilities but by who has a voice in its development, governance, and distribution of benefits. The World Economic Forum estimates that AI and automation will simultaneously drive job creation and loss at a scale redefining entire occupations, with the difference between inclusive and exclusionary transitions hinging on institutions, training, and mechanisms of collective representation (1).

Care work sits at the center of this debate: deeply relational, performed predominantly by women, and persistently undervalued (2). Within this workforce, community care workers (CCWs) (Figure 1) sustain health and social protection systems by the millions, yet enter the AI era with no say in the design, implementation, or governance of technologies reshaping their daily practice.

Community health workers (CHWs) are among the largest and least recognized workforces in health systems worldwide (3,4). The WHO projects an 11.1 million health worker shortfall by 2030, concentrated in low- and middle-income countries, with women comprising 67% of the global health workforce (5), a gap that calls not just for more workers, but for strengthening, professionalizing, and empowering those who already sustain primary care in their territories. Colombia offers an exceptional setting for this: after over four decades of precarious conditions, in 2025 the State began formalizing "*madres comunitarias"* (community mothers) as official ICBF employees (6,7), opening a unique window to define AI's role in their work, not whether these technologies will change what they do, but whether they will help steer that change or remain passive users of systems designed without their input.

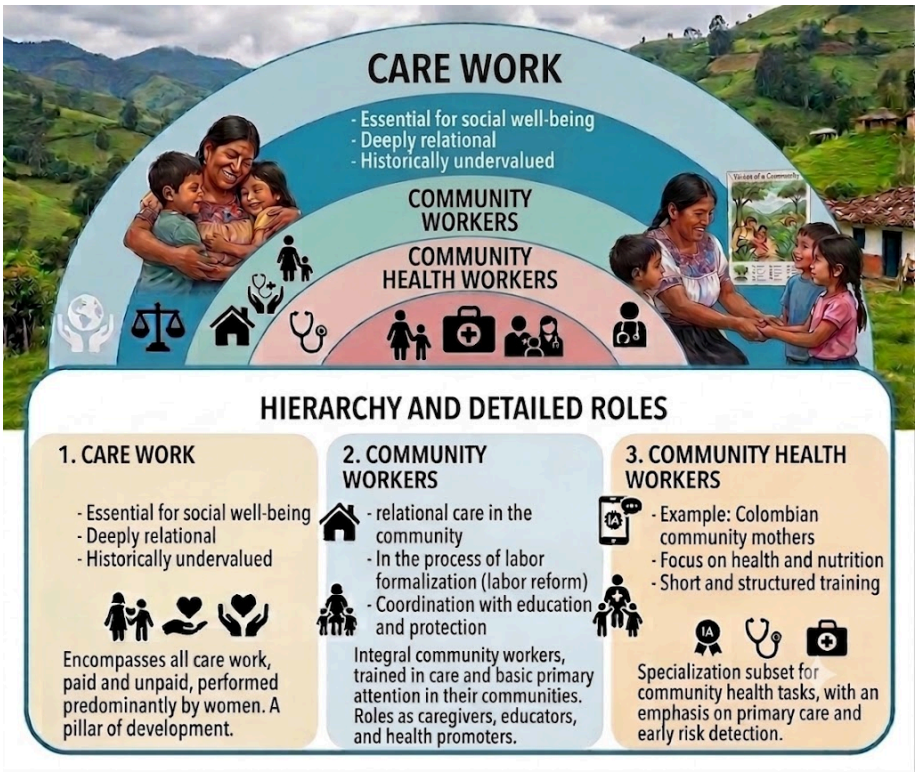


Figure 1. Hierarchical Model of Care Work and Role Specialization in Community-Based Care

RAÍCES responds to this challenge. Its hypothesis: active CCW participation in the design, validation, governance, and oversight of AI allows these technologies to augment rather than displace human labor, strengthening professional capabilities, generating new roles, improving recognition and working conditions, and contributing to better community health outcomes. RAÍCES's core innovation is not a technological tool, but a model of AI co-production and participatory governance led by formalized community workers — a replicable pathway toward a more equitable, inclusive, people-centered technological transition.

2. MAGNITUDE OF THE PROBLEM

2.1 Care work at the center of the future of work

Debates on the future of work tend to focus on high-wage professions exposed to automation, yet the most consequential transformation is unfolding in a less visible terrain: care work. The International Labour Organization (ILO) places the care economy at the heart of decent work, arguing that paid and unpaid care work sustains every other economic activity and represents one of the greatest job-creation opportunities of the coming decades (8,9). Investment in the sector could generate up to 299 million decent jobs by 2035 (nearly 80% held by women), including up to 30 million in Latin America and the Caribbean alone (9). The ILO's 5R framework calls for recognizing, reducing, and redistributing unpaid care work, and rewarding and representing those who provide it (9). RAÍCES operationalizes the last two Rs in the AI era: raising the value of care work and giving those who perform it a voice in decisions that reshape it.

AI's employment impact is not predetermined: technologies also create new activities in which human capabilities become more valuable, so the net effect on jobs and wages depends on design choices, policy, and institutions (10,11) — hence the key distinction between automation (executing tasks without human involvement) and augmentation (expanding human judgment and performance) (11). This raises two central concepts: just transition, ensuring access to training, protection, and decision-making power; and reskilling, still constrained by digital and gender divides affecting rural, low-income women (12,13). The challenge, then, is not more sophisticated AI, but adoption models that strengthen human labor and distribute innovation's benefits equitably.

2.2 Community health workers: invisibility and feminization

CHWs are predominantly female community members who receive brief but structured training to bridge households and the formal health system (4). Evidence spanning four decades shows that well-designed, supervised CHW programs significantly improve maternal and child health coverage: a Cochrane review of 82 trials found increases in childhood vaccination (RR 1.22), breastfeeding initiation (RR 1.36) and exclusive breastfeeding (RR 2.78), and tuberculosis cure rates (RR 1.22), though evidence on mortality reduction remains low-quality (14). Recognizing this potential alongside persistent

quality gaps, the WHO published 2018 guidelines on optimizing CHW programs within interprofessional primary care teams (3).

Despite this evidence, CHW work has been historically invisibilized, often under volunteer or outsourced arrangements without contracts or social security (15,16), an invisibility with a clear gender bias, treating care work as a natural extension of domestic roles rather than skilled employment. Any technology that ignores this history risks reproducing it. CHWs also carry a double care burden: their paid role compounds unpaid domestic care at home, a pattern confirmed in a qualitative study from the Dominican Republic linking expanded responsibilities and inadequate pay to threats to workers' sustainability and well-being (43).

