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Latin America and the Caribbean Code Against Cancer 1st Edition: 17 cancer prevention recommendations to the public and to policy-makers (World Code Against Cancer Framework)☆

Carolina Espina [a,*,1], Ariadna Feliu [a,1], Mauricio Maza [b,1], Maribel Almonte [c,2], Catterina Ferreccio [d,e,2], Carolyn Finck [f,2], Rolando Herrero [g,2], Juan Rivera Dommarco [h,2], Liz Maria de Almeida [i,3], Silvina Arrossi [j,3], Patricia J. García [k,3], María Luisa Garmendia [l,3], Alejandro Mohar [m,3], Raúl Murillo [n,3], Julio Santamaría [o,3], Guillermo Tortolero-Luna [p,3], Eduardo Cazap [q,4], Owen O. Gabriel [r,4], Diego Paonessa [s,4], J.Walter Zoss [t,4], Silvana Luciani [b,1], Andre Carvalho [a,1], Joachim Schüz [a,1], Working Groups of Scientific Experts[5]

[a] International Agency for Research on Cancer (IARC/WHO), Environment and Lifestyle Epidemiology Branch, 25 avenue Tony Garnier CS 90627, 69366 CEDEX 07 Lyon, France
[b] Pan American Health Organization (PAHO), Cancer Prevention and Control, Washington, DC 20037, United States
[c] World Health Organization (WHO), Department of Sexual and Reproductive Health and Research, Geneva, Switzerland
[d] Departamento de Salud Pública, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile
[e] Advanced Center for Chronic Diseases ACCDIS, Santiago, Chile
[f] Departamento de Psicología, Universidad de los Andes, Bogotá, Colombia
[g] Agencia Costarricense de Investigaciones Biomédicas, Fundación INCIENSA, Costa Rica
[h] Instituto Nacional De Salud Pública (INSP), Cuernavaca, Mexico
[i] National Cancer Institute of Brazil (INCA), Prevention and Surveillance, Rio de Janeiro, Brazil
[j] Centro de Estudios de Estado y Sociedad (CEDES), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina
[k] Universidad Peruana Cayetano Heredia (UPCH), Lima, Peru
[l] Institute of Nutrition and Food Technology, University of Chile, Santiago, Chile
[m] Instituto Nacional de Cancerología, Instituto de Investigaciones Biomédicas (UNAM), Tlalpan, Mexico
[n] Centro Javeriano de Oncología, Hospital Universitario San Ignacio, Bogotá, Colombia
[o] Centro Hemato Oncológico Panamá (CHOP), Panamá, Panama
[p] Centro Comprensivo de Cancer, Universidad de Puerto Rico, Puerto Rico
[q] Sociedad Latinoamercia y del Caribe de Oncología Médica (SLACOM), Red de Institutos e Instituciones Nacionales de Cáncer (RINC-SLACOM), Buenos Aires, Argentina
[r] Owen King EU Hospital, Department of Oncology, Saint Lucia
[s] Asociación Latina e Ibérica Contra el Cáncer (ALICC), Buenos Aires, Argentina
[t] Red de Institutos e Instituciones Nacionales de Cáncer (RINC-SLACOM), Rio de Janeiro, Brazil

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ABSTRACT

Preventable risk factors are responsible of at least 40% of cases and almost 45% of all cancer deaths worldwide. Cancer is already the leading cause of death in almost half of the Latin American and the Caribbean countries constituting a public health problem. Cost-effective measures to reduce exposures through primary prevention

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* Corresponding author.
E-mail address: espinac@iarc.who.int (C. Espina).

[1] Members of the IARC/PAHO Secretariat
[2] Chairs of Expert Working Groups
[3] Members of the Scientific Committee
[4] Members of the Advocacy Group
[5] (See Appendix).

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Cancer prevention
Cancer risk factors
Cancer early detection

and screening of certain types of cancers are critical in the fight against cancer but need to be tailored to the local needs and scenarios. The Latin America and the Caribbean (LAC) Code Against Cancer, 1st edition, consists of 17 evidence-based recommendations for the general public, based on the most recent solid evidence on lifestyle, environmental, occupational, and infectious risk factors, and medical interventions. Each recommendation is accompanied by recommendations for policymakers to guide governments establishing the infrastructure needed to enable the public adopting the recommendations. The LAC Code Against Cancer has been developed in a collaborative effort by a large number of experts from the region, under the umbrella strategy and authoritative methodology of the World Code Against Cancer Framework. The Code is a structured instrument ideal for cancer prevention and control that aims to raise awareness and educate the public, while building capacity and competencies to policymakers, health professionals, stakeholders, to contribute to reduce the burden of cancer in LAC.

1. Introduction

The Global Cancer Observatory from the International Agency for Research on Cancer (IARC/WHO) has estimated that one in five people worldwide will develop cancer during their lifetime, and one in eight men and one in 11 women will die from the disease [1]. In Latin America and the Caribbean (LAC), constituted by 32 countries and 685 million inhabitants, cancer is already the leading cause of death in almost half of the countries, with 1.5 million new cancer cases (7.7% of all cases worldwide) and 700,000 deaths estimated in 2020 (7,3% of all deaths worldwide) [2]. The leading cancers in all three subregions (Mexico/Central America, South America, and the Caribbean) are prostate, breast, and colorectal cancers (Fig. 1), while infection-related stomach and cervical cancers remain high in the Andean countries, and Bolivia and Paraguay, respectively [2]. The cancer burden is projected to increase by at least 67% reaching 2.4 million new cases annually by 2040 [2], and emphasizing the need for more stringent and targeted cancer prevention.

LAC is a vast and diverse region in geography, developmental progress and urbanization, literacy, culture and ethnicity, and access to resources, including health care, where 33% of the region's population is living in poverty [3]. Some cancer risk factors such as smoking, alcohol use and high body mass index (BMI) are common worldwide; however, the specific risk-attributable cancer burden varies considerably with socioeconomic, demographic, and cultural conditions, and unequal access to effective cancer prevention interventions. With at least 40% of newly diagnosed cancer cases [4–6], 44.4% of all cancer deaths and 42% of healthy years lost due to preventable risk factors worldwide, reducing exposure through prevention has become one of the most significant public health challenges of the 21st century and it is critical in the fight against cancer [7]. With progressive adoption of more westernized lifestyles in LAC, primary prevention and screening are the most cost-effective means to reduce the burden of cancer through policies and health systems strategies tailored specifically to the local needs of this common public health reality [8].

Evidence-based cancer prevention recommendations delivered by authoritative sources and structured in a Code Against Cancer are a key cancer awareness and education tool [9–12]. Here we present the 1st edition of the Latin America and the Caribbean Code Against Cancer (LAC Code Against Cancer), consisting of 17 recommendations for the general public, supplemented with 17 policy recommendations for policymakers, and describe the updated methodology within the newly launched World Code Against Cancer Framework [13].

