special articles

C/Can City Engagement Process: An Implementation Framework for Strengthening Cancer Care in Cities in Low- and Middle-Income Countries

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abstract

The effective implementation of locally adapted cancer care solutions in low- and middle-income countries continues to be a challenge in the face of fragmented and inadequately resourced health systems. Consequently, the translation of global cancer care targets to local action for patients has been severely constrained. City Cancer Challenge (C/Can) is leveraging the unique value of cities as enablers in a health systems response to cancer that prioritizes the needs of end users (patients, their caregivers and families, and health care providers). C/Can's City Engagement Process is an implementation framework whereby local stakeholders lead a staged city-wide process over a 2- to 3-year period to assess, plan, and execute locally adapted cancer care solutions. Herein, the development and implementation of the City Engagement Process Framework (CEPF) is presented, specifying the activities, outputs, processes, and indicators across the process life cycle. Lessons learned on the application of the framework in the first so-called Key Learning cities are shared, focusing on the early outputs from Cali, Colombia, the first city to join C/Can in 2017. Creating lasting change requires the creation of a high-trust environment to engage the right stakeholders as well as adapting to local context, leveraging local expertise, and fostering a sustainability mindset from the outset. In the short term, these early learnings inform the refinement of the approach in new cities. Over time, the implementation of this framework is expected to validate the proof-of-concept and contribute to a global evidence base for effective complex interventions to improve cancer care in low- and middle-income countries.

INTRODUCTION

Over the past decade, health researchers have sought to apply the fundamental principles of implementation science as a systematic and comprehensive approach to improving health care practice, including cancer care delivery.[1,2] Application of these principles varies in rigor. For example, the Consolidated Framework for Implementation Research has been widely used,[3] but a critical review determined that many initiatives used the framework mainly as a tool to guide data analysis rather than informing the design and development of health initiatives.[4] A specific framework for strategic implementation to improve cancer care delivery and patient outcomes has been proposed by Mitchell and Chambers.[1] However, most of the implementation science evidence derives from high-income settings and it cannot be assumed that this will be applicable where there are resource constraints.[5-7]

Means et al[8] recently proposed eleven novel constructs to be added to the Consolidated Framework for Implementation Research, including strategic policy alignments and perceived sustainability and scalability, to increase its compatibility for use in low- and middle-income countries (LMICs).Similarly, the broad framework developed by Villalobos Dintrans et al[9] aims to address these global health gaps and identifies six key elements for low-resource settings: (1) pre-implementation (diagnosis), (2) intervention provider or system, (3) intervention, (4) recipient, (5) environment, and (6) postimplementation (evaluation). The importance of evaluation as part of an iterative process of monitoring, evaluation, refinement, and modification is a common thread in implementation science literature and has been advocated in other international implementation projects including in lower-income settings.[10] A continuous learning approach and local capacity development are described

CONTEXT

Key Objective

What key factors need to be considered when implementing interventions aimed at improving access to quality cancer care in cities in resource-constrained settings? City Cancer Challenge (C/Can) has developed, tested, and adapted a new framework whereby local stakeholders lead a city-wide process to identify, plan, and execute cancer care solutions adapted to local context.

Knowledge Generated

Successful planning and implementation of local cancer care solutions requires the engagement of all relevant local stakeholders, an understanding of local context, and creation of a high-trust environment that fosters local ownership and multisectoral collaboration. Strengthening local capacities by leveraging existing expertise and resources is key for creating lasting change.

Relevance

Health care professionals are using the C/Can framework to identify gaps between current and high-quality services to set priorities for quality improvements in cancer care. As such, this framework and the learnings generated can inform the adaptation and improvement of interventions aimed at strengthening quality cancer care in resource-limited environments.

in the United States Agency for International Development's Collaborating, Learning and Adapting Framework.[11] The WHO Cancer Control—Knowledge into Action Guide[12] also highlights the importance of understanding the local context and being open to learn from past experiences for effective cancer control.

The aim of this article is to describe the design, development, and application of the City Engagement Process Framework (CEPF), a conceptual framework for the implementation of the C/Can initiative in cities in LMICs. Focus is given to how the CEPF builds on the above-mentioned frameworks, also highlighting its unique features. The learnings from the four so-called Key Learning Cities (Cali, Colombia; Asuncion, Paraguay; Yangon, Myanmar; and Kumasi, Ghana) are shared, with a focus on application of the framework in the first city, Cali, followed by the other cities that joined the initiative in a staggered approach during 2017 and early 2018. The framework is currently being applied in Porto Alegre, Brazil; Tbilisi, Georgia; Kigali, Rwanda; Leon, Mexico; and Greater Petaling, Malaysia.

DEVELOPING THE CITY CANCER CHALLENGE CEPF

City Cancer Challenge (C/Can) has followed a human-centered design approach that focuses on progressive testing and adapting of public health interventions to develop novel solutions to complex global health challenges.[13] Starting first in a small number of cities in LMICs, C/Can's CEPF has been progressively tested and adapted to resource-constrained environments through this learning by doing approach,[10,11] with the early learning now informing the process in new cities. Designed to engage local stakeholders in the planning and execution of projects that respond to local priorities in cancer diagnosis, treatment, and care, the C/Can CEPF incorporates key elements of existing implementation science frameworks mentioned above.[1,3,8,9,14] The CEPF also draws on the systems-wide,

inclusive, and collaborative approaches that have proven to be effective for other conditions such as HIV/AIDS.[15-19]

