

How to improve cancer outreach programmes in rural areas: insights from a realist evaluation

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Abstract

Background

Mobile outreach programmes may bring cancer prevention and organised screening information closer to rural communities, but their effects depend on interactions with local contexts and actors. This study aimed to explain how, for whom and under what circumstances the Bergo'Bus programme fostered engagement with cancer prevention and organised screening.

Methods

We conducted a realist evaluation informed by RAMESES II. An initial programme theory was developed through a realist review of cancer outreach literature published between 2013 and 2023. It was then refined through document analyses, participant observations and qualitative semi-structured interviews with stakeholders across eight departments of Nouvelle-Aquitaine. Data were analysed iteratively as Intervention-Context-Actor-Mechanism-Outcome configurations.

Results

The literature-derived theory primarily framed outreach as a means of producing individual change through increased awareness, knowledge, motivation and screening engagement. The field study confirmed five mechanisms supporting initial beneficiary engagement: convenience and visibility, social proof and norm activation, trust and psychological safety, personal relevance, and self-efficacy and navigation confidence. These mechanisms generated immediate outcomes, including spontaneous contact, questions, improved understanding and intentions to act, but rarely translated into screening participation or sustained preventive behaviour. This was constrained by the single-visit format, limited follow-up, geographical barriers, privacy concerns and restricted data sharing. The most distinctive empirical outcomes occurred at community and organisational levels, revealing a sixth mechanism: bridge-building and collective efficacy. By forging connections, Bergo'Bus appears to have strengthened cross-sector relationships, resource sharing, professionals' willingness to participate in future local initiatives, and the local dissemination of prevention messages. The refined programme theory therefore shifted from expected individual behaviour change towards a catalytic model centred on community empowerment and strengthened local prevention capacity.

Conclusions

Bergo'Bus appears to have acted as a catalyst for community mobilization and local prevention networks. Under a single-visit model, its main observable contribution was not sustained individual behaviour change but the strengthening of collective capacity for cancer prevention. Empowerment and strengthened local prevention capacity should therefore be considered core outcomes of rural outreach programmes, alongside resident-level engagement. Longer-term evaluation is needed to examine whether and how these collective capacities are sustained and what further locally relevant outcomes they generate.

Background

Cancer remains one of the most widespread and feared diseases worldwide, affecting people of all ages and backgrounds. Responsible for nearly 10 million deaths in 2020—about one in six deaths globally—it ranks among the leading causes of mortality worldwide (1). Yet an estimated 41% of new cases could be avoided by acting on modifiable risk factors and detecting tumours at an earlier stage (2).

Early diagnosis and organized screening already exist for breast, colorectal and cervical cancer in France, but attendance remains sub-optimal (3). Within nations, participation is consistently lower among rural, low-income and minority populations, perpetuating health inequalities in terms of morbidity and mortality (3).

Outreach is an implementation approach intended to reach people who do not readily access conventional health or social services (4). Rather than waiting for people to seek care, trained professionals proactively engage with communities in their everyday environments — whether through home visits, public spaces, or via digital tools such as calls, text messages, or social media (5).

By building trust and adapting interventions to the specific contexts and needs of the target groups, outreach shifts from a model of *acting on* people to *acting with* them. This helps reduce non-use of health services and promotes active participation (5). Widely used in public health and social care, this approach has proven effective in addressing structural barriers to cancer prevention, screening, and treatment, especially among marginalized or rural communities (6, 7). Evidence shows that outreach can improve knowledge, increase screening uptake, reduce delays in diagnosis, and help close gaps in cancer outcomes for high-risk populations (8, 9).

Bergo'Bus is a multicomponent mobile outreach intervention programme developed by a comprehensive cancer centre created to bring cancer prevention and screening services closer to rural and underserved areas (10). Municipalities are prioritised with Local Health Contract (Contrat local de santé [CLS]) coordinators, using shared territorial health diagnoses and locally identified access constraints (11). The programme combines prevention activities, promotion of organised screening and support for navigating health services. By adopting a proactive outreach strategy, the mobile unit collaborates with local stakeholders to deliver health promotion activities focused on modifiable cancer risk factors.

A realist evaluation was undertaken to elucidate for whom, under what circumstances and through which mechanisms this mobile model contributes to improved cancer outcomes. Understanding these intervention-context-actors-mechanism-outcome relationships is essential for optimising the programme locally and informing adaptation in other settings.

The initial programme theory (Fig. 1) proposed that targeting priority municipalities and working with local partners could reduce social and territorial barriers to prevention. Bergo'Bus aims to improve health literacy by offering practical tools, such as communication materials, informational resources, and breast self-examination workshops. Activities addressed four main areas: promoting screening and

vaccination, encouraging healthy behaviours (nutrition and physical activity), preventing addictions, and improving access to health rights and services. The intervention team draws on multidisciplinary expertise to carry out targeted interventions with vulnerable populations.

