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Reciprocal innovation to improve access to primary healthcare in Belgium: adaptation and development of a community health worker intervention

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Abstract

Background Widening health inequities in Belgium highlight the need for proactive, outreach-oriented primary care models. Large-scale community health worker programmes in low- and middle-income countries have demonstrated effectiveness in bridging healthcare access gaps and are increasingly recognised as potential reciprocal innovations for high-income countries. However, little is known about how such models can be successfully transferred across contexts, as these processes are rarely reported in sufficient detail, limiting replication and cumulative learning.

Aim This study addresses these gaps by detailing the development of the Community Health Workers for Primary Healthcare Access (COMPASS) intervention—a CHW-based model adapted from Brazil and South Africa for the Belgian health system.

Methods The COMPASS intervention was developed through a multi-phase, iterative process informed by the ADAPT guidance (Moore et al., 2021) and the Six Steps in Quality Intervention Development (6SQuID) (Wight et al., 2016). Three phases structured the process: (i) problem identification and exploration of potential solutions through qualitative fieldwork in Belgium and South Africa as well as field visits to Brazil and the UK; (ii) participatory adaptation and intervention design via co-creation workshops with stakeholders in Belgium; and (iii) pilot testing to refine the model and prepare for evaluation.

Results Phase 1 fieldwork in Antwerp identified key access barriers in Belgium; complementary fieldwork in South Africa, and field visits to Brazil and the UK, highlighted mechanisms through which CHWs address such barriers: mechanisms included sustained, structured, and culturally sensitive support embedded in both communities and the health system. Phase 2 co-creation workshops determined which elements of the Brazilian and South African CHW models could be retained as core components and which required adaptation to align with Belgian primary care structures and local needs. Phase 3 pilot testing confirmed feasibility and led to final refinements, resulting in a COMPASS intervention that is both contextually appropriate and ready for evaluation.

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Conclusions By providing a detailed account of the COMPASS intervention's adaptation and development, this study illustrates how established frameworks can be applied in practice to guide the design and transferability of complex health interventions. It offers practical guidance for adapting health service innovations across contexts in a transparent, systematic and context-sensitive manner.

Keywords Intervention development, Adaptation, Community health workers, Access to care, Reciprocal innovation, People living in socio-economically vulnerable circumstances, Primary health care

Introduction

Strong primary healthcare (PHC) systems are central to meeting the Sustainable Development Goals, by ensuring accessible, continuous, comprehensive and coordinated first-line health services [1, 2]. PHC systems should simultaneously address social determinants of health, promote equity, and foster community participation in line with the Alma-Ata declaration [3].

Yet translating these principles into practice remains challenging in many settings [3]. Belgium, the context of our study, provides a pertinent example: health inequities in the country not only persist but appear to be widening [4–9]. People living in socio-economically vulnerable circumstances face disproportionately higher rates of chronic illness, poorer self-reported health, and shorter life expectancy compared to more advantaged groups [10–12]. In addition, individuals with lower socioeconomic status face multiple barriers to accessing PHC [13, 14], including financial constraints, administrative complexity, language challenges, limited health literacy, and cultural disconnects between users and providers [4, 5, 8, 15–17]. The COVID-19 pandemic further exposed and exacerbated these disparities, revealing systemic shortcomings in reaching vulnerable populations with preventive and curative services within the Belgian health system [18–20].

Most health services in Belgium are financed through a compulsory health insurance system with patient co-payments. Recent policy measures have contributed to reducing financial barriers and improving affordability of care [5]. However, obstacles remain, as even free services, such as preventive cancer screenings, remain under-utilised by certain groups [21–23]. Evidence indicates that people's capacities to access care—including health literacy, navigation skills, and confidence in interacting with providers and advocating for themselves—are more predictive of problematic access than social vulnerability per se, and importantly, these abilities are modifiable [24]. This highlights the need for proactive, outreach-oriented models that not only adapt organizational processes but also strengthen people's capacity to engage with care [6–8, 25, 26].

One promising approach is the Community Health Worker (CHW) model, increasingly recognized as an effective means of bridging gaps in healthcare access and addressing health inequities [27, 28]. Typically recruited

from or with an in-depth knowledge of the communities they serve, CHWs are trained to deliver culturally appropriate health education, support, and linkage to services [29]. Originating in low- and middle-income countries (LMICs), CHW models have demonstrated measurable impact in areas such as maternal and child health, infectious disease control, family-planning, chronic disease management, and vaccination uptake [30–34].

Inspired by these successes, CHW models gained traction in high-income countries (HICs), particularly in the United States, and more recently in Australia and Canada [35–37]. Yet, they remain “a relatively underutilized human resource” in most HIC health systems [37]. In Europe, although community-based outreach workers have existed for decades, uptake of CHW models has been limited, often taking the form of short-term, disease- or topic-specific projects rather than fully integrated programmes [38]. The COVID-19 pandemic, however, spurred new pilot initiatives. For example, the Belgian Federal Government deployed 50 CHWs in socio-economically deprived neighbourhoods across ten cities [39]. Early evaluations indicate that CHWs play a valuable bridging role between their clients and the healthcare system [40]. Nevertheless, the initiative remains peripheral to mainstream health services, highlighting the need for sustainable integration [40, 41].

Insights for such integration can be drawn from large-scale CHW programmes in LMICs, notably Brazil and South Africa, where CHWs are formally embedded within PHC teams. These programmes contribute to improved access, continuity of care, and health outcomes through regular home visits, health promotion, and linkage to social and health services [42–47]. Their success has fuelled interest in reciprocal innovation—transferring ideas and interventions from LMICs to HICs [48, 49]. By challenging the traditional one-way flow of knowledge from high- to low-resource settings, reciprocal innovation recognises that valuable solutions to shared health system challenges frequently emerge from contexts of constraint [50]. CHWs are often cited as a promising example [51, 52], yet adaptation to HICs must address differences in health system structure, financing, governance, and population needs [28].