2. Principles and methods

2.1. The Latin America and the Caribbean Code Against Cancer, 1st edition, within the World Code Against Cancer Framework

The World Code Against Cancer Framework is a multi-stakeholder initiative, led by the International Agency for Research on Cancer (IARC/WHO), to promote cancer prevention globally through the development and dissemination of region-specific cancer prevention recommendations (Regional Codes Against Cancer), while maintaining a coherence of the different Codes Against Cancer around the world [9,13] (Fig. 2). This framework, founded on the experience of developing the European Code Against Cancer (ECAC), 4th edition [14], provides an umbrella strategy, based on a common and rigorous methodology, to translate the latest science on cancer risk factors and effective preventive interventions into straightforward recommendations for the public to follow [15]. Regional Codes Against Cancer focus on the individual but also aim to reach different audiences such as health promoters, frontline health professionals and policymakers, by including recommendations on effective policies and capacity building. With this purpose, the framework follows the outputs' structure of three "Levels of information" described elsewhere [14]: "Level 1 of information" as the set of region-specific recommendations; "Level 2 of information" as the knowledge translation output(s) for different target audiences, which expand on key aspects of the recommendations, definitions, clarifications, and further topics related to primary and secondary prevention of cancer; and "Level 3 of information" as the scientific justification and evidence base of the recommendations.

The LAC Code Against Cancer is the first Regional Code developed under this World Code Against Cancer Framework. It is tailored to the context and needs of the LAC region, considering specific risk factors, the cancer burden in LAC, social inequalities and economic barriers, and health care systems' portfolio of services. For the development and endorsement of the LAC Code Against Cancer, 1st edition, more than 60 independent experts in epidemiology, cancer prevention, health promotion, behavioural change, public health and public policies, and institutions and representatives of the civil society and medical associations from LAC [16], were convened in several committees and working groups (WGs) and led by the international organizations IARC and the Pan-American Health Organization (PAHO/WHO). The process has entailed collecting, analysing, and evaluating the most recent scientific evidence, with the objective of supporting cancer prevention recommendations, and anticipating challenges in implementing the recommended policies and innovations. The scientific justification of the recommendations for the public and their associated recommendations for policymakers of the LAC Code Against Cancer, 1st edition, are published in this Supplement [17–22].

2.2. Expanded methodology and process

The World Code Against Cancer Framework's methodology establishes a clear and standardized process for the development and maintenance of any Regional Code Against Cancer, to ensure and sustain the scientific integrity of the final product. We have adapted the PRECEDE-PROCEED model of health promotion [23], used in implementation research, as a planning, monitoring and evaluation framework to organize logically all activities and mixed methods utilized, from the formative research to the development of the LAC Code Against Cancer (depicted in the model as the "Health programme") and the future evaluation of its impact (Fig. 3). In this model, the PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational/environmental Diagnosis and Evaluation) phases correspond with steps 1

through 4; and the PROCEED (Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development) phases begin with step 5 up to step 8. Before the kick-off of the project to develop the LAC Code Against Cancer, formative research was carried out in the Phase 1 Social assessment. Straw and co-authors studied whether a potential LAC Code Against Cancer could be used as a tool to support the design and implementation of public policies for cancer prevention and control in Argentina [24]. Using the Consolidated Framework for Implementation Research (CFIR) [25] the perceptions of decision-makers and health professionals on the acceptability, appropriateness, and feasibility of implementing such a tool in the country were qualitatively assessed. The results showed all three variables ranked high, meaning that decision-makers and health professionals considered a future LAC Code Against Cancer to be highly acceptable, appropriate and feasible to support strengthening of current cancer prevention and control policies in Argentina. Yet it also highlighted that public's adherence to the recommendations of a future LAC Code Against Cancer would depend on complex and diverse factors involving changing unhealthy behaviours. In addition, to study potential dissemination strategies for a future LAC Code Against Cancer in the region, a dissemination research study on mobile health (mHealth) was conducted in Colombia. This study contributed to understanding the importance of ensuring high coverage and acceptability of mobile phone text and voice's messages as a channel to deliver cancer prevention advice to the public [26]. Despite the large potential reach of mHealth strategies, the final impact would depend not only on the efficacy of the intervention, but also on the active response and participation at population level. Thus, mHealth should be conceived as part of comprehensive multicomponent and multilevel interventions to achieve behavioural change.

2.2.1. *Development phase*

The Development Phase of the LAC Code Against Cancer, led by the IARC/PAHO secretariat, is represented in Fig. 3 in Phases 2 (Epidemiological assessment), 3 (Behavioral and environmental assessment), 4 (Educational and ecological assessment) and 5 (Administrative & policy assessment Intervention alignment). Five technical WGs of independent experts from LAC were convened to review and assess the evidence on the association with cancer and the impact of interventions related to the following topics, propose recommendations, and develop the three Levels of information of the LAC Code Against Cancer. These topics included: tobacco, body weight, diet, alcohol and non-alcoholic drinks, physical activity, and breastfeeding (WG1 on Lifestyle risk factors) [19,21]; air, water, soil, and food contaminants, radiations and occupations (WG2 on Environmental and occupational risk factors) [20]; infection-related cancers and interventions (WG3 on Infections) [22]; and early detection of cancer, and specific drugs associated with cancer risk (WG4 on Medical interventions) [18] (the WG5 on Communication and education will be described below). The LAC Code Against Cancer, 1st edition, has taken as a model the 4th edition of the ECAC to adapt, update and newly create recommendations tailored to LAC. As described by Schüz and co-authors [14], to be considered for a recommendation of the LAC Code Against Cancer (Level 1 of information), the WGs had to strictly follow an algorithm of five criteria:

- Criterion #1: "*The recommendation should be based on sufficient scientific evidence that following the recommendation to avoid or reduce exposure to a harmful agent, to adopt a healthy behaviour, or to uptake a medical intervention, would reduce the individual's risk of developing cancer or dying from cancer*" remained the most important and gatekeeper criterion to decide inclusion of a risk factor or an effective intervention in the LAC Code Against Cancer. Each WG has performed a rigorous epidemiological assessment, including systematically review of the literature through targeted PECOS/PICOS questions, with support of professional systematic reviewers, to reach agreed conclusions.
- In the LAC Code Against Cancer, criterion #2 defined as "*relevance of a particular risk factor or an effective intervention in terms of regional*