Evaluation questions, objectives and focus

The primary evaluation question was: how, for whom and under what circumstances does Bergo'Bus foster engagement with cancer prevention and organised screening, and which implementation outcomes occur?

Specific objectives were to characterise contextual factors and interventions resources that facilitate or hinder programme functioning; identify the generative mechanisms through which outcomes are produced; and refine the programme theory to support scale-up and transferability.

Methods

Study design

The study was a realist evaluation conducted and reported (Additional file 5) using the RAMESES II standards (12). It comprised a two-step method:

- First, a realist literature review explored existing literature related to cancer outreach programmes on how cancer outreach programmes work, for whom and under which circumstances. The review was used to develop an initial programme theory.
- Second, this initial program theory was confronted with empirical data from a triangulation of multiple sources. This included document analyses, participant observations and qualitative semi-structured interviews with stakeholders across eight departments of Nouvelle-Aquitaine.

A realist approach was selected because outreach interventions operate through context-dependent interactions rather than linear dose-response effects. This approach explains how mechanisms (M) are activated within specific contexts (C) to produce outcomes (O). As certain contextual elements relate either to the intervention itself, the broader environment, or the actors involved, and after following expert consultation, the analytic structure was expanded from CMO to ICAMO (Intervention, Context, Actors, Mechanisms, Outcomes). The literature was reread to integrate two initially overlooked elements—Intervention (I) and Actors (A)—and to refine the definition of outcomes.

The evaluation proceeded iteratively: the initial programme theory was progressively tested, refined, and reformulated in light of empirical findings, thereby strengthening its explanatory value and its transferability to other settings (13–15). Explanations from the literature were compared with field data, challenged by contradictory cases and reformulated when they did not adequately account for observed

patterns. The resulting configurations should therefore be understood as explanatory hypotheses supported by the available data, not as causal effects estimated independently of context.

Description of the intervention and setting

The French healthcare system is essentially Bismarckian in nature, with coverage—including prevention and screening measures—funded by the social partners. Geographically, Nouvelle-Aquitaine is a vast region covering 84,000 km², with a population of just over 6 million spread across 12 departments. It has only one comprehensive cancer center (Institut Bergonié) and three university hospitals (Bordeaux, Poitiers, and Limoges). Bergo'Bus is a mobile, multiprofessional outreach programme involving dietitians, a psychologist-addictologist, a gynaecological oncologist, an adapted-physical-activity specialist, social workers, a nurse, and prevention and communication officers. It travels to health-underserved rural communes identified in collaboration with CLS coordinators; no single national classification of 'underserved' municipalities was applied. It sets up in markets, supermarket car parks, school courtyards and workplace forecourts. Two audience streams are engaged: (i) passers-by who receive brief counselling and educational materials, and (ii) workshop participants referred by social, medico-social or educational partners for thematised sessions on modifiable cancer risks (tobacco, alcohol, diet, physical activity, HPV...).

The programme was created under the 2020 dedicated prevention call for projects and co-financed by the Nouvelle-Aquitaine Region and Regional Health Agency (ARS) to develop regional initiative.

Data collection

Realist Review

Phase 1 consisted of a realist review designed to elicit and refine the initial programme theory. This review followed the RAMESES standards for realist syntheses. Sources published in English or French were eligible. It combined (i) scoping of the oncology-outreach literature, (ii) purposive and iterative searches in MEDLINE, CINAHL and grey-literature sources (Cairn, theses.fr and capitalisationsante.fr) (January 2013 – January 2023) using combinations of terms related to outreach, mobile clinic, cancer prevention, screening and inequities, and (iii) extraction and coding of ICAMO data. A more detailed method of the review is available in the supplementary materials (Additional file 1).

An update to the review was conducted on 31 July 2026 to assess the currency and theoretical sufficiency of the initial programme theory (Additional file 1).

Field study

The developed ICAMO configurations and theory were refined through qualitative methods, including document analyses, participant observation and individual interviews.

Document analyses

A corpus of four core project documents, two calls-for-proposals and the minutes of five debriefing meetings was reviewed alongside field journals to capture the intervention logic, resources and contextual constraints.

Participant observation

An observation grid was developed, and five structured observations were carried out during awareness workshops. For outreach activities in public settings—such as markets and rural health events—where participant interactions were spontaneous and unplanned, a more adaptive observation approach was adopted.

Individual interviews

The prevention officer generated a list of all stakeholders active in 2023. These stakeholders could be health-care providers, screening coordinators, municipal services, sport-and-health associations and patient groups. Stakeholders were stratified by department and organisational type. The professional profiles of the participants ultimately interviewed are presented in Additional file 2.. Forty-three stakeholders were randomly selected within these strata. The list was then reviewed to preserve diversity in organisational and professional roles. The interview guide, developed specifically for this study, was informed by the realist review and pilot-tested with two stakeholders who were not included in the final sample. It covered five domains: 1. intervention; 2. contextual factors; 3. mechanisms; 4. Actors and 5. observed or expected outcomes (Translated interview guide in Table A2.2 Additional file 2).