This context-dependence presents substantial challenges for adaptation. Indeed, research shows that interventions transferred wholesale across settings often fail

or lose effectiveness [53]. While the general principle of community-based outreach is transferable, CHW programmes must be tailored to local realities [28]. Nevertheless, little empirical work has documented how CHW models are adapted as reciprocal innovations for HICs. Harris et al. [50] have called for more research on adaptation strategies that account for contextual fit while preserving core functions of the intervention.

The limited and inconsistent reporting of intervention development and adaptation processes complicates this picture even further. Many studies fail to adequately describe how an intervention was adapted, what frameworks informed decisions, and which contextual factors shaped the process [54–57]. This lack of transparency hinders replication, limits cumulative learning, and undermines the efficient use of research resources [55]. Moreover, Moore et al. [55] note that teams may adopt a hybrid approach in which an intervention is adapted and augmented with new components in which case the use of adaptation guidance and intervention development guidance is needed in tandem. However, existing frameworks typically address either adaptation or development in isolation, with little attention to how these processes intersect [58–61]. Without greater documentation of how these approaches are applied in practice, it remains difficult to identify best practices or build cumulative knowledge [60, 61].

This study addresses these gaps by examining the development of the Community Health Workers for Primary Healthcare Access (COMPASS) intervention through a process of reciprocal innovation, wherein the CHW-based model is adapted from Brazil and South Africa to fit the Belgian healthcare system.

Methods

Larger research context

This intervention development and adaptation process was embedded in the broader COMPASS project, a research initiative funded by the Research Foundation Flanders (FWO-SBO). Inspired by established CHW models in Brazil and South Africa, COMPASS seeks to strengthen the connection between PHC services and people living in socioeconomically vulnerable circumstances in Belgium. The project is based on the hypothesis that a community-based primary care (PC) model centred on CHWs can improve access to care and reduce health inequities. Its effectiveness and cost-effectiveness will be evaluated through a cluster randomized controlled trial (RCT), for which a detailed protocol is available elsewhere [62]. Bringing together expertise from sociology, family medicine, and health economics, COMPASS represents a multidisciplinary effort to adapt and evaluate the CHW model for the Belgian context.

Study setting

Belgium's healthcare system is based on compulsory social health insurance, which covers almost all residents and provides broad access to services [63]. Care is organized around principles of free provider choice and direct access to specialist services without gatekeeping and is predominantly delivered on a fee-for-service basis. Patients contribute to the cost of care through out-of-pocket payments, the cost of which varies depending on social and insurance status [63].

The study was conducted in Antwerp, Belgium's second-largest city, home to 565,707 residents representing approximately 175 nationalities. Over half of the population (56.5%) has a migration background, reflecting the city's high ethnic and cultural diversity [64]. Antwerp has a relatively balanced age distribution within the city's population: around 22% of residents are under 18, 61% are of working age, and 16% are 65 or older. A CHW-based model like COMPASS would therefore need to address access barriers relevant across different life stages. Furthermore, several areas of Antwerp experience significant social and economic deprivation: in 2023, 25.4% of children were born into socio-economically disadvantaged households [65], around 30.5% of residents received higher reimbursement for healthcare costs from health insurance funds – a common indicator of socio-economic vulnerability – 8.2% reported difficulty paying for care, and 15.9% did not have a regular general practitioner (GP) [66].

Guiding frameworks

The development of the COMPASS intervention followed a multi-phase, iterative process informed by the ADAPT guidance for intervention adaptation [55] and the Six Steps in Quality Intervention Development (6SQuID) framework [59]. These frameworks were chosen for their complementary strengths: ADAPT provides a consensus-based approach to achieving fit between interventions and new contexts, emphasizing contextual analysis, systematic adaptation, and continuous stakeholder involvement, while 6SQuID offers a pragmatic, evidence-based guide for developing interventions in a stepwise manner. Specifically, ADAPT guided the adaptation of existing CHW models from South Africa and Brazil by structuring how we assessed context–intervention fit, identified candidate models, and planned adaptations, while 6SQuID informed the development of new components by requiring us to define causal pathways, articulate change mechanisms, and consider implementation conditions and unintended effects. Both frameworks converge on the importance of collaboration between interdisciplinary teams and non-academic stakeholders to ensure relevance, acceptability, and sustainability. We applied all phases and steps of both frameworks in a

structured yet flexible process that integrated adaptation and development activities, except for Phase 5, which addresses sustained implementation at scale and falls outside the scope of this study. These phases are summarized in Table 1. The final evaluation phase is currently ongoing and will be reported in future work.

The Brazilian and South African CHW model

Before describing the adaptation and development of the COMPASS intervention, we first outline the CHW models in Brazil and South Africa that informed the design of COMPASS. Brazil's Family Health Strategy (FHS) was selected because it is one of the largest community-based PC programmes worldwide and has demonstrated notable improvements in health outcomes, particularly child mortality [42, 67, 68]. Consequently, it is widely regarded as a model for PC reform [43]. Inspired by Brazil's approach, South Africa introduced ward-based primary healthcare outreach teams (WBPHCOTs) in 2011 as part of a broader health system restructuring [47]. Although introduced more recently and still at an earlier stage of implementation, South Africa's experience nevertheless offers complementary lessons for adaptation. Together, these large-scale, well-established programmes represent the "original" model from which COMPASS was adapted.