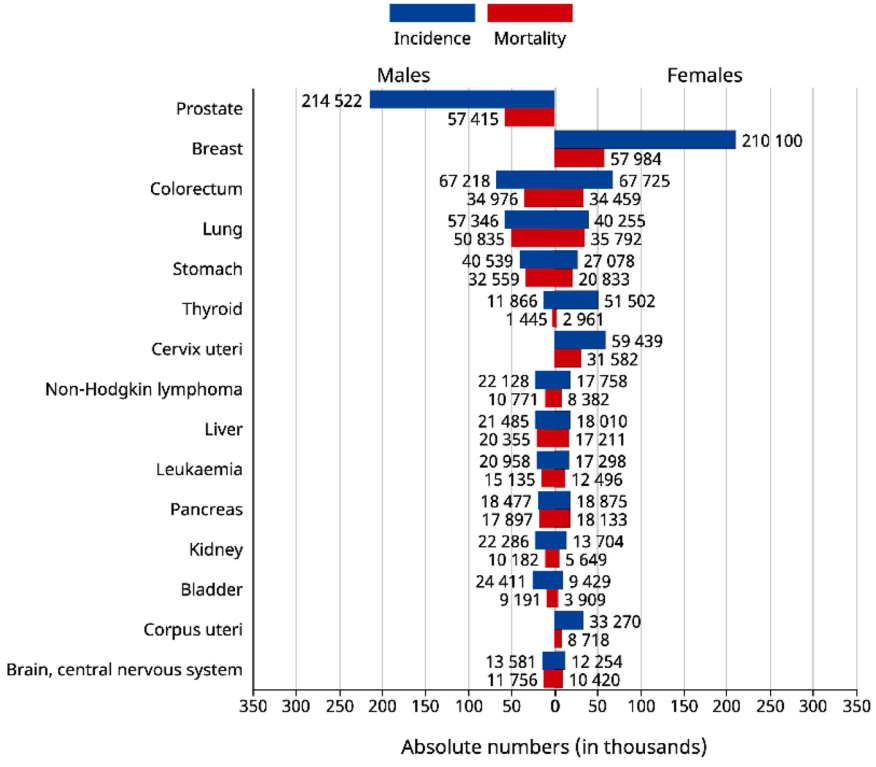

Fig. 1. Numbers of new cancer cases and cancer deaths for the top 15 commonest cancers in Latin America and the Caribbean (estimate for 2020 by IARC Cancer TODAY).

cancer burden" has been expanded to also encompass the assessment of new domains such as the social conditions and health inequalities in the region, as well as the availability, feasibility, and affordability of the proposed interventions according to the LAC settings (i.e., regulatory status and health care systems' means and needs).

- Criterion #3 is stated as *"The recommendation should target large segments of the general population of the whole region or sufficiently large subregions (*i.e.*, not high-risk groups or special small subpopulations), so that it is relevant to have the whole general population informed"*.
- Criterion #4 has also been modified to include the new recommendations for policymakers (Level 1bis in Fig. 2), so that individuals do not have to take autonomous decisions in the absence of public policies that would enable to comply with a given recommendation. Thus, each one of the recommendations to the general public are supported by an internationally endorsed policy or health service strategy, tailored to the LAC settings and health care systems, to further support guidance for policymaking or for policy changes when possible. Desktop review of evidence-based effective policies and guidelines, including grey literature, from worldwide authoritative sources on prevention of cancer and/or non-communicable diseases (NCDs) has been performed by the WGs with assistance of the IARC/PAHO secretariat.
- Finally, criterion #5 refers to the need for clear communication to achieve uptake of the recommendations by the public. For this purpose, the WG5 on Communication and education was formed, composed of experts in health promotion, behavioural change, psychology, and education. This WG, in close dialogue with the other four WGs, advised on the suggested communication for each recommendation and their cohesion as a set, and assisted in drafting the corresponding policy recommendations. Importantly, this input was reinforced with the results of a multi-country mixed methods pilot study aimed at testing the comprehension and persuasiveness of the draft recommendations of the LAC Code Against Cancer in the public of five LAC countries [17]. In addition, the WG5 guided the other WGs in the development of the on-line competency-based microlearning programme for primary healthcare professionals to be hosted in the PAHO Virtual Campus for Public Health, and described elsewhere in this Supplement (Level 2 of information in Fig. 3) [27].

After an iterative process involving the five WGs and the IARC/PAHO secretariat, the recommendations were critically assessed and approved by a committee not involved in their development, the Scientific Committee. This Committee was composed of distinguished leaders in cancer prevention and control from LAC, representing or having held a position in a national cancer institute or a public health organization. In addition, another external committee, the Advocacy Group, composed by of representatives of important civil society and medical organizations in LAC, contributed to the discussions and assessments of the recommendations. The LAC Code Against Cancer, 1st edition, has been developed in Spanish and translated into Portuguese, and English.

2.2.2. *Implementation, dissemination and exploitation phase*

Phases 6–8 (Fig. 3) show the steps from the implementation of the health programme to the outcomes' evaluation. Success in implementation and dissemination occurs through the development of different strategies, that increase the adoption and use of innovative and effective research findings, and facilitate practice improvements, organizational change, and policy implementation [28]. To ensure communication to the responsible authorities and decision-makers, relevant institutions, the scientific community and the public in LAC, this phase will be led by PAHO and the Advocacy Group. The use of proper dissemination strategies would help to overcome the barrier of lack of updated information on cancer prevention strategies and interventions, not only at individual, but also at primary health care provider and governmental level, which is of particular relevance in low- and middle-income countries [29]. With the aim of informing the Implementation, dissemination and exploitation Phase, a stakeholders' consultation was carried out through a workshop on dissemination and implementation organized by IARC. Stakeholders were asked to reflect on existing barriers and facilitators for dissemination and implementation that would affect the LAC Code Against Cancer, 1st edition, in each of the targeted audiences (i.e., the public, policymakers and primary healthcare professionals), and propose potential dissemination and evaluation strategies. Representatives of regional stakeholders including national cancer institutes, non-governmental organizations including cancer patient organizations, and medical associations, were invited to participate and divided into different groups. Each group approached the topic of discussion from the perspective of one of the audiences mentioned above (see Discussion).