Data analysis

Field journals, meeting minutes, calls-for-proposal documents and structured-observation grids were imported into Taguette, an open-source qualitative data analysis tool (16). Material was first indexed deductively according to Intervention, Context, Actors, Mechanisms and Outcomes. Inductive codes and analytic memos were then used to record elements that did not fit the initial programme theory. These data were compared with the realist review to draft provisional ICAMO configurations.

The 13 semi-structured interviews were transcribed verbatim and anonymised. Constant-comparative techniques were applied to explore how mechanisms were activated across different contextual conditions and organisational settings. An initial vertical reading was conducted without note-taking to verify the transcription quality of the 13 interviews and identify potential errors. A second, more detailed reading involved open and general note-taking, enabling comparison between interview data and insights from the literature. Finally, a thematic analysis was conducted to code the interviews according to elements of Intervention (I), Context (C), Actors (A), Mechanisms (M), and Outcomes (O), in order to build the ICAMO configuration.

Throughout the study, regular meetings were held between the project's main investigator (SMP) and two experts (VT and ZEH) to jointly interpret the empirical materials, discuss emerging configurations, and support the drafting and refinement of the article. This iterative process contributed to strengthening both the internal coherence of the analysis and the robustness of the resulting programme theory.

Results

Initial programme theory (literature review)

Of the 110 articles identified, 22 publications met the review inclusion criteria (Additional file 3, Figure A3.1). Ten French-language publications (4, 5, 7, 17–23) addressed outreach in health or social care more generally, while the remaining twelve (8, 9, 24–33), focused specifically on cancer-related outreach, most of which were conducted in the United States (11/12, 92%) (Additional file 4). Across these publications, the extraction process identified a wide range of intervention resources, external contextual factors, actors, mechanisms and outcomes that could contribute to ICAMO configurations.

The initial theory proposed that cancer outreach could support prevention and organised screening in rural or underserved populations by improving awareness, understanding, motivation, perceived ability to act and navigation of screening pathways. Most outcomes described in the literature were individual-level, short-term outcomes.

Overall, the literature yielded 23 intervention resources (I), three contextual factors (C) and a diverse set of actors (A), involving both beneficiaries and implementing organisations, grouped into eight categories. Six mechanisms (M) were identified. The interactions between these elements (I, C, A, and M) resulted in 25 outcomes, leading to an overall initial programme theory comprising 65 elements. These ICAMO configurations are detailed below, organised according to the six mechanisms identified (Fig. 1).

Convenience and visibility

When activities are visible, easy to reach and delivered repeatedly in familiar settings with known local actors and appropriate media coverage, people may perceive participation as requiring less practical effort and carrying less social risk. Expected outcomes include spontaneous contact and initial discussion of cancer prevention.

Social proof and norm activation (familiarity)

Accessible materials, facilitated dialogue, culturally adapted communication and endorsement by trusted people may signal that participation is normal and socially supported. Expected outcomes include clearer understanding of prevention and organised screening, greater acceptance of prevention messages and motivation to act.

Trust and psychological safety

Small-group or informal formats, credible local partners, non-stigmatising interactions and protected confidentiality may create psychological safety. People may then feel able to express fears, share experiences, ask questions and seek information.

Personal relevance and sense-making

Personalised exchanges, culturally appropriate communication and targeted educational resources may help people connect general cancer-prevention information to their own circumstances. Expected outcomes include greater interest and receptivity to organised screening messages.

Self-efficacy and navigation confidence (pathway clarity)

Clear explanations of referral pathways, administrative steps and available support may reduce uncertainty and strengthen confidence in the ability to act. Expected outcomes include enrolment in organised screening, use of preventive services and more continuous navigation through the care pathway.

Community mobilisation

Collaboration with local partners, multiprofessional involvement and collective activities may create shared ownership of cancer prevention. Expected outcomes include wider dissemination of prevention messages, demand for organised screening and improved local access to preventive services.

Overall, the literature emphasised individual-level outcomes, particularly awareness, knowledge, motivation and engagement with organised screening, while reporting fewer organisational or community-level implementation outcomes.

Refinement of the programme theory

Field study

Among the 43 selected partner organisations initially contacted, 15 responded and 14 agreed to participate. One participant later withdrew (Additional file 3, Figure A3.3). Thirteen semi-structured interviews were therefore completed with stakeholders representatives across eight departments of Nouvelle-Aquitaine (Additional file 2, Table A2.1).

The empirical material yielded 62 ICAMO elements organised around the same six mechanisms as the review. Field data supported all six mechanisms, 14 intervention resources, three contextual factors and five outcomes already identified. It also generated 28 elements not explicitly described in the reviewed literature: nine intervention resources, eight contextual factors and eleven outcomes. These additions mainly concerned local implementation conditions, the single-visit format and community-level outcomes. The additional intervention resources, contextual factors and outcomes are described below for each of the six mechanisms.