In both countries, PHC is delivered by multidisciplinary health teams embedded within geographically defined catchment areas. CHWs are core team members, recruited from local communities and responsible for a defined number of households (around 150–200). They conduct regular home visits—at least once per month to every household in their area, regardless of immediate need—allowing them to provide proactive rather than solely demand-driven care. Their tasks extend across the full spectrum of services, including health promotion, prevention, curative and rehabilitative support, as well as follow-up and referral between home and facility-based care. By combining universality, geographic coverage, and continuity of care, this model moves beyond fragmented or vertical programmes, offering comprehensive, cradle-to-grave support closely connected to local PC facilities [52].

The adaptation and intervention development process

Stakeholder involvement

Stakeholder involvement, a guiding principle of both ADAPT and 6SQuID, was embedded throughout all phases of the COMPASS project to ensure contextual relevance, acceptability, and co-ownership [58, 69]. For the adaptation and development process described in this paper, stakeholders were engaged through co-creation workshops (see Phase 2) and iterative consultation with two advisory boards that met at least annually to provide structured feedback: the *Societal Advisory Board*,

Table 1 Overview of adaptation and development Phases, corresponding framework steps, and application in COMPASS

Phases	ADAPT Guidance	6SQuID Framework	Application in COMPASS
Stakeholder involvement to ensure contextual relevance, acceptability and co-ownership	Phase 1: Understanding the problem and exploring Solutions Phase 2: Participatory adaptation and intervention design Phase 3: Finalizing the model and preparing for evaluation Phase 4: Evaluating the intervention Phase 5: Sustainable implementation	Step 1: Assess rationale and intervention-context fit Step 2: Plan and undertake adaptations Step 3: Plan and undertake piloting and evaluation (part 1) Step 3: Plan and undertake piloting and evaluation (part 2) Step 4: Implement and maintain at scale	Qualitative longitudinal study in Belgium to explore access barriers; Qualitative fieldwork in South Africa to develop a program theory for the original CHW model and map its context; Field visits to Brazil and UK to gain additional insights in the CHW model. Co-creation trajectory with 10 people living in socio-economically vulnerable circumstances in Antwerp; 5 GPs, 3 representatives of local social organizations, 6 federal CHWs and the COMPASS advisory boards. Refinement of intervention components through iterative discussion within COMPASS research team; One-month pilot to assess feasibility and refine procedures. <i>Beyond scope of this paper; part of ongoing research within the COMPASS project.</i> <i>Outside the scope of the COMPASS study.</i>

comprising organizations supporting socio-economically vulnerable groups, primary healthcare providers, representative bodies, and policymakers, and the *Scientific Advisory Board*, consisting of international academic experts from the UK, USA, South Africa, Belgium, and Brazil.

Phase 1: Understanding the problem and exploring solutions
(ADAPT Step 1; 6SQuID Steps 1–2)

This phase aimed to define the access-to-care challenges in Antwerp, Belgium, identify modifiable factors, and assess the fit between international CHW models and the Belgian context.

To understand the dynamics of healthcare access and health inequities, we conducted a qualitative longitudinal study with 16 individuals living in socio-economically vulnerable circumstances in Antwerp. Semi-structured interviews conducted at three time points over six months enabled us to trace how barriers evolved over time and across healthcare encounters. In parallel, 17 interviews with healthcare providers—including GPs, dentists, pharmacists, and psychologists—provided insight into systemic challenges. Data were collected between April 2023 and February 2024. An English-language version of the interview guides, developed specifically for this study, is available as Additional File 1. The data were analysed according to the six-phase process of Braun and Clarke's reflexive thematic analysis [70]. A full description of the study design, data collection and qualitative analysis approach, is provided in Op de Beeck et al. [71].

To further inform the adaptation of CHW models, we conducted fieldwork in South Africa between September and December 2023. Data collection included 37 semi-structured interviews with policymakers, academic experts, health professionals, including CHWs, and community members receiving CHW support, alongside observational fieldnotes from visits to five PHC clinics in Bloemfontein, Free State and Cape Town, Western Cape. An English-language version of the interview guides, developed specifically for this study, is available as Additional File 1. Reflexive thematic analysis was used to explore core components, delivery mechanisms, and contextual factors of the CHW programme. Details regarding the study design, qualitative methods, and analysis procedures are reported in Vroonen et al. (in review [72]).

In addition, exploratory field visits were organised to Brazil (Rio de Janeiro and Brasília) and the United Kingdom (London), facilitated by experts on the COMPASS scientific advisory board. These visits did not form part of formal data collection (i.e. no interviews or systematic observations were conducted), but served to gather contextual insights to inform the adaptation and

development of the intervention. In both settings, the research team visited PHC practices, engaged in informal exchanges with CHWs, nurses, GPs, managers, and researchers, and accompanied CHWs on guided neighbourhood tours. The information gathered during these visits provided valuable understanding of how CHW models operate in practice and how adaptation is being approached in another high-income setting.

Phase 2: Participatory adaptation and intervention design
(ADAPT step 2; 6SQuID steps 3–4)

In this phase, we used participatory methods to translate findings into an actionable intervention tailored to the Belgian context, integrating insight from the dual evidence base of Phase 1. Recognizing the importance of contextual and cultural fit, we adopted a co-creation approach aimed at fostering shared ownership and ensuring the intervention's relevance and acceptability among target communities [58, 69].

The co-creation trajectory consisted of eight weekly interactive workshops with a group of ten individuals living in socio-economically vulnerable circumstances in Antwerp – the target population of the intervention – and was complemented by regular stakeholder consultations. Following recommendations by O'Cathain et al. [56] and Beran et al. [73], we tailored our approach to different stakeholder groups to promote inclusive participation and help mitigate power asymmetries that often shape co-design processes. With the target population, we used creative, participatory methods to stimulate engagement, including icebreakers, role plays, small-group discussions, and a graphic jam exercise, a technique for generating ideas through drawing together. Consultations with other stakeholders, such as Antwerp-based GPs, local social organizations, federal CHWs, and the COMPASS advisory boards, centred on brief presentations followed by structured questions for input. To further support equitable participation, community actors were compensated for their time, and all workshop sessions with the target population were held in familiar community spaces rather than institutional settings. Researchers also invested time in relationship-building through repeated visits, informal conversations, and iterative feedback loops, which helped cultivate trust and create a more comfortable environment for expressing divergent views. Across the workshops, discussions progressed from identifying barriers to accessing care to defining key aspects of the intervention, such as the desired CHW profile, core tasks, and expectations surrounding the support relationship. A detailed process evaluation of the implementation and experience of the co-creation is described elsewhere [74].