In Colombia, the community mothers figure originated in the Hogares Comunitarios de Bienestar program, a low-cost state policy that instrumentalized vulnerable women by framing childcare as volunteering rooted in maternal instinct, evading the State's employer obligations and deepening labor precarity and gender inequality for decades (48). This persists today: 40,469 community mothers and fathers care for 454,531 children (ICBF) (7), acting de facto as caregivers, educators, and CHWs without labor guarantees. This scale and precarity make Colombia a natural laboratory: a predominantly female workforce sustaining early childhood care for over forty years under conditions the State itself calls a historic debt (7). Recognizing this work as decent employment, not volunteering, is the premise of any just technological transition: AI can only augment work first recognized as work.

2.3 The policy window

In 2025, Colombia opened a policy window that makes this workforce a unique case study on a global scale. Article 68 of Law 2466 of 2025, known as the Labor Reform, mandated that ICBF progressively incorporate community mothers, substitute mothers, and childcare home workers into its permanent staff as official employees (6). This mandate was given concrete regulatory form through Decree 0586 of May 2025, which recognized the position of community mother as a public-sector assistant-level position with an open-ended contract and a minimum wage floor, and Decree 1398 of 2025, which created the first 2,353 positions (17,18).

In February 2026, the first 2,300 community mothers were formally incorporated as public employees, the initial tranche of a target the Government projects at between 40,000 and 60,000 formalized workers by 2029 (7). The question RAÍCES poses is one of timing: formalization creates, for the first time, the contractual stability and social security conditions that allow these workers to take on new digital competencies without further precarization. Introducing participatory AI at precisely this moment allows technological professionalization to accompany legal formalization, rather than arriving afterward, disconnected from it.

3. THEORETICAL FRAMEWORK

3.1 Human-centered artificial intelligence

Shneiderman proposes a framework for human-centered AI that combines high levels of automation with high levels of human control, rejecting the false dichotomy between the two;

its guiding principle is to expand, not replace, human capability (19,20). The human-in-the-loop approach requires that consequential decisions remain under human oversight and accountability. These principles align with the OECD AI Principles and with UNESCO's Recommendation on the Ethics of Artificial Intelligence, both of which emphasize transparency, accountability, human oversight, and fairness (20,21). For the health sector specifically, the WHO has issued dedicated guidance on AI ethics and governance, emphasizing human autonomy and protection against bias (22).

3.2 Participatory artificial intelligence

Critical AI research has documented how systems reproduce bias when designed without the participation of affected communities, and has developed accountability instruments such as datasheets, model cards, and algorithmic audits (23,24,25). Abebe et al. propose concrete roles for computing in social change, framing it as a means of diagnosing, formalizing, and rendering visible structural problems, rather than as an isolated technical solution (26).

Recent literature also flags a risk: participation can become a mere legitimizing formality if it fails to transfer real decision-making power. Sloane et al. argue that participation is not a design patch for machine learning, while Birhane et al. distinguish between consultative, instrumental, and empowerment-oriented participation (27,28). Elish, through her concept of moral crumple zones, shows how human operators can end up bearing nominal responsibility for failures in systems they do not actually control (29). RAÍCES takes these warnings seriously: co-production is conceived simultaneously as a design method and as a governance mechanism, with effective transfer of decision-making capacity to CHWs through lived-experience panels, quality-improvement cycles, and a community council with binding authority over the system.

3.3 Community health workers and digital transformation

WHO guidelines and systematic reviews establish that CHW programs require community-based selection, adequate training, supportive supervision, fair remuneration, and integration into the health system to be effective and sustainable (3,14,15). Digital health transformation, as organized by the WHO through its classification of digital health interventions, offers opportunities to ease administrative burden and improve data quality, but only if it is designed with and for those who use it on the front line (30). The Community Health Impact Coalition has argued that professionalization, salary, and recognition are preconditions, not consequences, of any technological improvement (15).

3.4 Implementation science

RAÍCES adopts the Medical Research Council framework for complex interventions, which integrates development, feasibility, evaluation, and implementation in an iterative, context-sensitive manner (31). Evaluation draws on the RE-AIM framework, the Consolidated Framework for Implementation Research (CFIR 2.0), and Proctor's implementation outcomes, which distinguish between acceptability, adoption, appropriateness, feasibility, fidelity, cost, and sustainability (32,33,34). The study is

structured as a type II hybrid effectiveness-implementation design, which simultaneously assesses effects on work and outcomes alongside implementation strategies (35). The intervention is further built using participatory action research methods, human-centered design, and living labs, consistent with the co-production principle.

4. THE POLICY GAP: A GLOBAL PROBLEM

No country has yet formalized a female care workforce while also designing and governing, together with that workforce, the AI transforming its work, a global gap, not just Colombian. Three agendas advance on separate tracks: care work formalization, digital health transformation, and AI ethical governance. Formalization recognizes rights and stability but does not anticipate AI's arrival in the workplace (8); digital health initiatives deploy tools but treat workers as mere end users, and even where technical capacity exists, surrounding systems are unprepared to integrate AI safely (36,37); AI ethics frameworks articulate human oversight and fairness but offer little guidance on achieving real participation from frontline workers with limited digital literacy (22,23).

This disconnect creates a predictable risk: AI introduced from outside, after formalization, would exclude workers from its design, reproduce cultural and linguistic biases, and be perceived as control rather than support, a new form of labor degradation, formalized on paper yet subordinated to opaque algorithmic systems (29), leaving the ILO's fifth R (representation) without a claimant in the AI era (8).

RAÍCES fills this gap with a replicable institutional design: it uses the formalization window to couple labor rights with digital and governance competencies, turns human oversight into a concrete job, and unites the three disconnected agendas into one model. Colombia is where this window is open today, but the gap is shared by dozens of countries formalizing and digitalizing their care workforces in the coming years.

5. THE INTERVENTION: THE "RAÍCES" MODEL

5.1 Hypothesis and theory of change

RAÍCES's theory of change contrasts two possible trajectories arising from the same starting condition: labor formalization. The conventional trajectory and the RAÍCES trajectory (Figure 2). The assumptions underpinning this causal chain are explicit and verifiable. First, that formalization provides the stability conditions needed to invest in AI literacy and participatory co-design, without this translating into uncompensated overload. Second, that participation with real decision-making power, in contrast to the external, top-down introduction characteristic of the conventional trajectory, produces an AI role and system that are more culturally and functionally relevant, and therefore better adopted and sustained. Third, that formal recognition of the new role, together with corresponding pay and certification, translates increased competencies into genuine career mobility rather than unrecognized additional labor. Fourth, that community work carried out with greater autonomy, reduced administrative burden, and more time for direct care translates into verifiable improvements in the coverage, timeliness, or relevance of the health services delivered to the community. Fifth, that the conditions of participatory governance and cultural adaptation that explain success in the pilot territory are transferable to other territories, without the scale-up phase

reproducing the externally driven design logic characteristic of the conventional trajectory. Each assumption is linked to indicators in the evaluation plan.