For convenience and visibility, the field study added the mobile unit, playful and interactive tools and the single-visit format as intervention resources. Weather, geographical dispersion and delays in communicating the visit were additional contextual factors. Partner accounts and observations indicated high footfall and spontaneous questions, but also brief or superficial engagement and limited follow-through. These were treated as immediate engagement outcomes rather than evidence of behavioural change.

For social proof and norm activation, a positive local perception of previous, similar initiatives emerged as an additional contextual condition that could make participation appear familiar and acceptable.

For trust and psychological safety, the field study added a café-style welcome and a stable one-to-one contact person. Partners reported that these formats could reveal needs that had previously been unexpressed or unrecognised.

For personal relevance, hands-on demonstrations of screening procedures and a one-to-one contact person were additional resources. Some target populations did not perceive cancer prevention as an immediate priority. Partners reported apparent satisfaction, intentions to book mammography or use a faecal immunochemical test, and occasional on-site distribution of screening kits. These outcomes were reported or observed at the time of contact and were not verified through beneficiary follow-up.

For self-efficacy and navigation confidence, the single-visit format and limited internal follow-up were intervention constraints. Geographical barriers, privacy concerns and restricted data sharing between organisations also limited continuity. Partners reported occasional on-site kit distribution and screening completion by a minority of participants. The study did not directly measure subsequent screening participation or health behaviour, so longer-term uptake could not be established.

For community mobilisation, the field study added a cross-institutional steering committee and shared debriefing sessions. Previously weak cooperation and overlapping local initiatives were important contextual conditions.

For community mobilisation, no additional beneficiary-level outcomes were identified. Instead, the field study added more specific community and local-system implementation outcomes: stronger intersectoral relationships, resource sharing, greater willingness among cancer-centre professionals to participate in future outreach activities, and local relay of cancer-prevention information.

Refined programme theory

The results presented below reflect consolidated ICAMO configurations, where specific intervention resources, combined with contextual factors and the involvement of key actors, contributed to the activation of reasoning mechanisms that shaped observable outcomes in cancer prevention among rural and underserved populations. Across sources, six refined mechanisms were identified, five of which related primarily to beneficiaries' responses to the intervention, while one mechanism concerned the mobilisation and coordination of local stakeholders.

Taken together, these findings constitute the refined programme theory: in rural and underserved settings, outreach interventions support cancer prevention through community empowerment, by reinforcing community-level capacities and enabling locally grounded preventive actions (Fig. 2).

This refined theory is articulated below through six ICAMO configurations.

Convenience and visibility

The mobile unit, visible stand placement, brief contact opportunities, adapted materials and timing during national awareness months made the activity noticeable and easy to approach. Residents could stop without an appointment or prior commitment. However, the single-visit format interacted with geographical dispersion, weather and delayed local communication. These conditions reduced opportunities for repeated contact and follow-up. With local leaders, public-health bodies and the outreach team involved, convenience and visibility generated broad initial reach and spontaneous participation, but engagement was often brief and progression towards longer-term preventive action remained uncertain (Fig. 3.a).

Social proof and norm activation

Co-organisation with recognised associations, participation of trusted local volunteers and links with national cancer-awareness campaigns signalled collective endorsement. Where similar previous activities had been viewed positively, joining Bergo'Bus appeared socially acceptable and familiar. Community associations, municipal actors and health institutions helped create a supportive atmosphere, increase attendance and relay prevention messages informally (Fig. 3.b).

Trust and psychological safety

Small-group conversations, café-style discussions, a stable contact person and opportunities for confidential exchange created a less formal setting. These resources were particularly important where cancer evoked fear or stigma and where privacy was a concern in small communities. Volunteers, associations and prevention professionals reduced relational distance. Partners reported that participants were then more willing to ask questions, share personal or family experiences and discuss needs that might not emerge in a public or clinical setting (Fig. 3.c).

Personal relevance

Messages adapted to rural lifestyles, facilitator skills in flexible communication, diverse information sources and hands-on demonstrations helped participants relate prevention information to their own circumstances. This occurred in settings where cancer information was complex, health literacy varied and prevention was not always an immediate priority. Partners reported apparent satisfaction, clearer understanding and stated intentions to book mammography or use a faecal immunochemical test. These outcomes were not confirmed through direct beneficiary interviews or follow-up (Fig. 3.d).

Self-efficacy and navigation confidence

Printed referral pathways, direct links with Regional Cancer Screening Coordination Centres or on-site professionals, and the option of telephone follow-up could reduce uncertainty about what to do next. Their effect was limited by the single-visit format, weak internal follow-up, geographical barriers, privacy concerns and restricted data sharing. Partners described occasional kit distribution and some completed screening, but the study could not determine the proportion progressing through organised screening. The configuration therefore supports improved pathway clarity more strongly than verified screening uptake (Fig. 3.e).