IMPLEMENTING THE C/CAN CEPF: AN ADAPTIVE AND ITERATIVE LEARNING PROCESS

The City Engagement Process is C/Can's framework for the planning, design, and implementation of cancer care solutions adapted to local context. C/Can provides direct support for cities over a 2- to 3-year period to undertake a staged process (Fig 1) to deliver a set of outputs, processes, and practices that strengthen health systems building blocks for cancer care.[20] Table 1 shows the alignment of the CEPF with the simplified implementation science framework by Mitchell and Chambers[1] incorporating three stages: (1) Pre-implementation: Diagnosis and planning; (2) Implementation: Action and monitoring; and (3) Postimplementation: Monitor, support, and sustain. Progress along the City Engagement Process is measured by a series of process indicators (Table 1), which are a critical component of C/Can's Global Results Framework that outlines how progress and results will be measured in the short, medium, and long term, and will be the focus of another publication in this series.

Stage 1: Preimplementation: Diagnosis and Planning

Due diligence. Currently active in nine cities, new cities can join the C/Can initiative through a competitive application process, open to any city with a 1+ million population. The submission of an application is led by a local civil society organization (eg, professional association, cancer society, and patient association), with endorsement from the relevant city health leadership such as the Mayor or Secretary for Health. A comprehensive due diligence process is undertaken for shortlisted applicant cities to assess their eligibility and readiness to change on the basis of an established set of criteria. The C/Can readiness assessment checklist draws from previous work and incorporates learnings from implementation of the CEPF in current cities.

FIG 1. C/Can City Engagement Framework. C/Can, City Cancer Challenge.
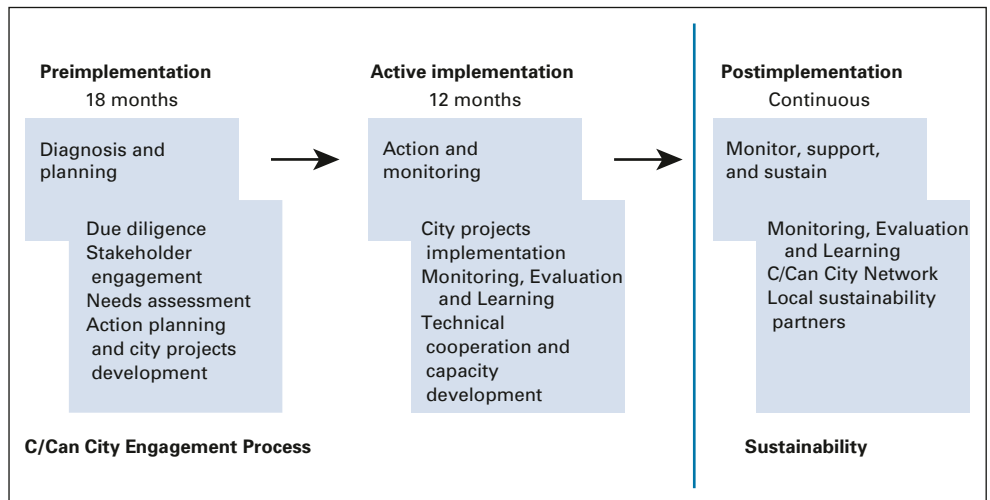
It is organized under five key themes found to be the enabling conditions for sustainability of changes, including local leadership, multisectoral partnerships, people-centered approach, an enabling policy environment, and core cancer care pillars (Table 2).

Stakeholder engagement. Successful cities formally join the C/Can initiative by signing a Memorandum of Understanding between C/Can, the city and regional or state government, and a local civil society organization. A comprehensive stakeholder mapping is conducted to ensure engagement of all relevant local stakeholders from public, private, and civil society sectors, including city health leadership, regional or national government, cancer care providers, health insurers, academia, scientific societies, and patient organizations. A multisectoral governance body for the initiative is then created: the City Executive Committee. Appendix Table A1 lists the composition of the City Executive Committees in each city; each includes on average 15 high-level decision makers, with relevant background and expertise.

Needs assessment. The City Executive Committee's first task is to convene a multidisciplinary Technical Committee with expertise in the quality, management, and delivery of cancer care. This group of approximately 20 local experts is responsible for convening a wider network of health care professionals representative of the main cancer care providers across the city that will (1) support a city-wide data collection process on cancer care capacity using a purpose-built questionnaire (described in the Appendix) and (2) analyze the results together as part of approximately 20 interinstitutional, topic-specific working groups including for pathology, nuclear medicine, cancer surgery, etc. Through a series of consensus-building meetings, these working groups review the data collected in their respective area of expertise, determine the city's key needs, and develop priority actions to address the gaps. The findings of this process are consolidated in a situation analysis report that serves as a baseline of cancer care services in the city. This report and the recommended actions are presented to the City Executive Committee for their approval. Appendix Table A2 provides a list of the number of institutions, professionals, and patients involved during the needs assessment in each city.

In parallel, the City Executive Committee conducts a sustainability assessment using the online Program Sustainability Assessment Tool to understand the factors that influence sustainability, assess their capacity, and develop a plan to increase the likelihood of sustaining changes.[14,21,22] This may include initiating a process to identify a viable local sustainability partner(s) that can sustain action beyond C/Can's direct support.

Action planning. C/Can supports the city leadership and working groups in further refining the prioritized actions into a set of objectives outlined in a City Action Plan, a roadmap that serves as a tool for resource mobilization and identifying the city's technical cooperation and capacity development needs. In parallel, and on the basis of the Program Sustainability Assessment Tool results, a longer-term city sustainability plan is designed by the City Executive Committee and the local sustainability partner(s) to ensure local ownership, accountability, and integration of projects, processes, and partnerships into the local structures.