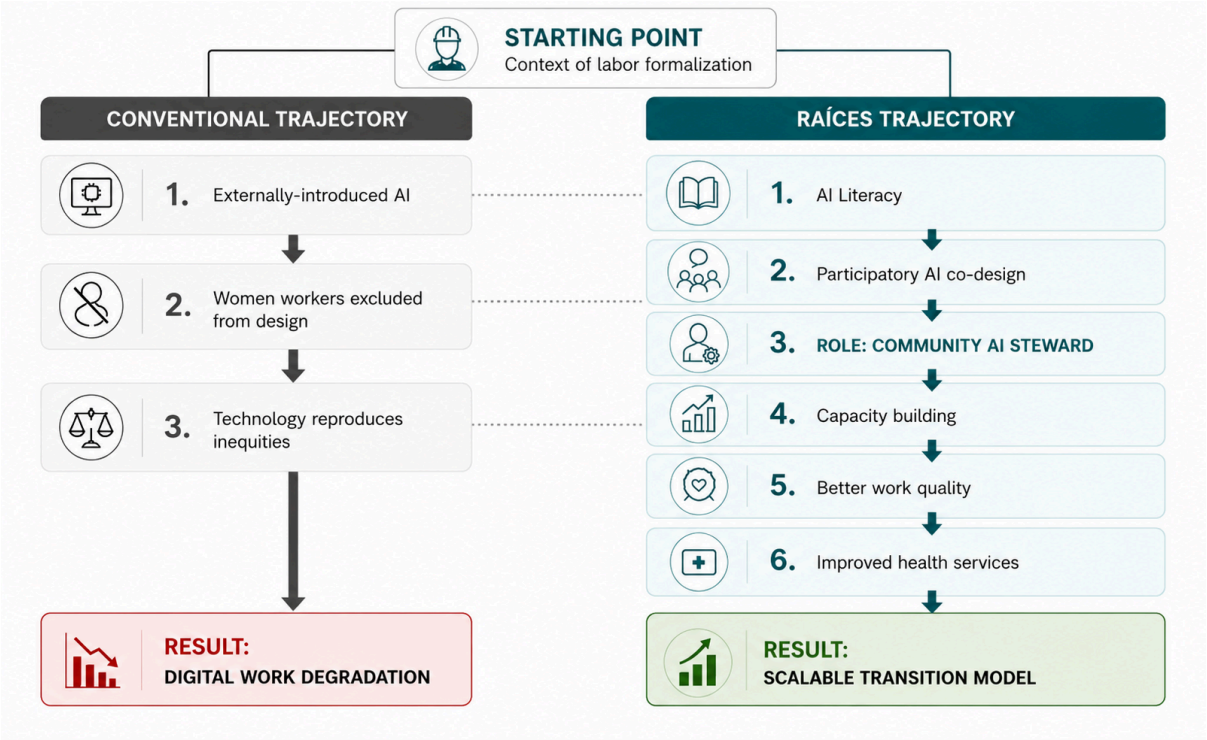


Figure 2. Comparative theory of change

The entire intervention revolves around a six-step cycle that turns every act of care into a learning cycle. Community work generates a situation; AI offers support; the worker validates and decides; the community provides feedback; AI improves based on that feedback; and the institution learns and adjusts its rules. The cycle never ends: each turn makes the worker more capable and the technology more relevant.

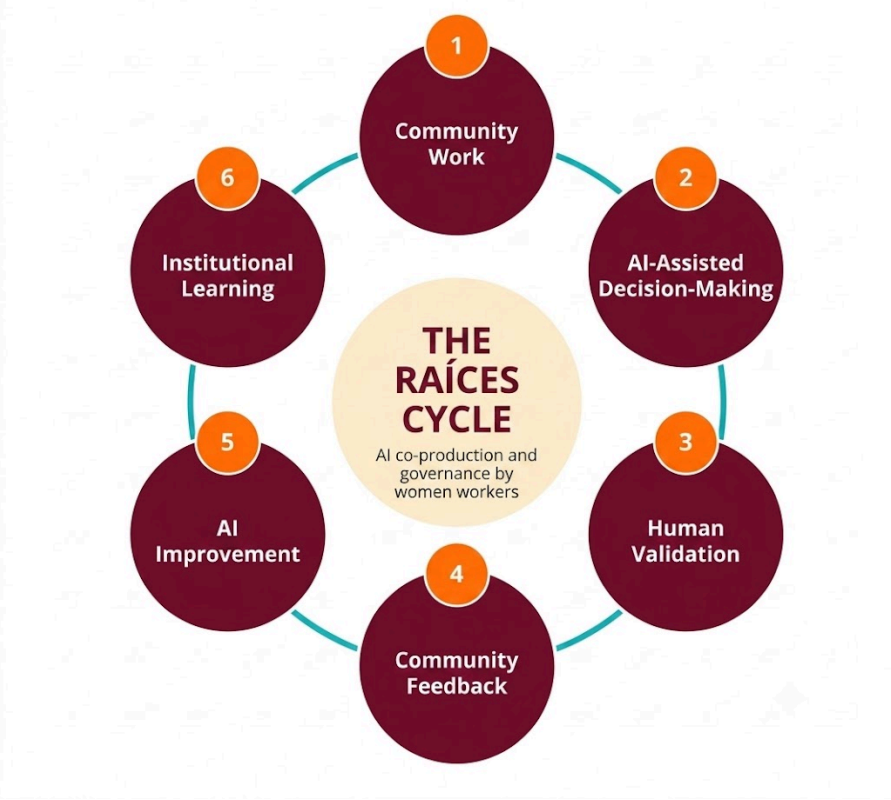


Figure 3. The RAÍCES Cycle: six steps that augment both the worker and the AI, simultaneously.

5.2 The new occupational profile: the Community AI Steward

RAÍCES's central innovation is the creation of a new occupational profile: the Community AI Steward. This is not a tool user, nor an external technician, but a community worker who takes on human custodianship of the AI system in her territory (Table 1). The profile translates the principle of human oversight articulated by ethical frameworks (20,22,23) into a concrete, paid job.

The role is conceived as a professional progression scale within formalized employment, comprising three levels: Steward in training, Certified steward, and Mentor. Each level is linked to verifiable microcredentials, salary recognition, and growing supervisory and representational responsibilities. In this way, the growth of capabilities translates into upward career mobility rather than unpaid overload.

Table 1. The New Occupational Profile: The Community AI Manager

Dimension	Content
Functions	Supervise the AI, detect biases, validate outputs, propose improvements, represent the community, oversee ethics and privacy, and train new workers.
Competencies	Digital and AI literacy, critical thinking about outputs, ethics and privacy, governance, leadership, and community facilitation.
Recognition	Verifiable microcredentials and certification of the role, linked to formalized employment and to salary recognition by level.
Career pathway	Progression across three levels: Steward in training, Certified steward, and Mentor, with growing responsibilities and pay.
Scalability	A replicable profile for other community health roles and other territories, provided the co-design process and participatory governance that gave rise to it are preserved, and a foundation for a new occupational category recognized by qualification systems.