Bridge-building and collective efficacy

A cross-institutional steering committee, explicit role allocation, partner mapping, shared debriefing and involvement of actors beyond healthcare created opportunities to work towards a common goal. In territories with previously weak cooperation or overlapping initiatives, these resources helped partners identify complementary roles. Reported outcomes included stronger intersectoral ties, pooled resources, willingness among cancer-centre professionals to participate in future outreach and local relay of prevention information (Fig. 3.f).

Discussion

The findings of this realist evaluation indicate that the Bergo'Bus intervention was well accepted and highly visible within the communities where it was deployed. Its presence in familiar rural settings, combined with active engagement from local actors, contributed to strengthening the reach, credibility and perceived legitimacy of cancer prevention activities. This high level of visibility was essential in generating initial contact with populations that are often distant from traditional healthcare structures, aligning with the literature on the effectiveness of mobile outreach units in reducing access barriers (8, 24).

The six mechanisms can be interpreted through a smaller set of complementary implementation theories rather than as six independently validated constructs. Although they were identified and refined through the realist analysis, they are consistent with constructs described in established theories of access, behaviour change, implementation and community action. Convenience and visibility reflect the importance of accessibility and physical and social opportunity described in access-to-care frameworks and the Behaviour Change Wheel (34, 35). Social proof and norm activation are consistent with Diffusion of Innovations Theory, which emphasise the influence of trusted actors and perceived collective endorsement on engagement with a new practice (36, 37). Trust and psychological safety correspond to relational processes described in participatory and community-based approaches, in which credible actors and non-stigmatising interactions create conditions for people to express concerns and engage in dialogue. Personal relevance is consistent with the Health Belief Model, particularly perceived susceptibility, perceived benefits and cues to action, while self-efficacy and navigation confidence reflect the role of confidence and actionable guidance described in Social Cognitive Theory (15, 38, 39). Normalization Process Theory further supports the importance of embedding referral, coordination and follow-up within routine organisational practices if these initial responses are to be sustained (40).

Finally, bridge-building and collective efficacy are consistent with Social Capital Theory, Partnership Synergy and Community Coalition Action Theory, which identify trusted relationships, complementary resources, shared goals and collective ownership as foundations for coordinated community action (41–43). This convergence with established theoretical constructs strengthens the explanatory credibility of the refined programme theory and indicates that the mechanisms identified are not specific artefacts of this evaluation. The study's contribution lies in showing how these recognised mechanisms may combine and interact within a rural mobile cancer-prevention programme. These theories were used to assess the theoretical coherence of the findings and were not applied a priori or formally tested as competing explanatory models.

Another highlight of the study is the short-term effects among participants. Partners reported immediate outcomes such as questions, apparent understanding, satisfaction and intentions to act. These reports are compatible with evidence that cancer-awareness interventions can improve short-term knowledge and help-seeking intentions (44). The present study did not measure health literacy, subsequent health behaviour or organised-screening participation, and it therefore cannot conclude that these outcomes changed, despite them being initially brought up in the initial theory and call for project. The single-visit format and lack of systematic follow-up provide a plausible explanation for the gap between initial engagement and verified action, but this explanation requires prospective testing. Geographical targeting may increase the availability of prevention activities in areas with fewer services; it does not, by itself, demonstrate a reduction in social or territorial inequalities. Equity-focused implementation research should assess who is reached, who benefits and who remains excluded (45).

Recent publications were consistent with the refined programme theory. Brief outreach interventions mainly reported immediate changes in knowledge and intentions, whereas repeated programmes embedded within community organisations also reported organisational adoption and maintenance. No new mechanism family or contradictory explanation emerged (Additional file 1, Table A1.2).

Comparing the realist review with the field study also shifted attention from individual responses to multilevel implementation outcomes. The reviewed literature mainly reported awareness, knowledge, motivation and intentions regarding organised screening. These outcomes fit health-promotion models that focus on individual beliefs and access.

Comparison of the realist review with the field study broadened the level at which outcomes were conceptualised. Community mobilisation was already present as a mechanism in the literature-derived theory, but the outcomes reported in the reviewed sources remained predominantly individual and short term. The field study identified additional community and local-system outcomes, including stronger interorganisational relationships, clearer roles, resource sharing, professionals' willingness to participate in future outreach, and local relay of prevention messages. These findings give greater empirical prominence to community mobilisation and suggest that strengthened local prevention capacity is a substantive outcome of Bergo'Bus, rather than merely a condition for individual behaviour change. This

interpretation remains provisional because these outcomes were reported by partners and were not examined over time.

These findings have implications for programme design and evaluation. Where organised screening is an intended objective, repeated contact, explicit referral pathways, defined follow-up responsibilities and appropriate data-sharing arrangements are needed. Sustaining community-level outcomes also requires governance, role clarity and resources that persist after the mobile unit leaves. Evaluation should therefore include outcomes at beneficiary, organisational and community levels, selected according to the objectives of each implementation. This multilevel approach is consistent with contemporary implementation-science guidance (46–48).