3. Results: 17 recommendations for Latin America and the Caribbean

The LAC Code Against Cancer, 1st edition, contains 17 recommendations based on the most recent solid evidence on lifestyle, environmental, occupational, and infectious risk factors, and medical interventions, to raise awareness and advise the general public on how to reduce their cancer risk and death associated with this disease (Fig. 4). Each one of the recommendations (Level 1 of information) is accompanied with recommendations for policymakers (Level 1bis of information), to guide LAC countries establishing the infrastructure

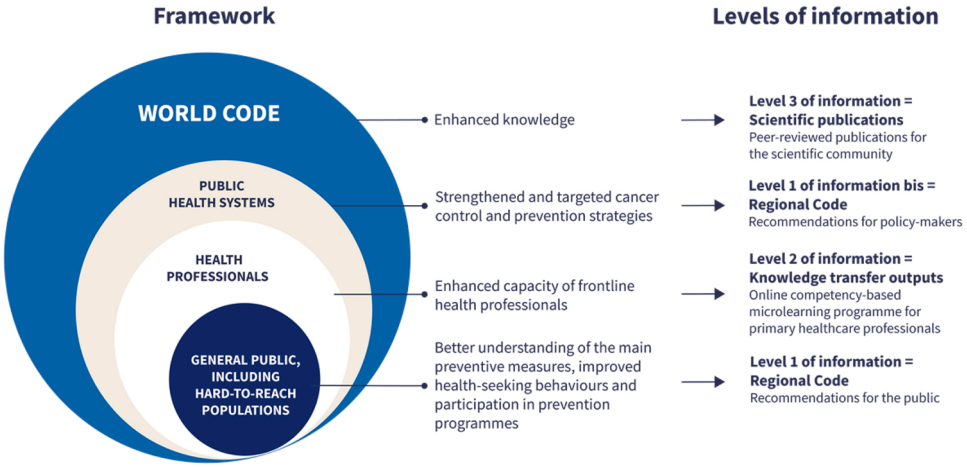

Fig. 2. World Code Against Cancer Framework.

needed that will enable the public adopting the recommendations, as an ideal instrument for cancer control (Figs. 5 and 6, Supplementary material). In addition, the LAC Code Against Cancer is complemented with an user-friendly and free comprehensive online competency-based microlearning programme for primary health care professionals (Level 2 of information), to be hosted in the PAHO Virtual Campus for Public Health. This programme includes the topics covered by each recommendation and transversal competencies such as communication and applying knowledge to real-world situations in primary and secondary prevention [27].

3.1. Recommendations for the public

The 17 recommendations on primary and secondary prevention of cancer, tailored for LAC, and not necessarily following a hierarchical order are shown in Fig. 4. As explained above, the LAC WG's experts reviewed the latest evidence to develop the LAC Code Against Cancer, taking the ECAC 4th edition [14] as a starting point. Based on this, the LAC Code Against Cancer 1st edition contain two recommendations on tobacco- and nicotine-related products and second-hand smoke, one recommendation on healthy weight, one recommendation on physical activity, one recommendation on diet, one recommendation on alcohol consumption, one recommendation on solar exposure, and one recommendation for workers, as in the ECAC 4th edition. In comparison with the ECAC 4th edition, the recommendation on breastfeeding and hormonal replacement therapy has been split in two, and the recommendation on cancer screening has been separated in three more detailed recommendations. Furthermore, the recommendation on infections-related cancers is more comprehensive than in the ECAC 4th edition, addressing other risk factors that are relevant for the risk-attributable cancer burden in LAC beyond hepatitis B virus and human papillomavirus (HPV) and new interventions besides vaccination. All recommendations include new elements that were not included in the ECAC 4th edition and will be described below. In addition, three entirely new recommendations are included in the LAC Code Against Cancer for reducing the exposure to indoor and outdoor air pollution, and for the detection and treatment of *Helicobacter pylori (H. pylori)*. A recommendation on radon as in the ECAC 4th edition has not been considered for LAC as explained by Blanco and co-authors [20].

3.1.1. Tobacco and nicotine-related products and second-hand smoke

Tobacco smoking remains the leading risk factor for cancer and other NCDs worldwide, as well as in LAC [30,31], hence, it stands as the first recommendation in the LAC Code Against Cancer. Although the prevalence of using other types of tobacco in LAC is lower than in Europe [32], the WG decided to keep them in the recommendation as chewing tobacco and prevalence of cancer of the mouth are high in some countries such as Brazil. New elements of the recommendation include recognizing the effectiveness of tobacco cessation [33], with professional help if needed [34] as less than 5% of smokers succeed to quit without assistance and, most importantly, it highlights avoiding the use of electronic cigarettes as it is associated with an increase in initiating smoking combustible cigarettes in those not consuming tobacco, especially amongst young people [21].

As regards second-hand smoke, the second recommendation in the LAC Code Against Cancer emphasizes the importance of promoting smoking-free households and respecting and supporting smoke-free public policies for the benefit of everyone's health [21].

3.1.2. Diet, physical activity, healthy body weight, and breastfeeding

The prevalence of overweight and obesity in LAC is increasing faster than in the rest of the world, particularly in low socio-economic groups [35]. The recommendation #3 on healthy weight, associated with at least 13 different types of cancer, and the recommendation #4 on physical activity and sedentary behaviour emphasize the importance of maintaining both actions throughout life [19].

The recommendation #5 on diet is quite complex, tailored to the context in LAC and includes several sub-recommendations. It promotes a diet rich in vegetables, fruits, legumes, and high in whole-grain foods, and encourages drinking water and eating natural or home-prepared

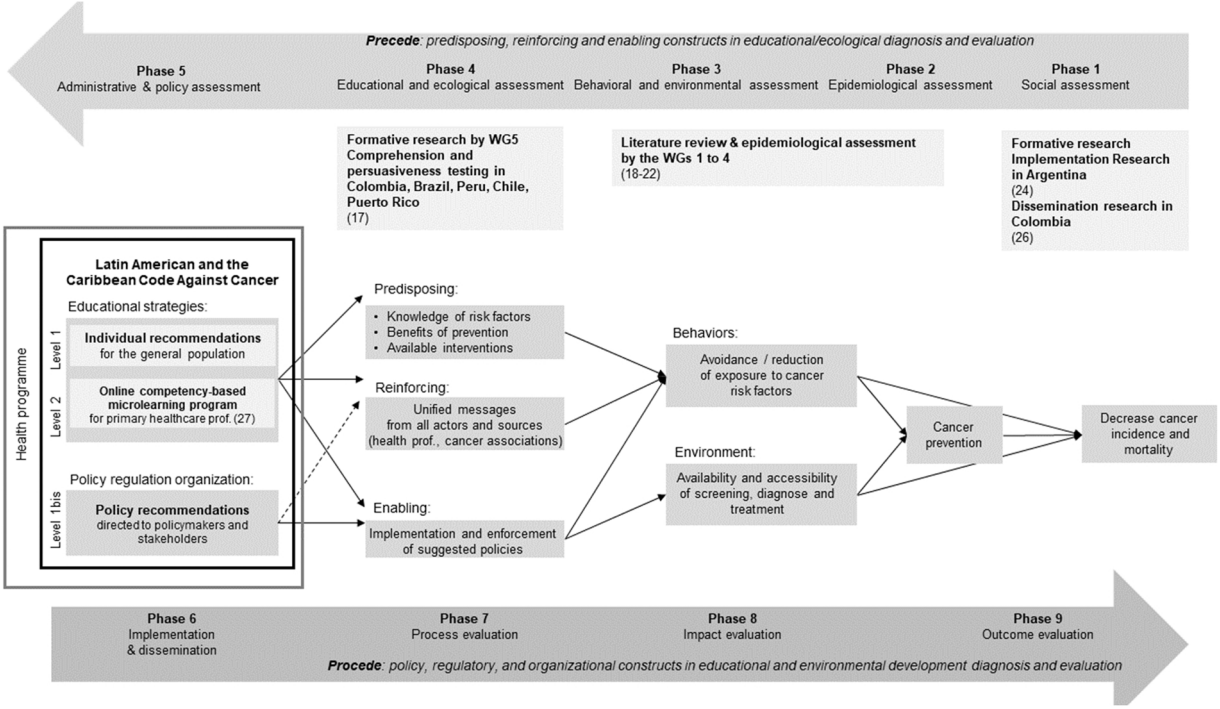

Fig. 3.
Planning, monitoring and evaluation framework (adapted from [23]). This logic framework was used to organize all activities and mixed methods utilized in the LAC Code Against Cancer project.