Project development. With C/Can's support, local topic-specific, interinstitutional, and cross-disciplinary project teams are formed and led by designated project coordinators. These project teams expand each SMART (Specific, Measurable, Attainable, Relevant, and Time-bound) objective into a city project plan. Each city develops on average 10 city project plans spanning the health systems building blocks for cancer as shown in Table 4. C/Can's technical cooperation team (see below) works closely with local project teams to ensure that each plan has a clear scope, deliverables, methodology, and metrics to measure progress and impact in the short, medium, and long term. If required, C/Can will facilitate input from external experts

TABLE 1. Application and Adaptation of Existing IS Frameworks to the C/Can City Engagement Process

Meta-Stage	Stage	Description	C/Can City Engagement Process	Stage-Specific Outputs	Process Indicators (Extracted From C/Can's Global Results Framework)
Preimplementation	Diagnosis and planning	Setting the stage Assess readiness, develop stakeholder inter-relationships, identify champions and early adopters, build coalition, identify barriers and facilitators, and knowledge synthesis	City applications and due diligence	Readiness assessment (on the basis of C/Can checklist)	Completion of application process Due diligence process completed
			Stakeholder engagement	MoU City Executive Committee	MoU signature completed No. of multisectoral and multilateral coordination bodies created No. of local stakeholders participating in multisectoral and multilateral coordination bodies created Stakeholder mapping completed
			Needs assessment	Formation of Technical Committee Formation of Technical Working Groups Situation Analysis Report Sustainability Assessment Report	No. of local experts participating in the Technical Committee and Technical Working Groups Percentage of institutions providing cancer care represented in the Technical Committee and Technical Working groups No. of health care professionals engaged in the needs assessment No. of patients engaged in the needs assessment No. of institutions engaged in the needs assessment Percentage of institutions providing cancer care engaged in the needs assessment Situation analysis report completed
			Action planning and project development	City Action Plan Project Teams City Project Plans City Sustainability Plan	Action plan coordinator identified Action plan completed City stakeholders use action plan as an information resource No. of projects under development Percentage of projects with project coordinator identified Percentage of project plans endorsed by the City Executive Committee No. of local experts engaged in project development Percentage of key institutions providing cancer care engaged in project development

(Continued on following page)

TABLE 1. Application and Adaptation of Existing IS Frameworks to the C/Can City Engagement Process (Continued)

Meta-Stage	Stage	Description	C/Can City Engagement Process	Stage-Specific Outputs	Process Indicators (Extracted From C/Can's Global Results Framework)
Implementation	Action and monitoring	Active implementation Develop and implement tools and systems for monitoring implementation, develop or provide training, adapt and tailor to context, adjust workflow, revise team roles or structures, and technical cooperation	Project implementation and progress monitoring Technical cooperation	Project's deliverables Collaborative agreement with Local Sustainability Partner	No. of projects under Implementation Total No. of local experts engaged in project implementation Total $ value of resources committed by technical cooperation partners to implement project Total $ value of resources committed by local private sector to implement project Total $ value of resources committed by city authorities to implement projects Total $ value of resources committed by C/Can to implement projects Percentage of project activities completed Percentage of outputs completed
Postimplementation	Evaluation and changes	Monitor, support, sustain Reminders or alerts; audit and feedback; coaching; learning collaborative; improve intervention fidelity; establish performance metrics and incorporate into individual, team, and organizational performance management, and reward practices; and establish policies	C/Can City Network: a community of practice Frameworks for monitoring, evaluation and learning, constructive engagement, and sustainability	Project ECHO,[23] a platform for city-to-city exchange and knowledge sharing Monitoring, evaluation, and learning data	Percentage of projects with monitoring and evaluation plans finalized No. of participants supported with knowledge sharing platforms Sustainability leadership group created Program Sustainability Assessment Tool report finalized Sustainability plan finalized Local sustainability partner(s) identified Agreements signed with local sustainability partner(s) Sustainability partnership risk management plan finalized

NOTE. Adapted from Villalobos Dintrans et al[9] and Mitchell and Chambers.[1]

Abbreviations: C/Can, City Cancer Challenge; IS, Implementation Science; MoU, Memorandum of Understanding.

Implementation Framework for Strengthening Cancer Care in Cities in LMICs

TABLE 2. C/Can Readiness Assessment Checklist

Enabling Conditions for Sustainable Change	Assessment
Local leadership and political commitment	Is there commitment from the bodies responsible for the planning, delivery, and financing of cancer care solutions in the city? Are they willing to invest time and resources to participate in the C/Can process?
	Is there potential to replicate the process in other cities or to scale up activity to a national level?
	Are there city champions willing to lead engagement with C/Can?
Partnerships Multisectoral approach, sustainability, and transparency	Is there evidence of multisectoral collaboration (informal or formal) to improve cancer care and/or other NCDs?
	Are there guidelines in place to manage any real, perceived, or potential conflict of interest associated with these collaborations? Is there a local pharmaceutical association that could support industry to engage appropriately?
	Are local strategic partners ready to invest their own financial and human resources to ensure the sustainability of cancer care efforts?
	Are there local strategic partners (eg, civil society organization and government) with the capacity to continue coordinating and scaling up projects developed through the C/Can process?
	Is there evidence of collaboration (formal or informal) between the different cancer care providers?
People-centered approach Robust and coordinated civil society and patient group representation	Is there a civil society organization with the capacity to take a lead role in the C/Can process? Is there evidence of collaboration between civil society organizations?
	Is there evidence of collaboration between the government and civil society to improve cancer care in the city? Are civil society organisations well-represented in cancer control planning processes?
	Are there cancer patient groups or associations in the city? Are they well-represented in cancer control planning processes?
Enabling policy environment National Cancer Control Plans and data-driven decision making	Is there a comprehensive national cancer control plan? If yes, is it adequately funded and implemented?
	Is there a comprehensive national NCD plan? Does it cover the full continuum of cancer control? Is it adequately funded and implemented?
	Is there population-based cancer registry data available in the city or country? If not, are hospital-based cancer registry data available? Is there collaboration with the International Agency for Research on Cancer's Global Initiative for Cancer Registry Development?
Cancer care pillars Availability of core cancer care services	Are the following core cancer services generally available in the city? Diagnostics, cancer surgery, radiotherapy, systemic therapy, palliative and supportive care, and childhood cancer