Strengths and limitations

This study presents several methodological strengths. First, it is grounded in a theory-driven approach, which guided the identification and interpretation of ICAMO configurations and supported the progressive refinement of the programme theory. Second, the evaluation relied on a comprehensive triangulation of data sources, combining insights from a structured literature review with empirical findings from the field study. This dual perspective strengthened the credibility and transferability of the results by allowing the convergence, comparison and refinement of mechanisms identified across contexts. Third, the diversity of interviewees, representing multiple institutions, professional roles and geographical areas, provided a broad understanding of how the Bergo'Bus intervention was implemented and experienced across rural settings. Finally, the iterative nature of the analytic process, consistent with realist methodology, enabled continuous adjustment between emerging findings and theoretical propositions.

Some limitations should also be acknowledged. A first limitation concerns the structure of information available in the literature. None of the reviewed studies presented their findings explicitly through an ICAMO lens; instead, they predominantly used CMO formulations, which limited the level of detail available to inform the intervention resources. Moreover, the literature largely focused on positive contextual influences, reporting favourable conditions that supported outreach activities, while negative intervention resources were rarely identified or discussed unless they were linked to external constraints (e.g., rurality, access, or structural barriers). Furthermore, the articles analysed originate from two countries: the USA, with a liberal healthcare system, and France, with a system that is essentially Bismarckian. This raises the question of the analysis's generalizability. As a result, the literature provided only a partial view of contextual dynamics, which required further clarification and completion through the field study.

In the field component, despite efforts to engage all partners, the study was unable to interview or follow beneficiaries over time, which restricts the capacity to understand how mechanisms evolve after initial contact. This resulted in an underrepresentation of the lived experience of targeted populations, limiting insights into how beneficiaries interpret and sustain preventive actions beyond the first encounter. Furthermore, the limitations inherent in the method must be taken into account; the data is self-reported,

without the measurement of specific indicators. These limitations should be taken into account when interpreting the findings and considering their applicability to other contexts.

Perspectives

The evaluation has already informed several operational changes. Depending on the objectives of each visit, relevant health professionals may now accompany the mobile unit. For example, radiology professionals can facilitate direct appointment booking and strengthen links with breast-screening pathways. The team has also clarified how the objectives of Bergo'Bus, the roles of participating organisations and the expected follow-up are presented to cancer-centre staff and local partners. These changes aim to improve intervention coherence and reduce uncertainty about responsibilities before, during and after each visit. They also seek to address the limited sustainability of one-off activities by encouraging greater local ownership and repeated delivery of prevention activities by community partners. The effects of these changes were not evaluated in the present study.

Transfer to other territories should preserve the functions identified in the programme theory rather than replicate every operational component. Local teams should assess trusted points of entry into the community, appropriate communication channels, available partnerships, referral capacity, and responsibility for coordination and follow-up. Because community mobilisation and local prevention capacity are core outcomes of the programme, adaptation should also consider how local actors will take ownership of, repeat and sustain prevention activities beyond the mobile unit's visit. Where organised screening is an intended outcome, mobile outreach should be connected to existing screening pathways and supported by repeated contact or navigation assistance. Future evaluations should prospectively assess reach across social groups, adoption and ownership by local organisations, continuity of prevention activities, use of referral pathways, and the maintenance of inter-organisational partnerships.

Conclusion

This realist evaluation shows that Bergo'Bus should be understood as a multilevel cancer-prevention intervention, rather than solely as a means of delivering prevention messages or increasing participation in organised screening. Its functioning depended on the interaction between accessible and trusted forms of engagement with residents and the capacity of local actors to coordinate, share resources and sustain locally relevant prevention activities. The refined programme theory therefore positions resident engagement, community mobilisation and strengthened local prevention as complementary core outcomes. It also suggests that a single outreach visit can generate visibility, dialogue and new connections, but that continuity requires clear responsibilities, repeated opportunities for engagement, integration with existing pathways and local ownership after the mobile unit leaves. Transfer to other territories should preserve these functions while adapting delivery to local contexts. Future evaluations should prospectively test the refined configurations and assess outcomes over time at resident, organisational and community levels.

Declarations

Ethics approval and consent to participate

This study was a non-interventional evaluation of the implementation of a cancer-prevention outreach programme. It involved interviews with adult professional and community partners, analysis of programme documents, and observation of programme activities; no clinical procedure was performed and no individual health data were collected. **Under Article R.1121-1, II, 1°(d) of the French Public Health Code, research in the human and social sciences in the field of health that does not pursue the biological or medical purposes defined in Article R.1121-1, I is not classified as research involving the human person. Consequently,** formal approval by a research ethics committee was not required. The study was declared to and registered with the Data Protection Officer of Institut Bergonié. All methods were performed in accordance with applicable French laws and regulations, Institut Bergonié data-protection procedures, and the ethical principles set out in the European Commission's *Ethics in Social Science and Humanities* guidance. Before each interview, participants received information about the purpose of the study, audio-recording, confidentiality, the voluntary nature of participation, and their right to withdraw. Oral informed consent was obtained and documented before data collection. No directly identifying information was recorded during observations. Audio files were destroyed after transcription.