Phase 3: Finalizing the model and preparing for evaluation (ADAPT Step 3; 6SQuID Step 5)

In this phase, findings from Phases 1 and 2 were consolidated into a finalized intervention model through iterative discussions within the COMPASS research team. To assess feasibility and refine procedures, a pilot was conducted in September–October 2024 at a GP practice in Deurne, Antwerp, which was excluded from the subsequent evaluation. Two patients were recruited into the control group and two into the intervention group, with CHW support provided by the CHWs' Outreach Coordinator. This arrangement offered the additional advantage of equipping the Outreach Coordinator with first-hand experience of the initial intervention steps, thereby strengthening their capacity to train and supervise CHWs in the subsequent trial. The intervention is reported according to the TIDieR (Template for Intervention Description and Replication) checklist (see Additional file 2) [75].

Results

The COMPASS intervention is designed to improve access to PHC for individuals living in socio-economically vulnerable circumstances in Antwerp, Belgium. While it builds on well-established CHW models in Brazil and South Africa, several modifications were required to align with the Belgian PHC system, the highly diverse context of Antwerp, and the requirements of a time-bound cluster-RCT. In addition, new elements were introduced through the intervention development process to respond to local needs and stakeholder input. Below, we first describe the adaptation and development process in three phases, which ensured contextual fit and feasibility, and then present the finalized COMPASS intervention, highlighting continuities with international models as well as innovations for the Belgian setting.

The adaptation and development process

Phase 1: Understanding the problem and exploring solutions

The longitudinal qualitative study in Antwerp, Belgium revealed that participants experienced barriers to accessing care that accumulated over time, which suggested that sustained and long-term forms of support were needed rather than isolated or short-term assistance [71]. Barriers were frequently linked to fragmentation in the healthcare system, pointing to the importance of navigation support to help people find and remain in care. While participants sometimes received help from informal or formal networks—for example, encouragement to seek care, assistance with payments, or practical guidance—such support was unevenly distributed and could not reliably ensure access. This indicated a need for more consistent, formalized outreach. Participants also described cultural barriers, including stigma related to

mental health, frequent reliance on hospital emergency departments instead of PC, and expectations based on practices from countries of origin (e.g., over-the-counter antibiotics without prescription). Taken together, these findings pointed to the need for continuous, structured, and culturally sensitive support, with a particular emphasis on navigation and outreach to reduce missed appointments and promote more appropriate use of healthcare services [71].

Based on the qualitative fieldwork in South Africa, we identified five key mechanisms that explain how and why change occurs through South Africa's CHW programme: (i) community embeddedness; (ii) health system integration; (iii) intersectoral collaboration and community mobilisation; (iv) multilevel adaptation to local needs; and (v) trust-building [72]. These mechanisms interact dynamically with one another and with contextual factors at multiple levels. Trust emerged as foundational, underpinning the effectiveness of all other mechanisms. In particular, the interplay between community embeddedness and health system integration—both strongly reliant on trust—was found to be central to CHWs' ability to bridge the gap between communities and formal PHC services [72].

When considered as a whole, the Antwerp and South Africa studies together with exploratory insights from Brazil and the United Kingdom provided a broad evidence base for adaptation. The Antwerp study clarified the specific barriers to healthcare access in Belgium, while the South African fieldwork deepened understanding of the mechanisms through which CHWs can address such barriers. The field visits in Brazil and the UK offered contextual lessons on CHW integration within diverse PHC systems. In combination, these findings indicated that CHWs in Belgium would need to provide sustained, structured, and culturally sensitive support; to be embedded in communities yet integrated into the health system; and operate in ways that foster trust and adaptability to local needs [71, 72]. The insights from this phase provided the foundation for the participatory design activities in Phase 2.

Phase 2: Participatory adaptation and intervention design

Several important insights emerged from the co-creation trajectory. First, the name *community health worker* was experienced as distant and difficult to use in everyday speech, partly because the English term was hard to pronounce and felt cumbersome. Through collective brainstorming and voting, the group proposed the term *zorgcompasser* (which translates to “care compass”), which was felt to better capture the supportive and guiding role of the worker.

Second, when defining the CHW profile, participants emphasized interpersonal and communication

skills—such as sociability, empathy, flexibility, and resilience—rather than shared language or cultural background. GPs, however, placed more emphasis on language skills and cultural proximity, one describing the need for “a social worker who speaks 26 languages” to serve Antwerp’s diverse population. This contrast highlighted a tension between professional expectations and community priorities.

The workshops also underlined the importance of flexibility in the setting of encounters. While home visits were considered useful, participants noted that these might not always be acceptable initially, and that neutral meeting spaces should also be available until sufficient trust is established. Regarding the scope of CHW support, the co-creation group envisioned a broad role, including offering social support, facilitating access to services, navigating the healthcare system, and acting as a bridge between patient and GPs by communicating information regarding clients’ broader living situations. Preventive health tasks, however, did not emerge as a priority from their perspective, whereas GPs strongly emphasized the need to address low uptake of preventive services among underserved groups.