Abbreviation: C/Can, City Cancer Challenge; NCD, noncommunicable disease.

during the project development phase, drawing on its global network of partners. Project timelines vary between 12 and 18 months and result in concrete outputs (eg, treatment guidelines for priority cancers and quality control manuals) that will need to be further implemented and monitored by local sustainability partners to achieve the expected result and long-term impact.

Stage 2: Implementation: Action and Monitoring

Project implementation and progress monitoring. The majority of project plans developed through the City Process require some form of technical cooperation for their development and implementation. C/Can defines technical cooperation or assistance as the sharing and transfer of information, knowledge, and expertise. C/Can's approach to technical cooperation prioritizes and leverages local knowledge and experiences rather than imposing solutions from outside without contextualization, and includes the following:

1. Technical expertise (short- and long-term technical assistance personnel or international expert consultations and twinning arrangements)

2. Training and learning opportunities (hands-on workshops, peer exchange, scientific visits, knowledge sharing meetings, and consensus building meetings).

Partnerships with health professional associations, such as ASCO, American Society for Clinical Pathology, and the International Society of Nurses in Cancer Care (ISNCC), and regional palliative care associations, among others, have been essential to respond to key common local needs, for example, strengthening the quality of pathology services and building capacity to deliver multidisciplinary cancer management. C/Can has also facilitated technical cooperation to deliver radiotherapy development plans and quality assurance guidelines with International Atomic Energy Agency–designated experts. Table 3 highlights the main technical cooperation activities provided to C/Can cities to support project implementation. The results of these activities will be described more in detail in the topic-specific articles of this series (eg, pathology, multidisciplinary cancer care, and radiotherapy).

Coordination, oversight, and progress monitoring of all projects requiring technical cooperation is led by local

TABLE 3. Summary of Technical Cooperation Activities Provided to C/Can Cities With Support From International Partners During Project Implementation Stage

Technical Cooperation Approach	Area, Description, and Partners Involved	Cities Involved	No. of Local Professionals Involved
International expert consultations	Guidelines for breast and cervical cancer treatment management—ASCO, ONS, ASCP, ISNCC, BHGI, IAEA, and TMH	Cali	41
		Asuncion	35
		Yangon	51
		Kumasi (virtual)	12
	Radiotherapy development plan or quality assurance guidelines—IAEA	Cali	8
		Asuncion	9
		Yangon	22
	Pain management guidelines—WHO CCPC and ASCO	Yangon	23
	Nuclear medicine: QUANUM preparation and city-wide quality assurance program—IAEA	Cali	31
	Pathology quality control or reporting—ASCP and SBPC	Cali	20
		Asuncion	50
		Yangon (virtual)	10
	Standardized pathology reporting—ASCP, IBM, and ICCR	Asuncion	15
	Essential oncology medicines list—ASCO	Yangon	35
Hands-on workshops or consensus building meetings	ASCO multidisciplinary cancer management course	Cali	41
		Asuncion	35
		Yangon	51
	ASCP pathology quality control	Cali	67
		Asuncion	65
		Yangon	82
	Immunohistochemistry quality	Cali	12
	ALCP palliative care	Cali	34
	ONS oncology nursing	Asuncion	60
	Communications	Cali	9
		Asuncion	18
	Public-Private Partnerships	Yangon	38
	WHO CCPC Palliative Care in Cancer Policy	Yangon	27
Peer exchange	Scientific visit to Hospital del Mar and ICO, Spain, on multidisciplinary teams for breast cancer management	Cali Asuncion	14
	Scientific visit to Hospital del Mar and ICO, Spain, on multidisciplinary teams for cervical cancer management	Cali Asuncion	14
	Latam forum for cancer sustainable financing	Cali Asuncion	16
	TeleECHO—11 sessions on cancer care topics	All cities	256

Abbreviations: ALCP, Asociación Latinoamericana de Cuidados Paliativos; ASCP, American Society of Clinical Pathology; BHGI, Breast Health Global Initiative; C/Can, City Cancer Challenge; IAEA, International Atomic Energy Agency; IBM, International Business Machines corporation; ICCR, International Collaboration on Cancer Registration; ICO, Institut Català d'Oncologia; ISNCC, International Society of Nurses in Cancer Care; ONS, Oncology Nursing Society; QUANUM, Quality Management Audits in Nuclear Medicine; SBPC, Sociedade Brasileira de Patologia Clínica; TMH, Tata Memorial Hospital; WHO CCPC, WHO Collaborating Center for Community Participation in Palliative Care and Long Term Care, Kerala, India.

stakeholders in close coordination with C/Can and a local sustainability partner where one has already been identified.