Latin America and the Caribbean Code against Cancer

Learn how to help prevent cancer in yourself and your family

Specialists on the subject and civil society representatives from Latin America and the Caribbean, convened by the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) and the Pan American Health Organization (PAHO), have reviewed the scientific evidence and recommend the following 17 actions people can take to help prevent cancer:

1. Don't smoke or use any type of tobacco. If you do, quitting is possible, with professional help if needed. Don't use e-cigarettes either, as they lead to tobacco use.
2. Make your home a smoke-free place. Respect and promote laws that ensure smoke-free spaces to protect our health.
3. Achieve or maintain a healthy weight throughout your life to help prevent several types of cancer.
4. Get daily physical activity throughout your life and limit the time you spend sitting. Being a physically active person helps prevent several types of cancer.
5. Eat a healthy diet:
   - Eat as many fruits and vegetables as possible at each meal, and regularly include legumes such as beans and lentils.
   - Eat whole grains, such as whole-grain bread, corn tortillas, and brown rice, rather than refined grains such as white bread or rice.
   - Avoid sugar-sweetened beverages, drink water instead.
   - Limit your consumption of ultra-processed foods, such as sweets, sweetened breakfast cereals, salty snacks, pastries, and cookies, among others. Instead, eat natural foods or foods prepared at home.
   - Avoid processed meats, such as deli meats, sausages, or cured meats, and limit your consumption of red meat.
   - Limit your consumption of very hot beverages, such as tea, coffee, and *mate*. Wait a few minutes until the liquid no longer feels hot enough to burn your lips or tongue.
6. Avoid drinking alcoholic beverages. This helps prevent several types of cancer.
7. Breastfeed your baby—the more months the better—to help prevent breast cancer and excess weight in your baby.
8. Protect yourself from direct sun exposure during peak sunlight hours to help prevent skin cancer.
9. If you cook or heat your home with coal or firewood, make sure smoke doesn't build up inside your home.
10. If air pollution is high where you are, limit your time outdoors.
11. Find out if your job exposes you to substances that can cause cancer, and request and adopt the recommended protective measures.
12. Infection from *Helicobacter pylori* bacteria can cause stomach cancer. Check with health professionals to find out if you might benefit from screening and treatment for this bacterial infection.
13. Infection with viruses such as hepatitis B and C, human papillomavirus (HPV), and human immunodeficiency virus (HIV) can also cause cancer. Therefore:
    - Vaccinate children for hepatitis B virus in their first 24 hours of life. Vaccinate yourself and your family at any age if you have not yet done so.
    - Vaccinate girls and teens against the human papillomavirus (HPV), primarily to help prevent cervical cancer, as well as other types of cancer. Take this preventive measure at the ages recommended in your country. If available, vaccinate boys as well.
    - Talk to health professionals to see if you might benefit from screening and treatment for hepatitis B and C viruses to help prevent liver cancer.
    - Get tested for human immunodeficiency virus (HIV), and ask about the prevention and treatment programs available in your country.
    - Make sure to use condoms consistently and correctly, especially with new or casual partners.
14. Do not use hormone replacement for menopause unless directed to do so by your healthcare provider. Hormone replacement can cause breast cancer.

Cancer can be controlled and cured if it is detected and treated early:

15. If you are between the ages of 50 and 74, visit a health care provider and ask for an early detection test for colon and rectal cancer (fecal occult blood test or colonoscopy). Based on the results, follow your health professional's recommendations promptly.
16. If you are 40 years of age or older, visit a health care provider every two years for a clinical breast exam. From age 50 to 74, get a mammogram every two years. Based on the results, follow your health professional's recommendations promptly.
17. If you are between the ages of 30 and 64, visit a health care provider and ask for a molecular human papillomavirus (HPV) test at least every 5–10 years for early detection of cervical cancer. Ask if you can collect the sample yourself. If you don't have access to the HPV test, ask for the exam that is available in your country. Based on the results, follow your health professional's recommendations promptly.

Fig. 4. Latin America and the Caribbean Code Against Cancer 1st Edition: Recommendations for the general public.

foods; while avoiding processed meat (including very salty meats) and sugary drinks, and limiting read meat and ultra-processed foods. Finally, it recommends limiting the consumption of drinks at very hot temperatures, such as mate, tea, or coffee, as the most recent evidence is showing strong associations with oesophageal cancer [19,36].

In addition, the WG was forceful at recommending avoiding alcohol in recommendation #6 as the evidence is strong that there is no safe level in relation to cancer risk [21,37].

Finally, recommendation #7 on breastfeeding emphasizes the longer time spent breastfeeding, the better [19].

3.1.3. Environment, occupation and radiation

As regards to the environmental and occupational risk factors, the WG was inclusive on using protection against solar exposure for the whole population (including adults, children, and workers), especially at peak hours. However, recommendation #8 did not include avoiding

Tobacco, weight, physical activity, diet, alcohol, and breastfeeding[1,2,3,4,5,6,7,8]

- Implement tax policies, considering best practices, aimed at discouraging the use of tobacco, e-cigarettes, alcohol, and unhealthy foods and beverages.
- Implement health warning labels for the containers of tobacco, e-cigarettes, alcohol, and unhealthy foods and beverages. For foods and beverages, it is recommended to implement warning labels that include the PAHO nutrient profile model.
- Create healthy environments in the community, schools, educational centers and public buildings: ban the use of products that contain tobacco and generate emissions in shared environments, as well as the use of e-cigarettes, which are a gateway for tobacco use; prohibit alcohol use in these settings; decrease the availability of unhealthy foods and beverages and increase the availability of healthy foods and beverages; promote the creation of spaces for physical activity, as well as spaces to facilitate breastfeeding, and ensure access to drinking water.
- Include quality physical education classes in curricula, promote physical activity at recess, and encourage active transportation to and from school.
- Ban advertising, promotion, and sponsorship of tobacco, e-cigarettes, alcohol, and breastmilk substitutes; and ban the advertising of unhealthy foods and beverages to children.
- Implement communication, education, and counseling programs to encourage behavioral changes in the population regarding the use of tobacco, e-cigarettes, alcohol, and unhealthy foods and beverages, and to promote physical activity, healthy eating, and breastfeeding.
- Safeguard the design, implementation, and evaluation of these policies from potential conflicts of interest.
- Adopt the international codes and conventions related to the recommendations above, and ensure that they are correctly implemented:
  - WHO Framework Convention on Tobacco Control.
  - International Code of Marketing of Breast-milk Substitutes.
  - The WHO Technical package SAFER to prevent and reduce alcohol-related death and disability.
  - The International Labour Organization Maternity Protection Convention and related recommendations.