Input from GPs further confirmed the relevance of a CHW intervention. GPs described how patients increasingly turn to them with questions beyond the medical domain, such as housing, social welfare rights, or administrative procedures. They acknowledged lacking both the time and expertise to respond to these needs. Importantly, they expressed that CHW involvement could thereby relieve pressure on PC. Such input reinforced the adaptation of CHW responsibilities to the Belgian context, with a stronger focus on social and administrative navigation. This differs from the ‘original’ models in Brazil and South Africa, where CHWs also carry more clinical responsibilities such as screening, treatment adherence, and home-based care.

This participatory process thus not only guided the naming, role definition, and task scope of the intervention, but also revealed points of divergence between community members and healthcare professionals. These insights helped determine which elements of the Brazilian and South African CHW models could be retained as core components, and where adaptations were necessary to align with the Belgian PC system and local community needs. The outputs of the co-creation trajectory were then consolidated and refined in Phase 3 to prepare the intervention for evaluation.

Phase 3: Finalizing the model and preparing for evaluation

Finalizing the COMPASS intervention required iterative discussion within the research team to consolidate findings from earlier phases, reconcile diverging stakeholders’ perspectives, and ensure alignment with the planned

RCT. Several adaptations were made to the “original” CHW model from Brazil and South Africa, driven both by contextual considerations in Belgium and by practical constraints of the evaluation design. In addition, a pilot study was conducted to test feasibility, which generated lessons that informed further refinements to the model. Together, these processes ensured that the intervention was both contextually appropriate and feasible for evaluation.

Recruitment and team composition Internationally, CHWs are typically recruited from the neighbourhoods in which they work, based on the assumption that shared lived experience fosters trust and culturally sensitive care. In Belgium, however, this approach was not feasible, because residents can freely choose their GP, meaning even people living in the same street or household may be registered with different practices. Antwerp’s highly diverse population further complicates the idea of matching CHWs to client groups, since no single worker could realistically reflect the heterogeneity of any one practice’s patient population. Finally, recruitment also occurred before GP practices were confirmed and randomised, creating uncertainty about placement. For these reasons, COMPASS prioritises interpersonal skills and cultural competence over strict geographic proximity.

Team composition also diverged from international models, where each team consists of at least one nurse and 6–10 CHWs, often supplemented by other professionals. While a larger team structure could theoretically work in Belgium, budgetary constraints and the requirements of the cluster-RCT necessitated a smaller-scale model. COMPASS therefore has a maximum of two CHWs per practice, with six CHWs covering nine GP practices. The GP practices range from GP-only to multi-professional teams including nurses, dietitians, psychologists, or diabetes educators.

Training and supervision Fieldwork in South Africa and Brazil confirmed that substantial pre-service training is essential for CHW performance [28]. COMPASS maintained this principle but adapted content to the Belgian context. CHWs completed an eight-week program covering navigation of the Belgian healthcare and welfare systems, motivational interviewing, communication skills, confidentiality, and prevention. Members of the COMPASS advisory boards shared training materials from Ghent, Belgium [76] and the USA [77], which were tailored to local needs. Principles of popular education were explicitly retained from Brazil to reflect the participatory approach that underpins community health work there [78, 79]. In addition, COMPASS added ongoing training modules to respond flexibly to emerging needs, such as

disease outbreaks, or to equip CHWs to deliver monthly prevention themes.

Supervision was another area requiring adaptation. In Brazil and South Africa, CHWs are supervised within multidisciplinary teams, but this was not feasible in Belgium, where GPs face high workloads and CHWs are thinly distributed across practices. COMPASS therefore appointed a dedicated external Outreach Coordinator to oversee all six CHWs, ensuring consistency, systematic fidelity monitoring, and reduced burden on GP practices. Weekly group supervision sessions allow for case discussion and peer learning across practices, while monthly one-to-one sessions support reflective practice and professional development. This dual structure aligns with the Belgian Federal CHW program [80].

Duration, delivery and caseload Another major adaptation concerned the scope and intensity of support. In Brazil and South Africa, CHWs typically provide open-ended support across the life course. In COMPASS, support was time-limited to 12 months to fit the RCT design. A structured framework was introduced to clarify what would be evaluated, guide CHW practice, and strengthen monitoring. Home visits, a cornerstone in international programs, were retained as the preferred mode of delivery, but the COMPASS intervention introduced flexibility through alternative meeting locations and the option of occasional phone follow-up to accommodate client preferences. Caseloads were also substantially reduced.

Whereas CHWs in Brazil and South Africa may cover 150–200 households, COMPASS limited caseloads to approximately 30 households per CHW. This adaptation reflected both feasibility within the trial and concerns raised during co-creation where CHWs in Belgium's federal project had already warned against caseloads of 50 households per month, underscoring the importance of a more manageable number.

Table 2 provides an overview of the main adaptations made in the COMPASS intervention, comparing components of the “original” CHW models with their adapted form, and outlining the rationale for adaptation (contextual fit or evaluation design).

Lessons from the pilot The pilot study generated several additional refinements. It highlighted the need to improve GP-led identification of eligible patients, for example by providing clearer guidance on inclusion criteria, documenting reasons for referral, and noting language preferences. Multiple reminders proved necessary to encourage attendance at the first appointment, while initial CHW encounters were more successful when held in familiar and trusted settings, such as GP practices or local social organisations. The pilot also underscored the importance of building trust gradually, adopting a phased approach to addressing client needs. Finally, it revealed the necessity of strengthening communication and collaboration between CHWs and GPs to ensure integrated support. Together, these adaptations and lessons from the pilot resulted in a