5.3 Demonstration case and territory

5.3.1 The territory: rural Nariño

Nariño, in southwestern Colombia, is predominantly rural: 56% of its population lives outside urban centers, mainly in the Pacífico Sur, Obando, and Centro subregions (46). This rurality drives poverty rates well above the national average, 21.4% rural multidimensional poverty in 2022, versus 12.7% in municipal seats, driven by informal employment, low education, and inadequate access to potable water (46). Its economy rests on small-scale subsistence farming (potatoes, maize, coffee, plantains, panela), a model with limited capacity to absorb economic or climate shocks to household food security. Nariño is also one of Colombia's most ethnically diverse departments: over 206,000 people self-identify as Indigenous (2018 Census), including large Pasto, Awá, and Quillasinga populations, plus a significant Afro-descendant population along the Pacific coast (47), a composition that deepens vulnerability, as more than half of Nariño's Indigenous population lives below the poverty line (46), compounding social determinants of health such as child nutrition.

This rural, multi-ethnic, moderate-to-high poverty profile, with intermittent connectivity and limited device access, is not unique to Nariño: it recurs across the Andean regions of Ecuador, Peru, and Bolivia, and much of Latin America and the Caribbean, giving Nariño strong value as a generalizable, regionally replicable pilot site.

Figure 4. Map of the department of Nariño, Colombia, showing its territorial boundaries

5.3.2. Chronic Child Malnutrition as a Public Health Problem

RAÍCES focuses its pilot on chronic child malnutrition (stunting), resulting from cumulative nutritional deficiencies during the first thousand days of life. Unlike acute malnutrition, which is more visible and reversible short-term, stunting is the most widespread and consequential form of child malnutrition in Latin America: Victora et al. show it causes irreversible harm , reduced adult height, lower educational attainment, and diminished economic productivity, with height-for-age at age 2 the single best predictor of adult human capital (44), making early childhood a critical, non-deferrable window for intervention.

In Colombia, stunting is markedly more prevalent in rural areas and tightly linked to household food insecurity: as of 2015, it affected 15.4% of rural children versus 9% in urban areas, mirroring higher rural food insecurity (64% vs. 52%). This pattern holds in Nariño, where a study in the Awá Indigenous community of Barbacoas found 17.6% chronic malnutrition prevalence in children under five, 71.3% of them rural, confirming the territorial inequalities seen nationally (50).

5.4. Project Description

- **Design:** A mixed-methods pilot study employing a Type II hybrid effectiveness-implementation design, which simultaneously assesses effects on work practices, process indicators in health care delivery (without attributing effects on morbidity or mortality to the pilot, as this lies beyond the scope of its nine-month

timeframe), and implementation strategies and outcomes. (40) The intervention is structured as a nine-month public innovation laboratory.

- **Setting:** Rural Nariño. Three to four municipalities will be selected based on four criteria: the presence of community mothers, prevalence of chronic malnutrition and food insecurity, intermittent connectivity representative of the Andean rural context, and endorsement from local, health, and community authorities. (38,39)
- **Participants and sampling:** 40 community mothers, selected through purposive maximum-variation sampling to capture diversity across four dimensions: experience in the role, prior digital familiarity before the intervention, ethnic identity (campesina, Indigenous), and geographic location. This sample size is consistent with a feasibility pilot and with the team's capacity to provide close accompaniment to each participant.
- **Recruitment and consent:** Participants will be recruited through the regional ICBF (Colombian Institute of Family Welfare) and community mothers' associations; informational sessions will be held; written informed consent will be obtained, with additional community consent from traditional authorities where applicable, under the principle of free, prior, and informed consent.
- **Inclusion and exclusion criteria:** Detailed in Table 2 below.

Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Being a community mother formally linked, or in the process of becoming linked, to ICBF in the selected municipalities.	Plans to retire or relocate away from the territory within the next nine months.
At least 12 months of experience in the role. This is an operational criterion: the pilot tests hypothesis 1 in an already relatively stable population, not among newer or more precarious workers.	Simultaneous participation in another digital health intervention that could interfere with the evaluation.
Availability to participate throughout the nine months of the lab.	Health or other conditions that would prevent sustained, safe participation.
Signing the informed consent form (and community endorsement where applicable).	Not granting informed consent.
No prior digital literacy is required: variation in this area is treated as a diversity criterion.	—

- **Resources and team:** Detailed in Table 3 below

Table 3. Resources and team

Resource	Detail
Coordination and research	Lead researcher, field coordinator, and research assistant.
Intercultural facilitation	Two workshop facilitators and intercultural mediation or translation when the context requires it.
Technical team	One or two software developers and a data and privacy specialist.
Training and evaluation	Instructional designer, trainers, a monitoring and evaluation lead, and a field assistant for monitoring and evaluation in the selected municipalities.
Materials	Devices (tablets or phones), reference anthropometric equipment (calibrated stadiometers and scales), rechargeable portable batteries (power banks) with solar backup panels in municipalities without reliable grid access, data plans, and workshop materials.
Partnerships	Regional ICBF, the departmental health secretariat, an academic institution, and community and indigenous authorities.

- **Timeline:** The five phases are structured across nine months with deliberate overlaps: Listening and Co-creation in the first third, Co-production and Deployment in the second, and Institutionalization in the third, overlapping with Deployment to ensure transfer. (Figure 5)

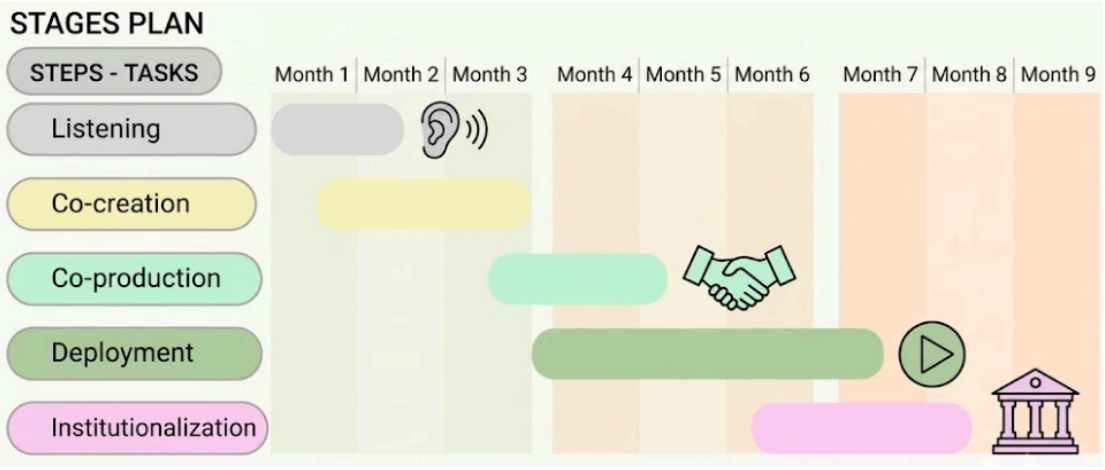


Figure 5. The timeline shows the five phases of RAÍCES distributed across nine months.