Stage 3: Postimplementation: Monitor, Support, and Sustain
C/Can defines sustainability as local ownership and incorporation of C/Can's guiding principles into local structures and processes for the continuous improvement of access to equitable, quality cancer care in cities. Early identification of local sustainability partners with the capacity, commitment, and potential to sustain efforts beyond the City Process is therefore a priority. Table 4 summarizes the key criteria for the selection of local sustainability partners who

emerged from on-the-ground learnings and early successes and failures. Once a local sustainability partner has been identified, a plan for the transition of coordination and oversight of projects is developed. Local sustainability partners play a critical role in the continuous monitoring and evaluation of project progress and impact against agreed indicators and targets.

Local sustainability partners continue to be connected to C/Can and its partners through a growing community of city alumni (the C/Can city network) in which they are supported to continue sharing knowledge and best practices. Most recently, C/Can has partnered with Project ECHO[23] to lead a series of virtual sessions that include a didactic presentation from an international cancer expert and a case study from one of the C/Can cities. The focus is on an exchange of best practices and fostering a productive, peer-to-peer discussion among cities.

APPLICATION OF THE FRAMEWORK: SPOTLIGHT ON CALI, COLOMBIA

Santiago de Cali is the capital of the Valle del Cauca province and the third largest city in Colombia, with 2.4 million inhabitants. The Cali Population–Based Cancer Registry at Hospital Universitario del Valle reported 23,046 new cases of cancer diagnosed in Cali during the period 2008-2012, for an average of 4,500 cases per year.[24] The incidence rates standardized by age for all cancer sites per 100,000 person-years were 204.6 for men and 185.1 for women. The infrastructure for cancer care includes 165 oncology services including both private and public hospitals and clinics. Cali's health system serves approximately 9 million people and is the regional center for patients in need of high-complexity medical care.

TABLE 4. Criteria for Local Sustainability Partners

Demonstrated local leadership and ownership mindset
A civil society organization or a consortium of public, private, and civil society organizations (including public-private partnerships)
Alignment with C/Can's guiding principles including multisectoral model in the city, region, and/or national level
Established relationship and alignment with national cancer control program, existing cancer legislation or advisory committees, and local/regional/national government
Capacity or potential to develop the required capacities, for strategic partnerships and local mobilization of resources to ensure sustainable financing
Demonstrated experience in working and collaborating with and/or receiving funding from international and multilateral or intergovernmental organizations (eg, WHO and regional offices, International Atomic Energy Agency, World Bank, and Regional Development Banks), international development agencies (eg, United States Agency for International Development), international organizations, and private companies
Track record of successful project implementation, including the key technical, financial, and administrative capacities
Certify compliance with C/Can's Constructive Engagement Framework

Abbreviation: C/Can, City Cancer Challenge.

Cali was the first to join the initiative with the signing of a Memorandum of Understanding with Alcaldía de Cali, Secretaria Municipal de Salud de Cali, Gobernación del Valle del Cauca, and Secretaria Departamental de Salud del Valle del Cauca in March 2017. A first meeting of the 18-member City Executive Committee was held in April 2017, bringing together representatives from the Ministry of Health, National Cancer Institute, local and regional government, public and private hospitals, the public university and teaching hospital, the cancer registry, public and private health insurance companies, and a patient organization.

From May to December 2017, the Technical Committee oversaw a data collection and analysis process involving 180 health professionals and health advocates representing 21 public and private cancer care institutions, and 188 patients with cancer (Appendix Table A2). A situational analysis report summarizing cancer care capacity and gaps was produced and became the basis of an activity planning exercise with local experts resulting in Cali's City Action Plan.

The City Action Plan included 15 priority objectives that were further refined into 10 projects spanning core areas including pathology, nuclear medicine, radiotherapy, palliative care, cancer registration, and blood donation with a cross-cutting focus on strengthening human resources and implementing a multidisciplinary team approach. City projects had staggered start dates (from June 2018 onward) depending on resources and availability of partners.

In November 2019, C/Can signed a collaboration agreement with ProPacifico, an independent, nonprofit organization dedicated to a multisectoral approach to promote sustainable economic development in Colombia. As C/Can's local sustainability partner, ProPacifico committed to continue to oversee the implementation, monitoring, and evaluation of ongoing projects and to continue driving wider and complementary efforts to improve access to quality cancer care in the long term.

Table 5 summarizes early outputs from Cali's 10 projects (as of July 2020), mapped against the building blocks of health systems strengthening for cancer care. Experience in Cali shows that by supporting city innovation and leadership, the C/Can CEPF can generate new political commitment, dynamics, and resource mobilization opportunities both locally and globally. This multiplier effect can result in additional and sometimes unforeseeable results and impact, which are also shown in Table 5.