Table 2 Overview of adaptations in the COMPASS intervention and their rationale

	Original CHW model (Brazil and South Africa)	Reasons for adaptation		COMPASS intervention (Belgium)
		Contextual fit	Evaluation design	
Recruitment	CHWs typically recruited from the neighbourhoods in which they work	Free choice of care provider High cultural diversity in Antwerp	Overlap of GP and CHW recruitment 1 CHW works at 2 practices	Recruitment based on interpersonal skills and cultural competence
Team composition	6–10 CHWs, at least one nurse, nurse technician, family physician, other health professionals optional	Diverse composition of GP practices	Budgetary constraints necessitate smaller scale	6 CHWs at 9 practices. Maximum of 2 CHWs per practice.
Training	Pre- and in-service training essential for effectiveness Based on popular education	Content tailored to local needs (e.g. epidemiology, Belgian PHC system, etc.)	/	Eight-week pre-service training based on popular education Ongoing in-service training
Supervision	CHWs receive supportive supervision within their teams (WBPHCOT or FHT)	Different team composition High workload of GPs	Max 2 CHWs per practice	External Outreach Coordinator to supervise all 6 CHWs. Weekly group supervision and monthly individual
Duration	Life-course approach	/	Budgetary constraints and time limitations of RCT	CHW support lasts 12 months
Delivery	Home visits	Co-creation and pilot indicate that home visits might not always be acceptable	/	Home visits preferred, but alternative locations are possible and follow-up can be maintained via phone, in line with client preferences
Caseload	Each CHW covers 150–200 households	Co-creation indicated that the original caseload might be too high	Feasibility concerns	Approx. 30 households per CHW

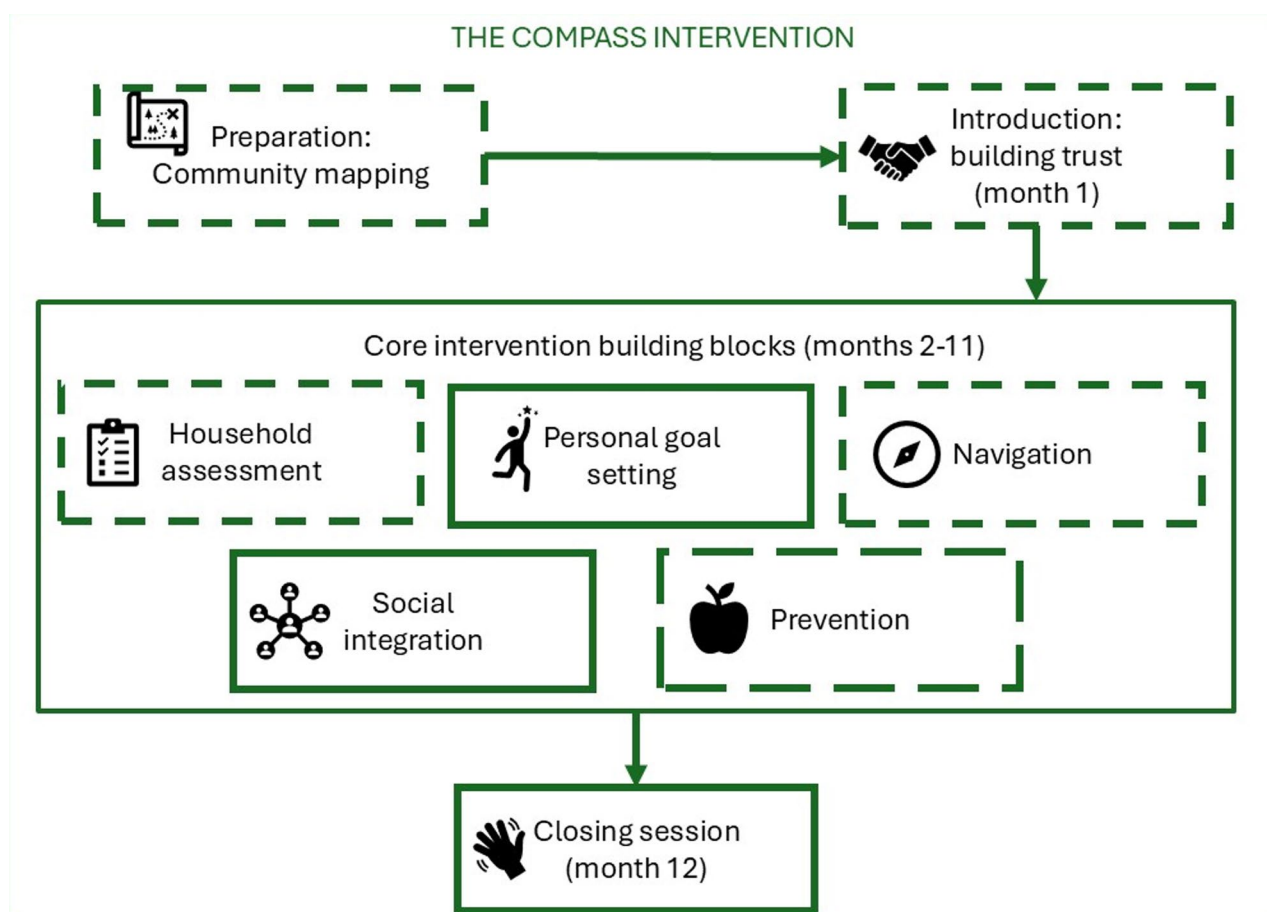


Fig. 1 The COMPASS intervention. Legend: Solid boxes = new developments in COMPASS; dotted boxes = adaptations of the ‘original’ CHW model

finalized COMPASS intervention that was both contextually appropriate and feasible for evaluation, as described in detail in the following section.

The COMPASS intervention

Drawing on the insights and adaptations described above, the finalized COMPASS intervention is implemented across nine general practices in Antwerp and delivered by six CHWs (80% FTE – 0.8 full-time equivalent, approx. 30 h/week). The CHWs are lay individuals with strong interpersonal skills, cultural competence, and a connection to the target population, trained specifically for the COMPASS role. Each CHW is linked to two practices, covering all selected clients at one practice and sharing responsibility with a colleague for a second. CHWs support approximately 30 clients each, with household members included if relevant. Potential clients are identified by GPs; full inclusion criteria and recruitment procedures are described in the trial protocol [62].