- **Ethics:** Approval by an ethics committee; informed consent; enhanced protection of data concerning minors; community governance of information; and, if necessary, the ability to reverse both decisions generated by the AI system and adjustments

introduced during the implementation process, in keeping with the principle of human oversight that runs throughout the project.

5.5. Implementation Phases

Phase 1. Listening (Escucha) — Months 1–2

- **Objective:** To gain an in-depth understanding of the work of community mothers, user families, and actors within the local health system and the ICBF.
- **Participants:** 40 community mothers, user families, and actors within the local health system and the ICBF.
- **Methods and instruments:** Structured ethnographic observation; task analysis; workday mapping; field accompaniment (with a subsample of 12 to 15 participants selected through maximum variation within the cohort; structured work diaries for the remaining participants; six to eight focus groups; semi-structured interviews); and participatory mapping. All instruments will be piloted before use.

Table 4: Sample guiding questions for interviews and focus groups

- **Resources:** Field team (coordination, research, and intercultural facilitation, see Table 4), recorders, diary and observation templates, and community spaces for focus groups.
- **Outputs:** A map of community-based work; a decision map (identifying where human judgment intervenes); an analysis of administrative burden and a map of the tacit knowledge held by community mothers; a map of the expectations and perceived needs of user families, which serves as the baseline for the community feedback step of the RAÍCES Cycle; and a map of friction points and current institutional rules within the health system and the ICBF, which serves as the baseline for the institutional learning step of the same cycle. The decision map establishes the boundaries of what is not to be automated.

- **Indicators:** Number of participants recruited and retained; number of tasks and decisions mapped; hours of observation within the shadowing subsample (12–15 participants); completion rate of structured work diaries among participants outside the shadowing subsample; thematic saturation in the qualitative analysis; number of families consulted and institutional actors interviewed; themes identified in each of the three baseline maps (worker, families, institutions).

Phase 2. Co-Creation — Months 2–4

- **Objective:** To design the AI system together with CHWs, granting them genuine, binding decision-making power over the system's design.
- **Participants:** A panel of 10 to 12 community mothers co-designers (selected from within the Phase 1 shadowing subsample to maintain methodological continuity), with validation from speakers of local Indigenous languages and from community authorities. This panel's decisions undergo subsequent validation with the rest of the cohort before being finalized, so that decision-making power does not rest solely with those directly participating in the workshops.
- **Methods and instruments:** A human-centered design cycle repeated over several iterations, taking as its starting point the decision map, the tacit knowledge map, and the map of family expectations produced in Phase 1, such that the empathy stage of the design cycle does not repeat the listening work already done, but rather deepens it and translates it into design decisions. Each workshop moves through seven steps: empathy, decision mapping, prioritization, prototyping, testing with simulated real-world cases, redesign, and a new cycle. Every decision made in the workshop modifies the AI system in a traceable way: if the workers decide that an alert should be worded differently, that a local term is more precise, or that a step is unnecessary, that agreement is translated into a change in the interface, the knowledge base, or the system's workflow.

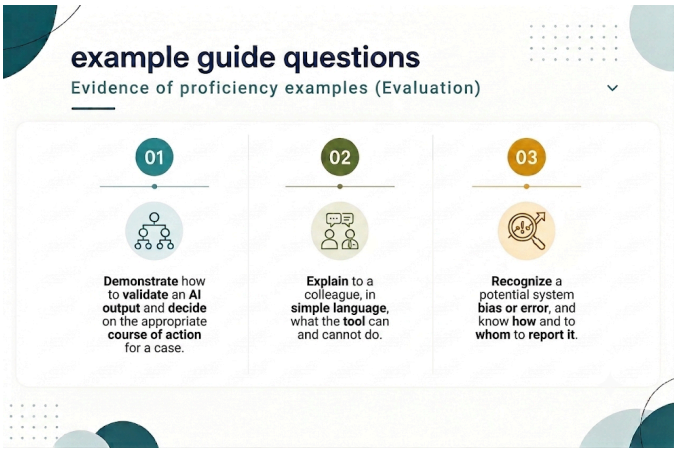
Table 5: Sample guiding questions for Co-designing workshops

- **Resources:** Prototyping materials, testing devices, a technical environment for iterating on the prototype, and a design-decision log.
- **Outputs:** A co-designed functional prototype; a cultural and linguistic adaptation protocol documented in a re-parameterizable format, that is, not as a fixed set of decisions unique to Nariño, but as a guide of criteria and steps that a new scale-up territory can follow to reach its own adaptation decisions (see Section 8); and a traceable record indicating what was decided, why, and who was involved.
- **Indicators:** Number of iterations and design decisions incorporated; proportion of workers' proposals effectively implemented; results of early usability testing; validation rate of the panel's decisions by the rest of the cohort, and the level of agreement or disagreement identified in that validation; proportion of Phase 1 findings (decision map, tacit knowledge, family expectations) explicitly reflected in at least one design decision; cultural adaptation protocol documented in a re-parameterizable format (completeness checklist).

Phase 3. Co-Production — Months 3–6

- **Objective:** To produce, together with the workers, both the system itself and the capacities to govern it, training the first cohort of Community AI Managers (*Gestoras Comunitarias de IA*).
- **Participants:** All 40 participants, as the training cohort.
- **Methods and instruments:** A modular, certifiable curriculum based on problem-based learning, anchored in the real tasks identified in Phase 1 and practiced directly on the co-designed prototype and the cultural adaptation protocol from Phase 2, so that certification is obtained not on a generic system, but on the actual tool and design decisions that the Community AI Managers will oversee in Phase 4. The curriculum also follows the selection, training, and supportive supervision principles set out in WHO guidelines (3). Modules: digital literacy; AI literacy (what the system can and cannot do); ethics and privacy; bias recognition; governance; critical thinking about system outputs; leadership and representation; and implementation. Assessment is based on observable competencies, not attendance.

Table 6: Examples of competency Evidence (Evaluation)



- **Resources:** Offline training platform or materials, trainers, assessment rubrics, and a micro-credentialing system.