Consent for publication

Not applicable.

Availability of data and materials

The qualitative data supporting this study are not publicly available.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

VT and SMP conceived the study.

ZEH and MN organised the data collection.

ZEH performed the realist review, the interviews and the analyses.

ZEH had full access to all the data in the study and takes responsibility for its integrity and the data analyses.

VT and SMP supervised the methodological design.

All authors contributed to interpretation, manuscript writing, and approved the final version.

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Figures

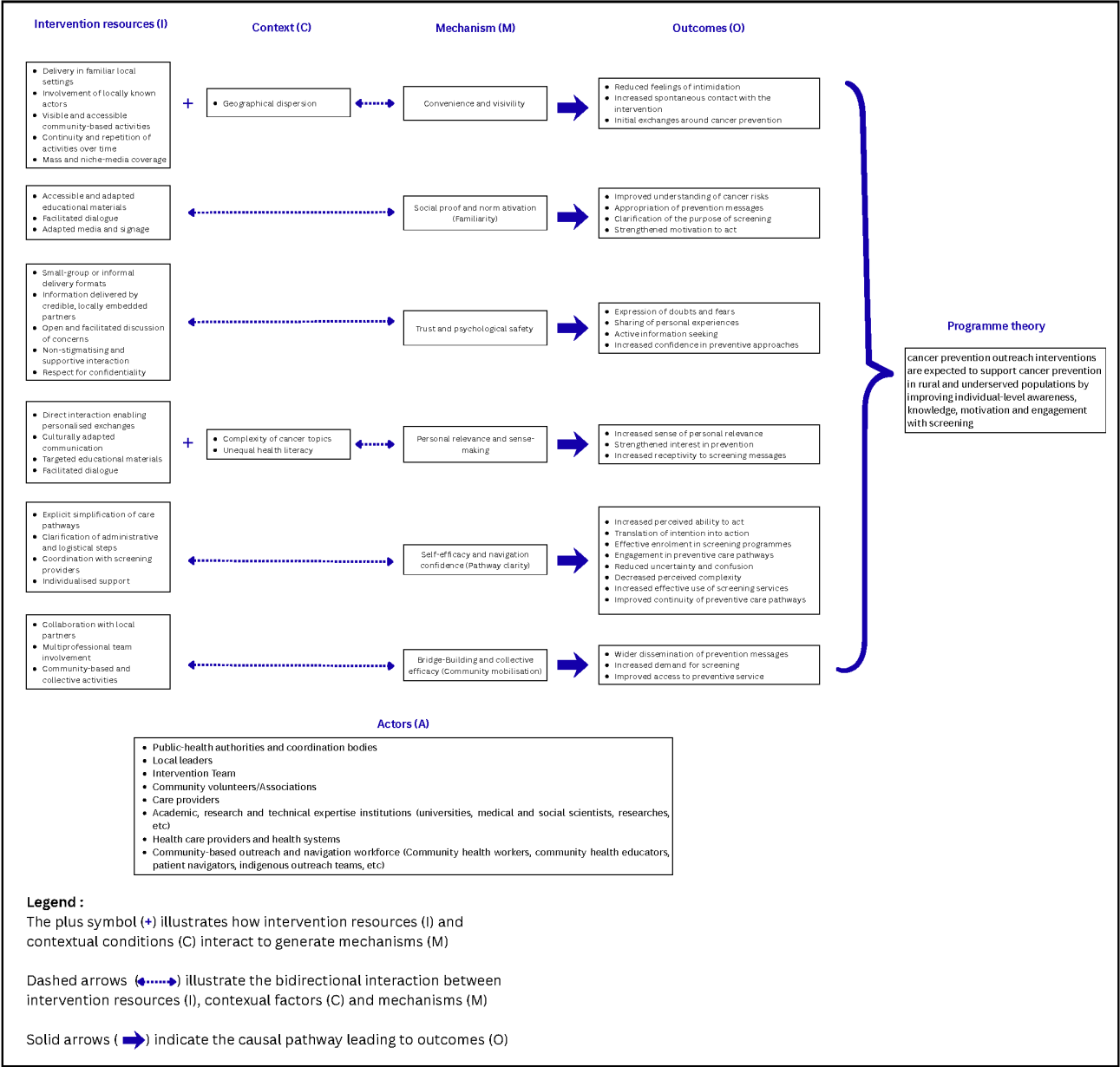


Figure 1

Initial programme theory of cancer-prevention outreach programmes in rural and underserved areas.

The theory developed from the realist review links intervention resources (I), contextual conditions (C), actors (A), mechanisms (M) and outcomes (O). Plus signs indicate interactions between resources and context; dashed arrows indicate bidirectional interactions; and solid arrows indicate pathways leading to outcomes.