The COMPASS intervention covers a period of 12 months, with at least one contact per month. Home visits are preferred to allow clients to remain in a familiar environment, but sessions may also take place in GP

practices, libraries, or public spaces, with follow-up by phone or messaging.

Before client enrolment, CHWs complete the eight-week training programme described above. A short preparation phase further involves “community mapping”, in which CHWs systematically explore the area surrounding their GP practices, identify key organisations, and introduce the COMPASS project to them. This generates an inventory of community resources and facilitates future referrals. To ensure quality and consistency, all CHWs receive weekly group supervision and monthly individual supervision from a dedicated external Outreach Coordinator (50% FTE) with extensive experience in Antwerp’s health and social sector. Collaboration between CHWs and GPs is central to COMPASS. CHWs also collaborate closely with GPs and other professionals present in the practice, attending monthly practice team meetings and sharing insights into clients’ social contexts to foster person-centred care. Practices are encouraged to provide CHWs with a dedicated workspace for meetings and administrative tasks.

Figure 1 provides an overview of the different steps in the COMPASS intervention. It highlights how the

intervention combines newly developed components (solid boxes) with adaptations of elements from the South African and Brazilian CHW models (dotted boxes). This distinction underscores that COMPASS is not a simple transfer of a pre-existing model, but the result of a process that both adapts proven strategies to the Belgian context and introduces new components to address locally identified needs.

Each client support trajectory begins with an introductory session to build trust, clarify the CHW role, and address urgent needs. Over the following months, CHWs and clients work together across five interrelated domains. First, CHWs gradually conduct a household assessment to gain insight into the household context, health needs, and barriers to care, sharing relevant information with GPs where appropriate. The assessment is designed to be flexible and spread over several visits to avoid overwhelming clients. Second, they facilitate a process of personal goal setting, in which clients identify their main life priorities, the health problems that hinder them, and the support they require. This structured process is designed to elicit intrinsic motivation and ensure that care aligns with what matters most to the client. As such, the intervention is tailored to the local context and needs of individual clients: CHWs adapt the frequency and content of their support according to each situation. Third, CHWs provide navigation support, helping clients to access appropriate services in the complex Belgian health and social care system and clarifying the roles of different providers. Fourth, they promote social integration by encouraging engagement with local organisations and mobilising informal networks, thereby strengthening social ties that can support broader health and well-being. Fifth, preventive health promotion, with a particular focus on mental health, is addressed both in response to individual needs and through monthly prevention themes such as cancer screening, immunisation, or alcohol reduction.

The trajectory concludes with a closing session in which the CHW and client reflect on progress and discuss how health goals can be sustained beyond the intervention period. To ensure consistent delivery, implementation was supported by a structured set of tools, including a training manual, intervention guide, household assessment tool, goal-setting worksheet, and thematic prevention flyers. Fidelity is reinforced through routine supervision, activity tracking, peer learning, and refresher sessions.

Taken together, COMPASS retained the central principles of international CHW models—proactive outreach, trusted relationships, and formal linkages to the health system—while adapting them to Belgium's institutional, cultural, and epidemiological context. The result is a time-bound, small-scale intervention that emphasizes

navigation, social integration, prevention and culturally sensitive support.

Discussion

This study examined the process of developing COMPASS, a CHW intervention adapted from Brazil and South Africa for implementation within the Belgian PHC system. Guided by a reciprocal innovation approach, we followed a structured and iterative process informed by both adaptation and development frameworks, namely ADAPT [55] and 6SQuID [59]. The process combined empirical fieldwork, international learning, and co-creation with stakeholders, resulting in an intervention that preserves core mechanisms of the original CHW model—such as proactive outreach, trusted relationships and formal linkages to the health system—while tailoring delivery to the Belgian context. In doing so, this study demonstrates the feasibility of adapting a CHW model developed in LMICs to a high-income, multi-diverse urban setting, thereby contributing to the relatively limited literature on structured transfers of CHW interventions across contexts [81]. CHWs have long been present in HICs, but they have typically emerged in a piecemeal and organic fashion, with little standardization and few explicit attempts to transfer lessons from LMICs [82]. By contrast, COMPASS illustrates how the intentional use of theory and evidence can support such a transfer.

Our findings underscore the added value of a clear programme theory in guiding adaptation. By articulating the hypothesised mechanisms of change based on qualitative insights, we were able to modify delivery strategies to fit the Belgian health system while remaining attentive to the intervention's "active ingredients" [83]. Nevertheless, the extent of contextual tailoring raises the question of when adaptation becomes reinvention. Like Naples and Stewart [84], we found that structural and contextual differences between settings sometimes necessitated such substantial shifts that the resulting intervention may be better understood as a new model. The literature offers little clarity on where this threshold lies [61], but our experience suggests that adaptation and development are often intertwined.

The development process also highlighted the importance and complexity of co-creation. On the one hand, sustained stakeholder involvement from the outset helped to ensure that the intervention was acceptable, relevant, and more likely to be implemented in practice [58, 69]. On the other hand, power imbalances were evident throughout, particularly in relation to whose perspectives carried the most weight in decision-making. Because the trial design depended on the willingness of GP practices to participate, their preferences often took precedence over those of other stakeholders. For example, input from GP representatives regarding workload

constraints led to prioritizing recruitment of patients already registered with a practice and in need of extra support, rather than conducting outreach-based recruitment. This decision reflected institutional priorities and sought to ensure feasibility and sustainability. This is consistent with other accounts showing how the voices of marginalized groups are often undervalued, even in participatory processes [85, 86]. Although we implemented a range of strategies to promote more equitable participation—including tailoring our methods to different stakeholder groups [56, 73], compensating community actors, holding workshops in community settings, and building trust through sustained engagement—these could only partially counterbalance structural power imbalances. This highlights the need for ongoing methodological innovation to ensure that community perspectives genuinely shape intervention design.