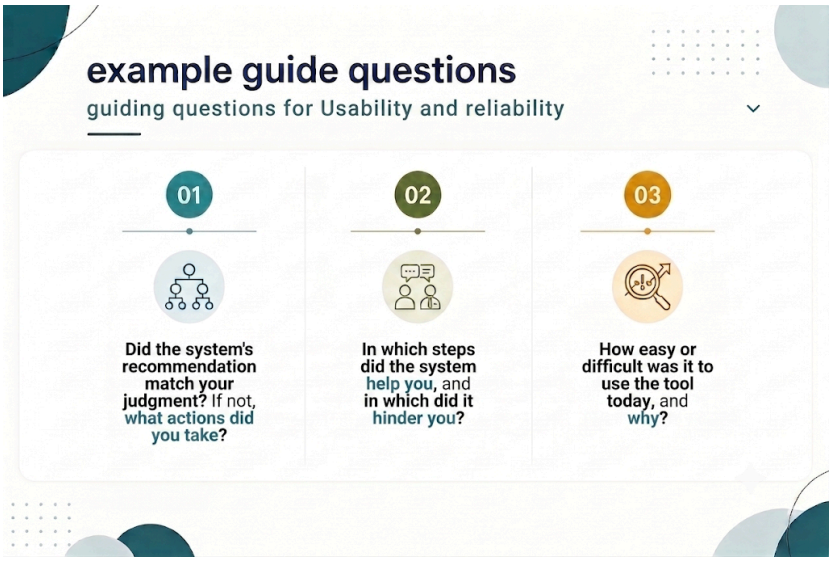
- **Outputs:** A cohort of certified Community AI Managers holding portable micro-credentials linked to recognized qualification pathways, with corresponding salary recognition at this first level.

- **Indicators:** Completion rate; proportion of participants achieving certification; performance on competency evidence; training hours recognized as protected, paid time within the formal workday; and proportion of participants reporting additional unpaid time spent completing the curriculum.

Phase 4. Real-World Deployment — Months 5–8

- **Objective:** To use the AI system under real-world conditions, gobulverned by a strict principle: no clinical decision is made by the system. The AI supports; the person decides.
- **Participants:** The 40 Community AI Managers certified in Phase 3, children aged 6 to 59 months from user families who provide informed consent, and their families.
- **Methods and instruments:** Accompanied implementation with standardized operating procedures, fidelity checklists, and usability measures. In the demonstration case, the AI supports anthropometric screening through a validated, open-source, offline-capable tool that estimates height and weight from images, comparing results against WHO growth standards to identify signs of malnutrition in children aged 6 to 59 months. (41,42)
- **Operational steps:** Deployment of the AI implementation will proceed through 6 steps:
    1. **Capture:** The worker scans the child with the family's consent.
    2. **Estimation:** The system generates anthropometric indicators along with a measure of uncertainty.
    3. **Comparison:** The system compares these against WHO growth standards and flags possible warning signs.
    4. **Human validation:** The Community AI Manager interprets the result and, where appropriate, cross-checks it against manual measurement.
    5. **Decision and action:** Family education, follow-up, or referral, always decided by the person.
    6. **Recording and feedback:** The system documents the case, and the aggregated feedback feeds into the Community AI Governance Council, which approves improvements (Figure 3).

Table 7: Sample guiding questions for Usability and reliability



- **Resources:** Devices, reference anthropometric equipment, field-based technical support, and referral pathways agreed upon with the health system.
- **Outputs:** A documented pilot implementation, with active referral protocols ensuring that no at-risk case is left without a care pathway.
- **Indicators:** Adoption; sustained use; fidelity to protocol; usability; concordance between the system's suggestion and the human decision; and screening coverage.

Phase 5. Institutionalization — Months 7–9

- **Objective:** To make the model durable and transfer its governance to the community.
- **Methods and instruments:** Establishment of the Community AI Governance Council, with bylaws and decision-making rules; training of mentors selected from among the participants based on their performance on the competency evidence certified in Phase 3, so that the third level of the occupational ladder (Table 8) is awarded based on observable merit rather than discretionary appointment; and sustainability workshops.
- **Resources:** Council bylaws and regulations, physical or virtual space for periodic sessions, training materials for mentors, and a system for recording minutes and decisions.

Table 8: Sample guiding questions for interviews or focus groups

- **Participants and Council composition:** community mothers, community and Indigenous authorities, the ICBF, territorial public health representatives, developers, and academia.
- **Outputs:** A functioning Community AI Governance Council; a sustainability plan and first cohort of mentors; and a structured transferability profile.
- **Indicators:** Council established and meeting regularly; proportion of Council decisions that modify an initial technical proposal, not merely the number of decisions adopted; active mentors, with the proportion of certified Community AI Managers advancing to this third level; sustainability plan approved; structured transferability profile documenting the pilot's critical elements of governance and cultural adaptation, as an input for the scale-up phase.

The Community AI Governance Council represents one of the model's most transferable innovations. It is a simple, adaptable governance structure that addresses a central challenge in the ethical implementation of AI: defining who, in practice, exercises human oversight of the system. By granting CHWs a formal role in decision-making, it turns human oversight into a local, sustainable institutional mechanism. Its transferability, however, does not depend solely on replicating this structure. It also requires reproducing the co-design and participatory governance process that made its creation possible in the pilot territory. For this reason, the transferability profile developed in this phase identifies the conditions necessary to guide its implementation in other contexts.

5.6. The AI Architecture

The architecture is deliberately realistic and relies on readily available technology. It combines a moderate-sized language model for assistance, education, and documentation; a retrieval-augmented generation mechanism that grounds responses in a verified knowledge base (ICBF guidelines, health protocols, and WHO growth standards), ensuring that the system cites its sources rather than fabricating content; the validated image-based

anthropometric estimation component; offline functionality; mandatory human validation; bias monitoring; audit logs; and privacy by design. (42,43)

Four features make this architecture well-suited to low-resource rural settings, and therefore reproducible across much of Latin America. On-device processing and offline capability eliminate dependence on connectivity and protect privacy. Retrieval augmentation constrains the system to verified, traceable sources, facilitating validation and accountability. (30,31) Audit logs and bias monitoring make oversight by the Community AI Managers possible. And updates can be distributed whenever connectivity is available, without centralizing sensitive data. The knowledge base is updated through a process governed by the Council, data capture takes place with consent, and ownership and control of community information rest with the community itself, with enhanced protection given that the data concern minors. (26)

6. IMPLEMENTATION AND GOVERNANCE

Implementation is anchored in partnerships that provide viability and legitimacy. The ICBF, the employing entity following formalization, coordinates employment and certification for the new role. (17) Community and Indigenous authorities are governance partners, not mere informants, acting under free, prior, and informed consent. The Nariño Departmental Health Institute ensures integration with care pathways. A university supports the evaluation and validation of the outcome instrument. Developers contribute technical capacity under the direction of the Community AI Governance Council.