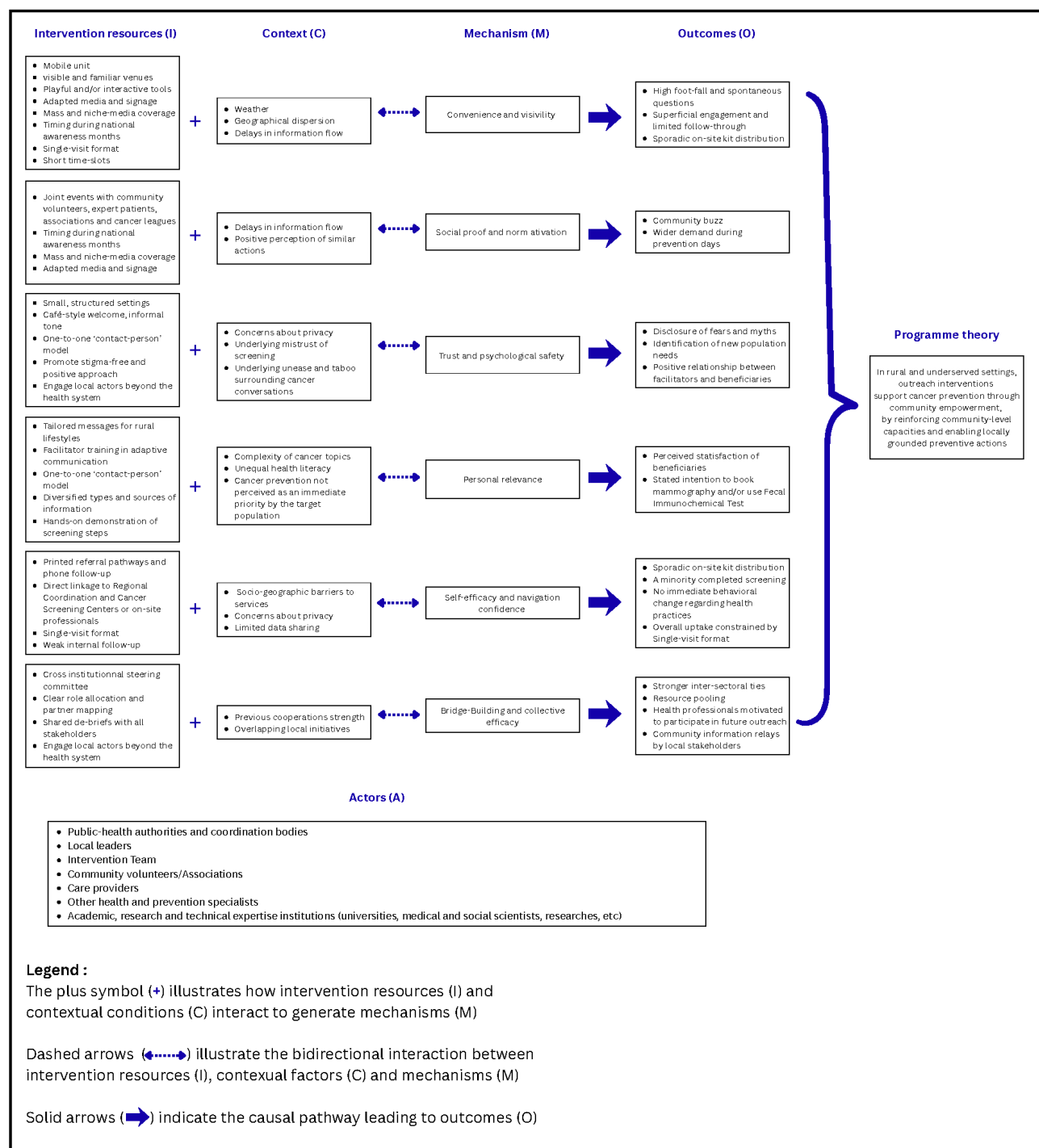


Figure 2

Refined programme theory of the Bergo'Bus cancer-prevention outreach programme in rural France.

The empirically refined ICAMO model shows how intervention resources (I) and contextual conditions (C), involving different actors (A), activate six mechanisms (M) and generate individual, community and organisational outcomes (O). Plus signs indicate interactions between intervention resources and

contextual conditions; dashed arrows indicate bidirectional interactions between resources, context and mechanisms; and solid arrows indicate pathways from mechanisms to outcomes. Together, these configurations explain how outreach may support community empowerment and locally grounded cancer-prevention activities in rural and underserved settings.

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Figure 3

Intervention-context-actor-mechanism-outcome configurations underlying the Bergo'Bus cancer outreach programme in rural France.

The six main mechanisms relate to: (a) convenience and visibility; (b) social proof and norm activation; (c) trust and psychological safety; (d) personal relevance; (e) self-efficacy and navigation confidence; and (f) bridge-building and collective efficacy.

Supplementary Files

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- [Additionalfile1Realistreviewmethodologyv0.3.docx](#)
- [Additionalfile2Qualitativemethodsv0.5.docx](#)
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