ADAPTATION OF C/CAN PROCESS TO LOCAL CONTEXT: KEY LEARNINGS AND RECOMMENDATIONS

As C/Can evolves, it is developing the processes and competencies to use key learnings from cities to continuously improve the CEPF to better meet cities' needs. Both the collective and individual learnings are paramount to long-term success. The gradual on-boarding of the Key Learning Cities through 2017-2018 was intentional, with the purpose of generating knowledge over time that could

TABLE 5. Cali: Early Wins Resulting From C/Can City Process Framework Addressing WHO's HSS Building Blocks

HSS Building Block	C/Can Projects Areas	Project Outputs (May 2018-June 2020)	Catalytic Effects (May 2018-June 2020)
Service delivery or health services	Quality control and assurance programs and manuals, standard operating procedures, and treatment guidelines and protocols	Multidisciplinary treatment guidelines developed for management of breast cancer and cervical cancer developed with support from ASCO and ONS, pending endorsement from the Ministry of Health Radiotherapy quality assurance program developed with support from IAEA Nuclear medicine quality assurance program developed with support from IAEA Implementation of an immunohistochemistry service at HUV, the main public teaching hospital *Described in detail in the pathology paper of this series*	Formalization of a Blood Bank Technical Working Group that was initially convened for the C/Can blood bank project. The group has since coordinated two city-wide blood donation campaigns collecting 450 blood units and set up regular training on immunohematology for blood bank staff across the city
Health workforce	Capacity development of health professionals on all areas of the cancer care spectrum	See Table 2 on technical cooperation and capacity development activities	The lack of adequate training of oncology nurses was brought to the attention of local authorities through the C/Can needs assessment. In response, the Ministry of Education approved an oncology nursing curriculum that has already been implemented at the local public university
Health information	Cancer registries and local data collection and dissemination	Institutional cancer registries created and functional in the Fundación Valle de Lili and the HUV, with local technical assistance from the population-based Cancer Registry in Cali administered by the Health Department of the Universidad del Valle	Creation of a cross-institutional Cali Cancer Observatory that supports the integration of data across the city. This effort was led by the Municipal Health Secretariat and City of Cali in response to the need for improved information systems highlighted through the C/Can needs assessment
Medical technologies	Radiotherapy and nuclear medicine development plans and essential medicines lists	10-year radiotherapy plan developed	HPV vaccination program reactivated, after being brought back onto the city's public health agenda by C/Can's launch in 2017
Health financing	Health financing landscape and demand for services analyses	A supply and demand assessment for radiotherapy developed	C/Can partner Astellas supported a feasibility study for the implementation of a comprehensive cancer care unit at HUV, which garnered political commitment from the Ministry of Health of Colombia and the Department of Valle del Cauca to support the construction of a new building solely dedicated to oncology at HUV, including infrastructure and equipment
Leadership and governance	Policy environment and capacity building of local stakeholders, change agents, and decision makers	Active City Executive Committee established	Successful collaboration across the City Executive Committee members prompted the creation of a multi-institutional cancer advisory board—the Valle del Cauca Roundtable. In 2019, the Roundtable developed the first Departmental Cancer Control Plan in Colombia

Abbreviations: C/Can, City Cancer Challenge; HPV, human papillomavirus; HSS, health systems strengthening; HUV, Hospital Universitario del Valle; IAEA, International Atomic Energy Agency; ONS, Oncology Nursing Society.

be distilled, shared, and applied to new cities, with a strong focus on sustainability of the intervention.

Build Trustful Relationships and Foster Local Ownership

The experiences to date are part of a growing evidence base to inform the design and implementation of subnational complex health interventions. Some of these experiences reaffirm previous observations,[5,25,26] for example, the time needed to develop relationships and structures to support a health system–wide approach. Ultimately, the pace and scope of work are related to building a high-trust environment that brings together the right stakeholders. Practically, this has required allocating time in the preimplementation stage to identify champions and early adopters and to engage all local relevant stakeholders to convene an effective City Executive Committee, with the decision-making authority

and leadership stewarding these efforts on behalf of each city. An area for greater attention going forward is to improve the communications and knowledge dissemination to the City Executive Committee to support and sustain the local cancer community's engagement and investment of time.

Have a Deep Understanding of the Local Context

Not only do local technical experts need to identify and prioritize their own needs to develop solutions on the basis of local data, but also these needs must be translated into actionable project plans that consider local levels of resources and capacity to be sustained over time. In C/Can Key Learning Cities, on average, 85% of the institutions providing cancer care services in the city and 200 health care professionals participated in the needs assessment.

Design and Implement Context- and Resource-Adapted Technical Cooperation Projects Leveraging Local Knowledge and Expertise to Create Lasting Changes

Developing local capacities and providing technical cooperation through a learning-by-doing approach naturally lead to self-reliance. Allocating time to convene the technical teams and define roles and responsibilities is key. For example, this approach was applied on the ground during the development of guidelines for the treatment and management of breast and cervical cancer, and quality control manuals for pathology laboratories in Cali, Asuncion, Yangon, and Kumasi. Local experts lead the entire process, from existing guidelines review to drafting and regulatory approval and implementation with technical support from C/Can's regional and global partners such as ASCO, American Society for Clinical Pathology, International Society of Nurses in Cancer Care, International Atomic Energy Agency, Tata Memorial Hospital, and Catalan Institute of Oncology, among others.

Promote a Culture of Monitoring and Evaluation Among Local Professionals

During the development and implementation of city technical cooperation projects, the need to strengthen local capacities in project management including planning, implementation, and monitoring became clear. This was also addressed through a learning-by-doing and locally led approach, as opposed to the delivery of one-time workshops or training. A monitoring and evaluation framework with locally appropriate indicators and targets was developed for each project through a series of consultations with local project teams, relevant partners, and C/Can's technical team, who share best practice examples from other cities. In addition to these project-specific indicators, C/Can's global approach to monitoring progress and impact has also expanded to include periodic surveys, case studies, and stories of change that can capture the catalytic and unintended positive effects of the CEPF, as demonstrated in Cali (Table 5).