Implementation strategies are selected using the CFIR (Consolidated Framework for Implementation Research), taking into account both contextual determinants and the characteristics of the intervention. (38) These include: cultural and linguistic adaptation; training with supportive supervision; local champions; quality improvement cycles; and data feedback. The risk register identifies five threats along with their corresponding mitigations.

Table 9: Risks and mitigation strategy

Financial sustainability rests on three pillars: the integration of the role into the ICBF's formal staffing structure, which internalizes labor costs; the open and low-cost nature of the technology, which avoids proprietary licensing; and the possibility of blended financing, combining cooperation funds and public budget, for the scale-up phases. Institutional sustainability rests on the Community AI Governance Council, which ensures continuity beyond the pilot.

7. MONITORING AND EVALUATION

The evaluation adopts a Type II hybrid mixed-methods design, simultaneously assessing effects on work and on implementation. (40) The evaluation plan is structured around the five assumptions defined in the theory of change, translating each one into verifiable indicators that make it possible to identify which elements of the causal chain contribute to achieving the expected outcomes and which require adjustment.

The primary indicator will be a Composite Index of AI-Augmented Community Work Capacity. It is important to clarify that this index does not constitute a new psychometric instrument, but rather an implementation measure built from previously validated indicators. This approach makes it possible to draw on existing evidence, avoid the unnecessary creation of new scales, and facilitate the interpretation of results.

7.1. Traceability from Assumptions to Indicators

The following table links each assumption of the theory of change to the indicators, instruments, and measurement points that make it possible to verify it. This traceability complements the Composite Capacity Index with the structural indicators, employment stability, effective governance, certification, and service improvement that the causal chain requires and that an index focused on individual capacities cannot capture on its own.

Table 10: Assumptions to indicators

Assumption	Indicator(s)	Instrument / source	Timing
1. Formalization → stability to invest in literacy/co-design without overload	Contractual continuity; protected hours dedicated to literacy and co-design; "AI literacy" domain of the Composite Index; perceived work overload	ICBF administrative records; stability and overload survey	Baseline, midline, endline
2. Participation with real power → role and system more relevant and better adopted than the external design	"Participation in governance" domain; proportion of Council decisions that modify an initial technical proposal; adoption (≥ 80%) and sustained use (≥ 70%); qualitative comparative analysis of participatory versus technical decisions	Composite Index; AI Community Governance Council minutes; system usage records	Continuous, with a cutoff at 9 months
3. Recognition of the new role → competencies translated into real labor mobility	Proportion of Stewards who advance a level; certification rate; salary variation associated with the level reached; "occupational empowerment" domain of the Composite Index	Certification records and ICBF payroll; Composite Index	Midline, endline
4. Increased capacity and quality of work → improved health services	Reduction in administrative time (≥ 30%); increase in direct care time (≥ 20%); screening coverage and timeliness; relevance of referrals	Activity records; demonstration case information system	Baseline, midline, endline
5. Improved services → a transferable model without reproducing the external design	Structured transferability checklist (critical governance elements and cultural adaptation); ex-ante qualitative assessment in the next territory on fidelity to the participatory cycle (phases 1-5)	Governance Council documentation; qualitative interviews during the scale-up phase	At the close of the pilot and prospectively, prior to scale-up

7.2. Composite Capacity Index

The index integrates ten domains, each operationalized through validated or adapted scales: AI literacy; digital trust; professional autonomy; reduction of administrative burden; time available for direct care; calibrated trust in AI; participation in governance; community leadership; occupational empowerment; and technology acceptance. Each domain is scored from 0 to 100, and the overall index is a weighted average. Its construction follows good practice adapted to composite indicators: conceptual definition, selection of validated scales, cognitive testing of items with a panel of individuals with lived experience, consistency and

structural analysis, and participatory weighting, whereby the workers themselves decide which dimensions matter most, an act that constitutes governance in its own right. Interpretation is longitudinal; the aim is not to classify individuals, but to demonstrate the growth of capacities over time.

7.3. Defining Success: Pilot Thresholds and Scope

To ensure the proposal is evaluable rather than merely descriptive, the pilot defines its nine-month success thresholds in advance and explicitly links them to the assumptions of the theory of change.

Table 11: Pilot thresholds and scope

Criterion	Pilot target	Assumption verified
System adoption by participants	≥ 80%	2
Sustained use at 9 months	≥ 70%	2
Reduction in administrative time	≥ 30%	4 (mediator)
Increase in direct care time	≥ 20%	4 (mediator)
Worker satisfaction	≥ 80%	1
Contractual continuity without an increase in unpaid workload	≥ 90%	1
Advancement of at least one level on the occupational scale	≥ 60% of Stewards at 9 months	3

Secondary implementation outcomes are assessed using the Proctor and RE-AIM frameworks, including acceptability, adoption, appropriateness, feasibility, fidelity, cost, reach, and sustainability, together with usability and community trust.(37,39) Exploratory outcomes associated with the demonstration case include screening coverage, timeliness, and the appropriateness of referrals, corresponding to Assumption 4. The pilot is not intended to attribute effects on mortality, as such outcomes lie beyond its scope. Indicators for Assumption 5 are inherently prospective and qualitative. Because the nine-month pilot is not designed to observe scale-up, these indicators are documented as conditions for future monitoring rather than as quantitative success thresholds within the pilot timeframe. The measurement plan includes three assessment points (baseline, midline, and endline), combining quantitative analyses of within-participant change with parallel qualitative analyses to explain the mechanisms underlying observed outcomes. (40)

8. ILLUSTRATIVE CASE AND IMPACT

Marleny, a formalized "*madre comunitaria"* (community mother)in a municipality in Nariño, represents the point where the two trajectories diverge.

Default trajectory: The territorial entity introduces, without prior consultation, an AI system that automates the nutritional and pedagogical monitoring previously carried out by Marleny. Under the banner of "efficiency," part of her functions observation, recording, case prioritization are transferred to the system, and her role is reduced to that of a mere operator feeding data into a tool that decides on her behalf. There was no AI literacy training, nor any space for her to shape its design. The result is not merely overload: it is a silent degradation of her role, one that opens the door to her position being deemed dispensable or replaceable by more "digital" profiles at the next contract renewal, while older community mothers or those with lower digital literacy, the very profile that has historically borne the brunt of informal care work, face greater risk of labor exclusion. Formalization, far from protecting her, becomes the setting in which labor inequality is reproduced under a new technological layer.

RAÍCES trajectory: Under the same contract, Marleny participates with genuine decision-making power in the co-design of the tool. The AI is limited to systematizing and making visible the work she already does, never deciding on her behalf or substituting her pedagogical judgment, and its implementation is conditioned on reducing administrative burden without replacing functions. This participatory design is itself the safeguard against displacement: because it is Marleny and her peers who define the tool's boundaries, the technology reinforces her role rather than contesting it, and this recognition translates into genuine career mobility rather than a risk of replacement.