Sun exposure[9]

- Promote public programs to reduce sun exposure, including the design of public spaces that protect the population.
- Regulate occupational exposure to the sun and monitor the implementation of programs to reduce sun exposure.

Indoor air pollution[10]

- Implement actions and programs to progressively reduce the indoor use of coal and firewood, such as using updated stoves or switching to cleaner energies.

Outdoor air pollution[11]

- Establish environmental air quality standards consistent with WHO guidelines or interim targets, and implement strategies to meet them in the short term.
- Increase the coverage of the air quality monitoring network in heavily populated areas.
- Establish communication and information systems to keep the community informed of air quality.

Occupational hazards[12]

- Report, regulate, and monitor economic activities that expose workers—whether formal or informal—to type 1 carcinogens in the workplace.
- Ensure that both public and private companies eliminate or at least control the use of carcinogenic substances to reduce employees' exposure.

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2 World Health Organization. Tackling NCDs: 'best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: WHO; 2017. Available from: https://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf.
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Fig. 5. Latin America and the Caribbean Code Against Cancer 1st Edition: Recommendations for policymakers on lifestyle, and environment and occupation.

Helicobacter pylori[13]

- Define national policies on the screening and treatment of *Helicobacter pylori* infection according to the various at-risk population groups. Develop organized programs to implement these policies.
- Ensure the availability of the lab tests, treatment, follow-up, and diagnostic procedures required for these programs, and implement antibiotic resistance testing to ensure high eradication rates.

Viral infections[14,15, 16, 17, 18, 19, 20, 21]

- Ensure universal hepatitis B virus vaccination for boys and girls immediately after birth, and implement strategies to proactively find unvaccinated individuals in order to vaccinate them, preferably before they are sexually active (catch-up vaccination).
- Ensure access to diagnosis of hepatitis B and C, and availability of treatment for anyone diagnosed with these viral infections.
- Ensure the availability of HPV vaccines to sustain vaccination programs. Give one or two doses in vaccination programs, as recommended by WHO. Promote vaccination as a priority in girls 9–14 years of age and extend, if possible, to 18 years; include boys based on the availability of resources. Ensure WHO's global goal of vaccinating 90% of girls by age 15 by 2030.
- Establish a program to promote and facilitate HIV testing in the general population. Ensure treatment of at least 95% of people with the infection. Ensure that at least 95% of patients have suppressed viral load.
- Implement sex education programs. Ensure free and widespread access to condoms.

Hormone replacement during menopause[22, 23,24]

- Develop consensus on national guidelines on the use of hormone replacement during menopause, as well as on customizing dose, regimen, and duration of treatment.
- Prohibit the over-the-counter sale (without medical prescription) of hormone replacement therapies for menopause.

Early detection of colon and rectal cancer[25]

- Implement secondary prevention programs for colon and rectal cancer. According to current scientific evidence, mortality from colon and rectal cancer can be reduced by a fecal occult blood test every two years followed by colonoscopy for patients who have a positive result, and by at least one colonoscopy in a person's lifetime between the ages of 50 and 74.
- Ensure a reasonable and regulated supply of fecal occult blood tests and colonoscopy services as needed for national programs.

Early detection of breast cancer[26, 27]

- Ensure the availability of quality mammograms and clinical breast examinations performed by health professionals with appropriate training, and discourage the use of breast self-examinations, as they have no benefit.
- Ensure timely diagnosis and treatment of patients with abnormal mammograms or clinical breast examinations. According to the WHO Global Breast Cancer Initiative, no more than 60 days should pass between first symptoms (or first interaction of the person with symptoms with the corresponding health system) (or detection of patients with abnormal results via screening) and complete diagnosis, including a comprehensive pathology report. Once cancer is confirmed, the best multimodal treatment available in the country should be offered.
- Adopt the recommendations for screening and early diagnosis in people at high risk of developing breast cancer.

Early detection of cervical cancer[28, 29, 30]

- Following the WHO cervical cancer elimination initiative, ensure that at least 70% of women over 30 years of age are screened with a high-performance test (such as the HPV test) at least twice in their lifetime, once before age 35 and again before age 45. Where HPV molecular testing is not available, continue to use the available test (cytology or visual inspection with acetic acid) until HPV molecular testing is implemented.
- Ensure that 90% of patients with precancerous lesions or cervical cancer receive treatment, regardless of the screening algorithm offered (e.g., screening followed by colposcopy, biopsy, and treatment of confirmed lesions, or screening and treatment of patients with abnormal results).
- Ensure the availability of early detection tests, triage, diagnosis, treatment, and follow-up, according to the national program.

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Fig. 6. Latin America and the Caribbean Code Against Cancer 1st Edition: Recommendations for policymakers on infections and medical interventions.

sunbeds despite the evidence that sunbed use contributes to the cancer burden [38], as their use in LAC is only relevant for a small population segment within the highest socio-economic groups [20].

Air pollution is an emerging public health problem. It is addressed in recommendation #9, on the exposure to solid fuels (coal and biomass) indoors, especially in rural areas and spaces that are not well ventilated, and affecting mainly women and children [39]; and in recommendation #10, as Latin America is one of the most urbanized areas in the world and outdoor air pollution, coming from multiple sources such as traffic or industry especially in urban areas, is expected to have a large impact in the general population as well as in workers, particularly among informal street vendors [20,40].

A recommendation on cancer prevention for workers is highly relevant in a region with a very high rate of informality. Recommendation #11 aims at empowering workers, especially those of low socioeconomic status, to exert their right to be informed about what agents they may be exposed to, but also to demand and adopt protective measures, while maintaining the duty of ensuring protection at the employer level [20].

3.1.4. Infections and related preventive interventions

LAC has a high prevalence of *H. pylori*, bacteria classified as carcinogen and responsible of 90% of gastric cancers, as well as a growing problem of *H. pylori* resistance to antibiotics [41]. Recommendation #12 of the LAC Code Against Cancer addresses the control of *H. pylori* infection through detection and subsequent treatment as a cost-effective intervention and cornerstone for the reduction of gastric cancer risk [42]. Importantly, the recommendation relies on health care professionals to inform individuals on the eligibility for this intervention and the availability of the respective programs in each country [22].