Ensure an Ongoing Focus on Sustainability

Cali and Asuncion are now providing pivotal learnings on sustainability planning. Sustainable solutions in cancer care require significant funding commitments, public policy approval and implementation, and capacity development that cannot be fully achieved within a 2- to 3-year timeframe. For that reason, fostering a sustainability mindset among city stakeholders and agents of change is critical to ensure local ownership and continuation of project deliverables. In Asuncion, a local leadership group composed of former City Executive Committee members and representing the National Cancer Institute, the National University, the Cancer Control Program, and private and public cancer care providers is committed to not only sustain change but also scale up the CEPF to other cities in Paraguay, as part of the implementation of the Paraguay Cancer Law[27] that establishes the creation of a national comprehensive cancer care network.

DISCUSSION

C/Can has developed a novel implementation framework whereby local stakeholders lead a staged city-wide process to assess, plan, and execute cancer care solutions adapted to the local context. The CEPF incorporates key elements of existing implementation science frameworks and approaches[1,3,8-11,13,14,20] and adapts them to cancer care in resource-constrained settings. Although still in the early phases of validation, evidence, and insights generated in Cali and the first cities (Asuncion, Yangon, and Kumasi), reinforce the importance of key constructs recognized in existing frameworks in the successful application of the C/Can model.

As promoted by the WHO Cancer Control Framework,[12] early learnings suggest that the gradual implementation of a limited number of priority projects that are designed through a locally led planning process facilitates a high level of engagement of local experts and project execution.

The concept of local ownership and leadership has also proven to be a critical consideration for C/Can in local sustainability planning.[14,18,28] By leading their own sustainability planning from the outset and embedding it throughout the engagement process, cities develop local ownership, strengthen their capacities, and are more likely to be prepared and committed to continue project execution after external direct support ends. Although the need for a sustainability lens had been recognized early in C/Can's development, it is now clear that sustainability planning must be integrated into the preimplementation stage. As such, C/Can's sustainability approach builds on the principles of existing sustainability frameworks[14,29,30] and aligns with the ten constructs outlined in the Global Health Delivery Project's report on sustaining delivery at scale[17] to support cities in transitioning from C/Can's support to local ownership and accountability.

One of these constructs is partnerships and specifically ensuring that domestic and external partners are engaged and leveraged to influence the scaling up process.[17] C/Can's approach to partnership engagement has been unique in this context by seeking to meaningfully involve all relevant public- and private-sector stakeholders in project design and implementation. Although such an approach is recognized and encouraged by global health leaders,[31,32] clear and comprehensive guidance on managing the risks and opportunities associated with multisectoral engagement is often lacking. In 2019, on the basis of experience in current cities and extensive consultation with C/Can partners and stakeholders, C/Can developed a Constructive Engagement Framework[33] to ensure that C/Can-initiated partnerships are able to deliver maximum, balanced, and legitimate benefits for all, while addressing any real or perceived conflicts of interest. C/Can's experience has demonstrated that an agile approach makes it easier to maximize these benefits. It has allowed C/Can to rapidly pivot and leverage the resources, competencies, expertise, and offerings of different partners, across different countries, to respond to cities' changing needs. Agility as an organization has also allowed C/Can to be uniquely responsive to city needs during the current pandemic. C/Can has leveraged existing experience in digital platforms and remote technologies to connect cities with regional and global technical experts to continue scheduled technical cooperation and capacity development activities.[34]

C/Can's CEPF is presented here within the constraints of limited application with a first set of cities in the early phases of implementation. Although the pace of learning and adaptation of the process has accelerated over the last 2 years, continuous and specific efforts to monitor and evaluate progress will be critical in assessing the relevance, effectiveness, and likelihood of sustainability. In parallel, dissemination of early learnings and insights into the implementation of the framework is proving to be critical in shaping the process in other cities and accelerating the improvement of the framework's application and adaptation to other cities.

In conclusion, C/Can has developed and implemented a City Engagement Process Framework building on existing IS frameworks, incorporating a human-centered design approach, and adapting it to cancer care in resource-constrained settings and mixed health systems' challenges. Because strengthening the capacities needed for implementing and sustaining changes in cancer care requires an iterative and adaptive approach, C/Can will continue to integrate on-the-ground learnings to further scale up, adapt, and validate its CEPF to generate knowledge on the complexities of effective implementation of interventions to improve cancer care in LMICs. This is pivotal to adjust the intervention to the context of the community involved, achieve sustainability, and create a global community of practice of cities committed to knowledge exchange to accelerate progress toward Sustainable Development Goal 3.4 of reducing premature mortality from noncommunicable diseases.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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APPENDIX. NEEDS ASSESSMENT QUESTIONNAIRE

The needs assessment questionnaire is an evidence-based instrument designed to systematically collect data on the quality and capacity of cancer care services in the city, while addressing the extent to which patients are placed at the center of care by assessing community access and integration of care within the city. The questionnaire development process, led by the National Cancer Institute's Center for Global Health, included (1) focus group discussions, key informant interviews, and a consensus building exercise with global cancer experts to determine key areas of assessment for quality cancer care services; (2) a narrative systematic review of published literature around quality cancer services; (3) selection of a framework to outline core cancer services implementation; and (4) a final consensus building exercise with global experts, which resulted in the ranking of quality cancer care services.