This divergence lies at the core of the RAÍCES model: without participation backed by genuine decision-making power (Assumption 2), and without formal recognition accompanying the new competencies (Assumption 3), the introduction of AI into care work is not neutral; it can deepen precisely the labor inequality that formalization sought to correct, displacing those with the least digital capital. RAÍCES does not merely avert this displacement: it turns its avoidance into the very design criterion that distinguishes its trajectory from the default one.

9. ROADMAP, SCALABILITY, AND REPRODUCIBILITY

We are not scaling an application. We are scaling an institutional model. This distinction lies at the heart of RAÍCES's strategy, and reproducibility is a design objective from the outset, not an aspiration added later. The model is projected across a five-year roadmap, moving from the pilot to a regional framework, giving the project a clear sense of trajectory (Figure 6).

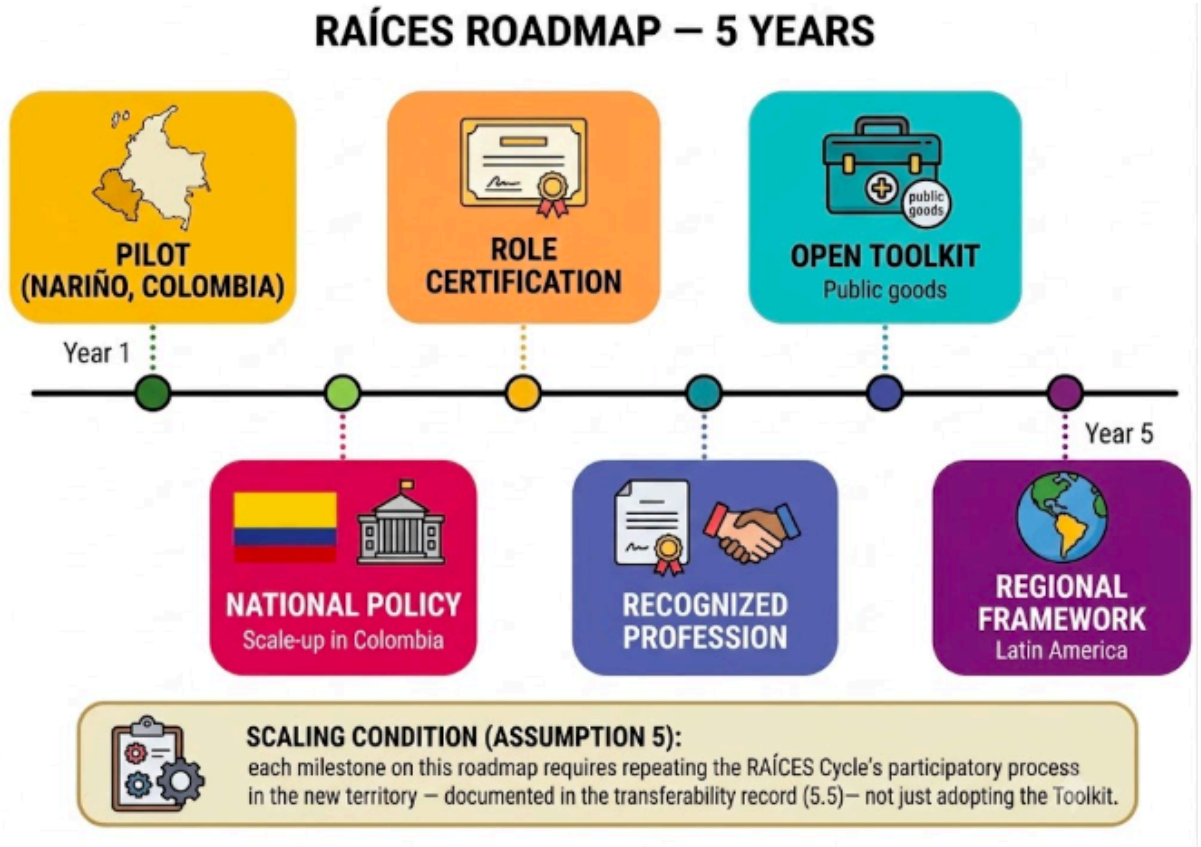


Figure 6. RAÍCES roadmap: from the pilot in Nariño to a framework for Latin America.

Reproducibility rests on four concrete decisions. First, the choice of a demonstration case, chronic malnutrition, and of a territory whose conditions are shared with broad Andean and rural regions across Latin America. (19,44) Second, a low-cost, open-source architecture with offline functionality, suited to environments with intermittent connectivity. Third, cultural adaptation conceived as a re-parameterizable protocol, so that the model can be adjusted to different ethnic and linguistic contexts without being rebuilt from scratch. Fourth, the requirement that each scale-up territory repeat the co-design and participatory governance process of the RAÍCES Cycle, as documented in the transferability profile, rather than merely adopting the Toolkit or the Council's institutional form; without this fourth decision, scaling the model would risk reproducing the externally imposed trajectory (Figure 9) that RAÍCES seeks to avoid.

To support transfer, an open public-goods package has been developed: the RAÍCES Toolkit: an open curriculum, a governance manual containing the bylaws of the Community AI Governance Council, an implementation guide based on the CFIR and the MRC framework, the instruments used across the five phases (guides, criteria, and rubrics), and open-source documentation of the architecture (36,38). The national pathway draws on the ICBF's formalization process, which will bring between 40,000 and 60,000 workers into formal employment by 2029 (17). At the regional scale, RAÍCES is proposed as a framework for Latin America and the Caribbean, where investment in care could generate up to 30 million jobs by 2035 (44).

10. CONCLUSION

The future of care work will not be decided by technology, but by the decisions we make about who designs it, who governs it, and who benefits from it (2,7). RAÍCES offers a concrete answer to the question posed by the Geneva Challenge 2026: how to make transitions inclusive, ensure that workers are supported, and ensure that the gains are shared.

Its contribution is not a new AI tool, but a new institutional arrangement: transforming a historically invisible female workforce into co-producers, auditors, and governors of artificial intelligence. The role of the Community AI Manager is the innovation that sets RAÍCES apart from any conventional digital health project, and the RAÍCES Cycle is the image that encapsulates it. Having been designed in a representative territory, with an explicit and transferable methodology, provided that each new territory repeats the participatory process that gave rise to it, and not merely its institutional form, the project does not aspire to be a memorable exception, but a repeatable model.

Let us return, in closing, to where we began: to them. The story of RAÍCES begins and ends with the women who, every morning, turn their territory into a place of care. The name is no accident: roots sustain and nourish from below, invisibly, that which flourishes in plain sight. Recognizing, formalizing, and strengthening this work at its root, giving it a voice over the technology that will transform it, is perhaps the most decisive task for the future of work.

AI should not decide the future of community health workers; community health workers should decide the future of AI.

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