The viral infections caused by the hepatitis B and C viruses, HPV, and the human immunodeficiency virus (HIV) are also classified as carcinogens to humans and have a diverse and relevant prevalence across LAC [43,44]. The recommendation #13 encompasses all these viral infections and associated cancers, as well as the available preventive measures such as vaccination for hepatitis B virus and HPV, detection and treatment of the infection caused by hepatitis B and C viruses under the guidance of health care professionals, HIV testing and treatment through available programmes, and the correct and consistent use of condoms to protect against sexually transmitted diseases related to cancer [22].

3.1.5. Cancer screening and other medical interventions

On medical interventions, the LAC Code Against Cancer recommends avoiding hormonal replacement therapy (HRT) as much as possible, in recommendation #14, and using it only under medical prescription, since HRT is commonly available in the region as a non-prescription drug [18].

The LAC Code Against Cancer addresses secondary prevention cancer through screening and early detection in the last three recommendations, introduced by the common statement “Cancer can be controlled and cured if it is detected and treated early”. The burden of colorectal cancer is increasing in the region [2] and many countries already have a type of screening test (occult blood in faeces or colonoscopy) implemented. Therefore recommendation #15 advises on requesting the corresponding test at the health care service and ensuring follow-up of the results with a health professional [18]. Similarly, recommendation #16 encourages women to attend routinely to the clinical breast examination performed by a health professional at the health care service [45], and to undergo biennial mammography from 50 to 74 years of age, followed-up by a health professional according to the results [18]. Finally, recommendation #17 follows the recent WHO guidelines of undergoing cervical cancer screening preferably with HPV DNA test at least every 5–10 years and ensuring follow-up of the results with a health professional [18,46].

3.2. Recommendations for policymakers

As a requirement described in criterion #4 of the World Code Against Cancer Framework methodology, all 17 recommendations targeted to the public explained above (Fig. 4) are accompanied by a corresponding public policy recommendation targeted to LAC policy-makers (Figs. 5 and 6, Supplementary material). These policy recommendations are based on authoritative international guidelines and intended to support countries to invest in primary prevention of cancer, while strengthening health systems to support early detection and subsequent effective treatment of cancer. Those countries that lack the infrastructure needed to implement the LAC Code Against Cancer recommendations are encouraged to make an effort to establish intermediate goals to achieve their implementation in the mid- and long-term.

Many preventive policy measures such as increasing taxes on unhealthy products, implementing health warning labels, or creating healthy environments are relevant to tackle several risk factors such as tobacco, alcohol, high BMI, physical inactivity, or unhealthy diet. In addition, all these are common risk factors for other NCDs like cardiovascular or respiratory diseases and diabetes, thus a joint positive impact and co-benefits are expected [47]. Consequently, the public policy recommendations related to the lifestyle recommendations #1 to #7 of the LAC Code Against Cancer were packaged together (Fig. 5), into a single, comprehensive policy recommendation. The rest of the LAC Code Against Cancer recommendations #8 to #17 have their corresponding public policy recommendation (Figs. 5 and 6, Supplementary material); some examples are listed below:

- implementing taxes to reduce the consumption of and banning advertising of tobacco, electronic cigarettes, alcohol, and unhealthy food and beverages;
- increasing the availability of healthy food and beverages, spaces for physical activity, spaces for breastfeeding, and ensuring access to drinking water;
- implementing communication, education, and behaviour change counselling programs aimed at preventing the use of the above mentioned products, among other measures;
- regulating and monitoring economic activities that expose formal or informal workers to carcinogens, including solar exposure;
- establishing the air quality standards consistent with the WHO guidelines or their interim targets,;
- defining the national policy and develop organized programs on screening and treatment of *H. pylori* according to risk population groups;
- ensuring access to hepatitis B and C diagnosis and treatment for those individuals diagnosed with these viral infections;
- providing quality mammograms and clinical breast examination performed by health professionals with appropriate training, while ensuring the diagnosis and timely treatment of patients with abnormal mammograms or clinical breast examinations;
- or ensuring availability of early detection tests, triage, diagnosis, treatment, and follow-up for cervical cancer according to the national program.

3.3. On-line competency-based microlearning programme for primary healthcare professionals

Given that primary care healthcare professionals are usually the entry point to the health system, and are typically adequate message multipliers due to trust relationships with patients and the community [48], a comprehensive free e-learning program on primary and secondary prevention of cancer, based on the actions recommended in the LAC Code Against Cancer was developed by the five WGs and the IARC/PAHO secretariat. This program, to be hosted by the PAHO Virtual Campus for Public Health [49], aims to improve health literacy and public awareness of cancer prevention in the region, through building

capacity to improve knowledge, attitudes and practice of primary care healthcare professionals. The e-learning program is described in detail elsewhere in this Supplement [27].

4. Discussion

All 17 evidence-based recommendations for the public explained above, address the most important risk factors, effective interventions, and types of cancer that could be prevented across the LAC region. Importantly, a significant effort has been done to properly communicate often complicated scientific terms through messages that the general population in all LAC countries could understand and act upon. The pilot testing conducted in the general population of five LAC countries throughout the development of the LAC Code Against Cancer has assisted in tailoring and refining the more technical messages initially proposed by the experts WGs, while providing some explicative elements and examples when needed [17]. Still, educational and health behaviour change tools such as the LAC Code Against Cancer would need a high reach or dissemination to have a real impact in public health practice. Dissemination is defined as an active approach of spreading evidence-based interventions to the target audience via pre-determined channels using planned strategies. For dissemination strategies to be successful, attention is required not only at the individual level, but also at the structural level of the organizations delivering the intervention, and the economic and political environment through which the interventions or services are provided [50].

The LAC Code Against Cancer, 1st edition, also provides countries with advice on the most suitable policies needed to implement to allow the public to comply with the 17 recommendations. Although smoking rates have steadily declined in LAC, and most of the countries have ratified the WHO Framework Convention on Tobacco Control and all of them have enacted legislation to enforce smoke-free public spaces, tobacco control efforts are still needed in the region to fully implement the recommended tax rate on tobacco products and expand on tobacco cessation programmes and anti-tobacco campaigns for young people [8,51].

Dietary and lifestyle changes have led to rising obesity rates in LAC, including in children, to epidemic levels. Many countries have established regulations to implement front-of-package labelling, healthy school environment and nutrition education, promotion of physical activity and sugar-sweetened beverage tax, aiming at reducing weight in the population. However, most of these strategies have not been evaluated to assess their impact on preventing overweight and obesity [52].