The questionnaire collects more than 1,100 data points and is divided into five key areas:

1. Management of cancer care services

2. Core cancer care services:

   a. Diagnostics (radiology, nuclear medicine, pathology, and laboratory medicine)

   b. Clinical (medical oncology, pediatric oncology, radiotherapy, surgical care, and palliative and supportive care)

3. Quality of cancer care

4. Community access and integrated care

5. Health workforce and training

To date, the questionnaire has been applied in seven cities. On the basis of consultation with local end users and technical experts, the scope and content of the questionnaire has been revised. Although initially paper-based, through a collaboration with the Universidad del Valle, Cali, Colombia, a first online iteration was developed in REDCap[35] and tested in Porto Alegre, Tbilisi, and Kigali. To further build on learnings from the first digital pilot and enhance data quality, a purpose-built Data Portal has been created, enabling real-time data collection and analysis through a secure user-friendly, mobile platform.

TABLE A1. C/Can's City Executive Committee Member Organizations

City	Country	City Executive Committee Member Organizations
Asuncion	Paraguay	Municipalidad de Asunción, Ministerio de Salud y Bienestar Social de Paraguay, Instituto Nacional del Cáncer, Instituto de Previsión Social, Sociedad de Oncología, Universidad Nacional de Asunción-Facultad de Ciencias Médicas, Hospital de Clínicas, Autoridad Regulatoria Radiológica y Nuclear de Paraguay, Grupo San Roque, Instituto Codas Thompson, Fundación Unidos contra el cáncer, and Fundación Renaci
Cali	Colombia	Ministerio de Salud y Protección Social de Colombia, Instituto Nacional de Cancerología, Alcaldía de Cali, Secretaria Municipal de Salud de Cali, Gobernación del Valle del Cauca, Secretaria Departamental de Salud del Valle del Cauca, Fundacion Valle del Lili, Centro Médico Imbanaco, Hospital Universitario del Valle, Clínica de Occidente, Universidad del Valle-Registro Poblacional de Cáncer, Universidad del Valle-Facultad de Salud, Unicancer, ACEMI, EMSSANAR, and Fundación POHEMA
Kigali	Rwanda	City of Kigali, Ministry of Health of Rwanda, Rwanda Palliative Care and Hospice Organization, Polyfam Clinic, Rwanda Military Hospital, Kigali Teaching University Hospital, University of Rwanda, IMBUTO Foundation, Rwanda Biomedical Center-Cancer, Division MUHIMA District Hospital, Hospice St Jean Paul II, Rwanda Children's Cancer Relief, Rwanda NCD Alliance, Rwanda Social Security Board, Breast Cancer Initiative East, Africa Inc, and King Faisal Hospital
Kumasi	Ghana	Kumasi Metropolitan Assembly, Ashanti Regional Coordinating Council, Ministry of Health of Ghana, Ashanti Traditional Council, Komfo Anokye Teaching Hospital, Ghana Health Service, Kwame Nkrumah University of Science and Technology, National Health Insurance Authority, Peace and Love Hospital, and Breast Care International
Porto Alegre	Brazil	Prefeitura de Porto Alegre, Secretaria Estadual de Saúde Estado do Rio Grande do Sul, Federação Brasileira de Instituições Filantrópicas de Apoio a Saúde de Mama (FEMAMA), Moinhos de Ventos Hospital, Hospital de Clínicas de Porto Alegre, Hospital Presidente Vargas, Hospital Santa Casa, Hospital São Lucas da PUCRS, Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA), Latin American Cooperative Oncology Group (LACOG), Sociedade Brasileira Cirurgia Oncológica, Regional RS Sociedade Brasileira de Oncologia Clínica (SBOC), Sociedade Brasileira de Radioterapia (SBRT), Unimed Porto Alegre, and Instituto de Previdência do Estado do Rio Grande do Sul
Tbilisi	Georgia	Tbilisi City Hall, Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia, Georgia Patients' Union, Europa Donna Georgia, National Centre for Disease Control and Public Health, Tbilisi State Medical University, Todua Medical Center, Mardaleishvili Medical Centre, Young Oncologists Group of Georgia, Universal Medical Center, and Parliament of Georgia-Healthcare Committee
Yangon	Myanmar	Department of Public Health and Department of Medical Services, Ministry of Health and Sports (MOHS), Yangon Regional Government, Myanmar Medical Association, Yangon General Hospital-Hospital Administration, Yangon Regional Health Department of NCDs-MOHS, Shwe Yaung Hnin Si Cancer Foundation, Yangon General Hospital—Department of Medical Oncology-Department of Radiation Oncology, Central Women's Hospital, Yangon Children's Hospital, U Hla Tun Cancer Foundation, and Myanmar Private Hospital Association
Greater Petaling	Malaysia	The Selangor State Government of Malaysia, University of Malaya, and National Cancer Society of Malaysia[a]
Leon	Mexico	Municipality of León Guanajuato, Secretary of Health for Guanajuato, National Cancer Institute of Mexico, and Rodolfo Padilla Foundation[a]

[a]City Executive Committee formation in progress.

TABLE A2. Summary of Participating Institutions, Professionals, and Patient Advocates in Needs Assessment

City	No. of Participating Institutions	Percentage of Institutions Participating in the Needs Assessment	No. of Health Care Professionals Participating in the Needs Assessment	No. of Patients or Patient Advocates Participating in the Needs Assessment
Cali	24	80	186	188
Asuncion	16	80	202	151
Porto Alegre	33	75	168	98
Leon	NA	NA	NA	260
Yangon	20	95	172	NA
Greater Petaling	NA	NA	NA	NA
Tbilisi	27	35.4	175	95
Kumasi	31	90	257	53
Kigali	32	100	126	80

Abbreviation: NA, not available.