Finally, methodological requirements also shaped decisions during development. In particular, the evaluation design of a cluster-RCT required a more detailed and standardised intervention protocol than that used in Brazil or South Africa—specifying, for example, the steps for household assessment, personal goal setting, and system navigation – to enable fidelity monitoring. It also necessitated standardisation of implementation strategies across clusters, particularly recruitment procedures. As a result, potentially useful context-specific adaptations were constrained; for instance, GPs' offers to help reach hard-to-recruit patients could not be accepted because not all practices were able to provide such support.

Methodological strengths of the study include the novel integration of the ADAPT and 6SQuID frameworks, transparency in reporting the intervention development process, and the systematic adoption of co-creation principles. Intervention development was informed by multiple sources of evidence from several countries, which strengthened both the rigour of the process and the potential transferability of insights [87]. The study further benefited from an interdisciplinary COMPASS team with combined expertise in CHW programmes, intervention development, co-creation, and RCTs, which provided both substantive knowledge and methodological credibility.

We also recognize several limitations. First, for an intervention that relies primarily on the development of trust between CHW and client, a one-month pilot is relatively short. This is a common constraint in intervention development due to limited resources and time, but it means that longer-term relationship-building dynamics remain to be tested [59]. Second, although co-creation was central to COMPASS, balancing input from policymakers, health professionals, and community-based actors required continuous negotiation. This reflects a common limitation in co-creation, where structural

power asymmetries are difficult to overcome [88], despite efforts to support more equitable participation. Finally, although the development of the COMPASS intervention was informed by principles of reciprocal innovation, achieving genuine reciprocity – ensuring that the collaboration also yields concrete benefits for partners in South Africa and Brazil – remains a persistent challenge that calls for continued effort and engagement [50].

In line with ADAPT [55] and 6SQuID [59], Phase 4 of this study entails a full evaluation of effectiveness and cost-effectiveness, with particular attention to CHWs' contribution to reducing health inequities [27, 89]. Equally important is a process evaluation that examines not only whether the intervention works but also how, why, and for whom it works [90, 91], targeting remaining uncertainties and shedding light on both intended and unintended consequences of adaptations [55]. The causal pathways identified during the development phase represent theoretically plausible and desirable mechanisms, yet they remain to be empirically verified, and the model will inevitably evolve during implementation [92]. Looking ahead, future research should also explore the extent of contextual adaptation required to scale up the COMPASS intervention beyond Antwerp, creating opportunities to refine the model and enhance its potential for successful implementation across Belgium and beyond.

There are currently very few examples of studies reporting the full process of transferring a CHW intervention from LMIC to HIC [81]. This paper therefore contributes to the small but growing body of literature on cross-context transfer, which will eventually help determine under what conditions such adaptations are most effective [55]. While much of the existing evidence concerns the effectiveness of CHWs in delivering disease-specific interventions, we deliberately drew on the broader South African and Brazilian models with strong primary health care connections, which have been identified as essential for programme effectiveness [37, 93]. By providing a detailed description of the adaptation and development process, as well as of the final COMPASS intervention, we address a recurring gap in the literature, where lack of transparency often complicates evaluation and replication [61, 81]. Furthermore, by reporting on CHW characteristics, training, and supervision procedures, we offer the kind of practical detail that is essential for replicability [94].

Conclusion

By providing a detailed account of the COMPASS intervention's development and adaptation, this study contributes to the emerging science on complex intervention design and transferability, offering practical insights for adapting health service innovations to new contexts in a transparent and context-sensitive way. Future evaluation of the COMPASS intervention will generate evidence on

its effectiveness and cost-effectiveness, and may inform broader implementation of community health worker models in high-income settings facing persistent health inequities.

Abbreviations

6SQulD	Six steps in quality intervention development
CHW	Community health worker
COMPASS	Community health workers for primary care access
FHT	Family health team
GP	General practitioner
HICs	High-income countries
LMICs	Low- and middle-income countries
PC	Primary care
PHC	Primary health care
RCT	Randomized controlled trial
WBPHCOT	Ward-based primary health care outreach team
TIDieR	Template for Intervention Description and Replication

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-026-14157-2>.

Supplementary Material 1: Semi-structured interview guides used in the preparatory fieldwork in Antwerp and South Africa.

Supplementary Material 2: Completed TIDieR checklist indicating page numbers for detailed information on the COMPASS intervention to facilitate transparency and replicability.

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Author contributions

All authors contributed to the conceptualization and study design and took part in the adaptation and development process of the COMPASS intervention. EodB conducted qualitative fieldwork in Antwerp, including data collection and analysis. LV conducted qualitative fieldwork in South Africa, including data collection and analysis, and undertook a research visit to the UK and Brazil. CM joined the research visit to the UK. EodB, LV and TVI jointly organised and carried out the co-creation process and stakeholder consultations. LV drafted the manuscript. All authors reviewed multiple drafts of the manuscript and approved the final version for submission.

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Data availability

Data are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical standards set out in the Declaration of Helsinki. It was approved by the Ethics Committee for the Social Sciences and Humanities, University of Antwerp, Belgium (SHW_2023_98_1) and the Health Sciences Research Ethics Committee, University of the Free State, South Africa (UFS-HSD2023/0267/2609), with permission from the Free State Department of Health (28/02/2023). All

participants provided written informed consent prior to participation in the study.

Competing interests

The authors declare no competing interests.

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