In the environment and occupations many well characterized, ubiquitous and controllable exposures like air pollution and high-level exposure levels of silica, asbestos, or benzene in the workplace persist, reflecting inadequate surveillance, regulations, and enforcement [53]. Some countries have been incorporating the WHO Air Quality Guidelines at national level [54], however, there are still avoidable environmental and occupational exposures to carcinogens that require enforcing regulations and setting targets for intervention to reduce cancer in LAC.

As regards interventions such as vaccination, most LAC countries have introduced Hepatitis B and HPV vaccination programmes successfully, yet, the WHO goal of having 90–95% of girls vaccinated for HPV is not yet achieved [55]. Similarly, population-wide programmes for the eradication of *H. pylori* among high-risk populations could be cost-effective in LAC countries where the prevalence of *H. pylori* is high [8], and the recently available and relatively affordable treatments for hepatitis B and C have yet to be used widely in many LAC countries.

Finally, with respect to early detection and screening, breast cancer has shown a substantial and continuous increase in the incidence and mortality of this disease in all LAC countries. This is probably related to the combined effect of increased incidence together with the high proportion of advanced stage cancers at the time of diagnosis, mostly among lower educated women, and with clear barriers in access to rapid and effective treatment. Similarly, the increase of colorectal cancer incidence and mortality in this region may reflect changes in lifestyle factors, such as a diet rich in meat and processed foods and lack of physical activity, along with limited implementation of early detection guidelines, insufficient capacity of early diagnosis and optimal treatment, and low adherence to treatment. Lastly, low coverage and poor treatment completion of detected lesions in, mostly opportunistic, cervical cancer screening remains a major issue in the region [2].

The dissemination strategy to promote and make awareness of the LAC Code Against Cancer includes a variety of channels and means of dissemination. This will comprise through traditional and social media campaigns delivered by partner organizations or national governments, mHealth strategies, capacity building for healthcare professionals and community health agents, and advocacy activities at all levels (community, national and regional) such as workshops, conferences or multistakeholder policy dialogues targeted to governmental and civil society organizations, and the medical and scientific communities. Common barriers for dissemination identified in the stakeholders' consultation mentioned above include fragmented health systems, lack of access to information, lack of resources and/or prioritization, lack of political will, and excess of bureaucracy. On the other hand, facilitators such as the civil and scientific societies as well as international organizations should assist in overcoming them. The evaluation of the dissemination and implementation strategies will be crucial to track the knowledge transfer, reach, and utilization (or impact) of the LAC Code Against Cancer by the general population across countries, but also at the structural or decision-maker level, and at health provider level.

The ultimate goal of the LAC Code Against Cancer is to enhance the awareness, motivation, capability and opportunity of the public [56], to adopt healthy behavioural changes and adherence to preventive interventions, while influencing the implementation of policies and health systems strategies needed to support these changes, and achieve, in the long-term, cancer prevention outcomes [57]. The primary health care professionals of LAC are fundamental for the success of the LAC Against Cancer, as multipliers to transfer the knowledge in cancer prevention and to give advice to the community [58–60]. Capacity and competencies in cancer prevention can be built through the free comprehensive on-line competency-based microlearning programme [27,49].

In conclusion, the LAC Code Against Cancer, 1st edition, offers an exceptional tool for cancer prevention education and public health, developed "*by the experts of region of Latin America and the Caribbean and for the region*". It provides evidence-based recommendations to educate the public on healthy behaviours and to encourage adherence to preventive interventions, as well as to guide and support governments in the implementation of the best cancer control strategies. Together, all this collaborative effort should build the capacity and competencies to health professionals, public-policy makers, governments, stakeholders, patients, and their families, to contribute to reducing the burden of cancer in LAC.

CRediT authorship contribution statement

Carolina Espina: Conceptualization, Methodology, Resources, Writing – original draft, Visualization, Project administration, Funding acquisition. **Ariadna Feliu**: Conceptualization, Resources, Writing – review & editing, Visualization, Project administration. **Mauricio Maza**: Writing – review & editing. **Maribel Almonte**: Resources, Writing – review & editing. **Catterina Ferreccio**: Resources, Writing – review & editing. **Carolyn Finck**: Resources, Writing – review & editing. **Rolando Herrero**: Resources, Writing – review & editing. **Juan Rivera Dommarco**: Resources, Writing – review & editing. **Liz Maria de Almeida**: Validation, Writing – review & editing. **Silvina Arrossi**: Validation, Writing – review & editing. **Patricia J. García**: Validation, Writing – review & editing. **María Luisa Garmendia**: Validation, Writing – review & editing. **Alejandro Mohar**: Validation, Writing – review & editing. **Raúl Murillo**: Validation, Writing – review & editing.

Julio Santamaría: Validation, Writing – review & editing. **Guillermo Tortolero-Luna**: Writing – review & editing. **Eduardo Cazap**: Writing – review & editing. **Owen O. Gabriel**: Writing – review & editing. **Diego Paonessa**: Writing – review & editing. **J. Walter Zoss**: Writing – review & editing. **Silvana Luciani**: Writing – review & editing. **Andre Carvalho:** Writing – review & editing, Supervision. **Joachim Schüz**: Writing – review & editing, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare no conflict of interest.

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Appendix

The 'Working Group of Scientific Experts' consists of the following authors (experts listed by working group if not co-authors):

(Lifestyle risk factors WG1): Tânia Cavalcante, Tania Cony Aburto, Camila Corvalán, Joaquin Barnoya, Simón Barquera, Pedro Rodrigues Curi Hallal, Luz Myriam Reynales, Isabelle Romieu, Mariana Stern.

(Environment and occupational risk factors WG2): Eduardo Algranti, Estela Blanco, Luis Abdón Cifuentes, Lizbeth Teresita Lopez Carrillo, Ana María Mora, Julietta Rodriguez-Guzmán, Laura Andrea Rodríguez Villamizar, Lene H.S. Veiga.

(Infections WG3): Luis Fernando Aranha Camargo, Loretto Carvajal, Maria Constanza Camargo, Valeria Fink, Eduardo Lazcano-Ponce, Ana Patricia Ortiz, Carolina Porras, Arnoldo Javier Riquelme P é rez, Vanessa Van de Wyngard.

(Medical interventions WG4): Leonardo Javier Arcuri, Armando Baena, Lucia Delgado, Jóse Jerónimo, Mauricio Maza, Melisa Paolino, Rossana Ruiz, Gabriela Torres-Mejía, Cynthia Villarreal-Garza.

(Communication and education WG5): Anabelle Bonvecchio Arenas, Arlette Bahena Botello, Fernanda de Albuquerque Melo Nogueira, Isabel Cristina Garcés Palacio, Elmer E. Huerta, Claudia Jurberg, Maríantonia Lemos, Orlando Martínez Granera, Karina Pesce.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.canep.2023.102402.

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