ICCI-LA

Iniciativa Integrada para el Control de Cáncer en América Latina

Integrated Cancer Control Initiative in Latin America

Addressing the rising burden of cancer in Colombia: Challenges & opportunities

An Analysis of Colombia's Health System and Cancer Control Policies

The ICCI is made possible through a collaborative agreement between UICC and Novartis. All research activities performed by UICC and research partners are done independently of Novartis or any other pharmaceutical manufacturer.

NOVARTIS

Acknowledgements

We would like to thank all those who participated in this project, especially those who attended and contributed to the Virtual Stakeholder Workshop, whose names appear in Appendix J.

Rifat Atun*, MBBS, MBA, FRCGP, FFPH, FRCP

Professor of Global Health Systems, Harvard T. H. Chan School of Public Health, Boston, MA, USA

Amanda M. Gutierrez, MPH

Research Assistant, Harvard T. H. Chan School of Public Health, Boston, MA

Jacob A. Mendales, MPH

Research Assistant, Harvard T. H. Chan School of Public Health, Boston, MA

Anthony A. Morgan, MPH

Research Assistant, Harvard T. H. Chan School of Public Health, Boston, MA

Carlos Z. Zegarra, MD, MPH

Research Assistant, Harvard T. H. Chan School of Public Health, Boston, MA

Jeremy Sanchez, MPH

Research Assistant, Harvard T. H. Chan School of Public Health, Boston, MA

ICCI-LA Study Collaborators:

Dr. Jairo Aguilera López

Coordinador Grupo Evaluación y Seguimiento de Servicios Oncológicos, Instituto Nacional de Cancerología

Dr. Carlos José Castro Espinoza

Director Médico Liga Colombiana Contra el Cáncer

Dra. Ana Cristina Galvis A.

Subdirectora Fundación Sanar Niños con Cáncer

Dra. Adriana María Garzón P.

Presidente y Fundadora Fundación Simón

Dr. Raúl Hernando Murillo Moreno

Director del Centro Javeriano de Oncología

Dra. Carolina Wiesner Ceballos

Directora General Instituto Nacional de Cancerología E.S.E.

*Corresponding author

Table of Contents

Glossary

ASCOFAME – Colombian Association of Schools of Medicine
ASR – Age-Standardized Rate
CVD – Cardiovascular Disease
CNS – Central Nervous System
HPV – Human Papilloma Virus
LAC – Latin America and the Caribbean
ICCI-LA – Integrated Cancer Control Initiative in Latin America
IARC – International Agency for Research on Cancer
GLOBOCAN – Global Cancer Observatory
PPP – Purchasing Power Parity
GDP – Gross Domestic Product
Intl$ – International dollars
PDCCC – Colombia's National Cancer Control Plan
PNCC – National Program for the Control of Cancer
SGSSS –General System of Social Security in Health
ECNT – Chronic, non-communicable disease
ARL – Insurers of Occupational Risk
PMR – Maximum Recovery Budgets
IPS – Healthcare Providers Institution
EPS – Health Promotion Agency
UPC – Capitation Payment Unit
EPC – Enhanced Primary Care
MINSALUD – Ministry of Health and Social Protection of Colombia
PHC – Primary Healthcare
UHC – Universal Health Coverage
NCD – Non-Communicable Disease
COVID-19 – Coronavirus disease 2019
SARS-CoV-2 – The virus responsible for causing COVID-19
PAHO – Pan-American Health Organization
WHO – World Health Organization
CONCORD-3 – A program for worldwide surveillance of trends in cancer survival, led by the London School of Hygiene and Tropical Medicine. CONCORD-3 is the latest study, published in The Lancet in 2018.
DANE – National Administrative Department of Statistics
INS – National Institute of Health
OOP – Out-of-Pocket
HER2+ – Human Epidermal Growth Factor Receptor 2 positive; a defining feature of a type of breast cancer
SISBEN – System for Selecting Beneficiaries of Social Programs
ICBF – Colombian Institute of Family Welfare
ADRES – Administrator of Resources of the General System of Social Security in Health

FONSAET – Salvage and Guarantees Fund for the Health Sector
FOSYGA – Security and Guarantee Fund
ECAT – Catastrophic Events and Traffic Accidents
SOAT – Compulsory insurance for all motor vehicles in Colombia
CRES – Regulatory Health Commission
CCF – Family Compensation Funds
POS – Mandatory Health Plan

1. Executive Summary

Objectives

The aim of the Integrated Cancer Control Initiative in Latin America (ICCI-LA) study is to help improve Colombia's response to the rising burden of cancer, as part of its Constitutional commitment to health as a human right and its efforts to expand universal health coverage. The objectives of this report are to discuss the overall context of the Colombian health system, with an emphasis on cancer, present major health system challenges identified by stakeholders, and identify policy options as suggested by the leading experts involved in the ICCI-LA study.

Methods

We used mixed methods of inquiry that included a review of published literature and datasets on the Colombian health system and cancer burden, an online survey conducted among subject-matter experts to ascertain primary challenges and opportunities within the Colombian health system in relation to cancer, and a series of moderated virtual stakeholder workshop which facilitated expert discussion around the topic.

Findings

According to the Global Cancer Observatory (GLOBOCAN) that includes estimates by International Agency for Research on Cancer (IARC), a research agency of the World Health Organization (WHO), Colombia had an age-standardized rate (ASR) of 178.8 new cases of cancer per 100,000 people in 2018. The estimated cancer incidence in Colombia lies between that for Mexico and higher-incidence Latin American country clusters of Argentina, Brazil, and Chile, which have ASRs closer to 200 cases per 100,000 people.

The cancer incidence is estimated to continue rising in Colombia, with 148,600 new cases of cancer projected for 2030 and 189,988 new cases projected for 2040. These figures represent a 45.8% increase in cancer cases between 2018 and 2030, and an 86.5% increase between 2018 and 2040.

Similarly, cancer mortality levels have also been rising, and currently account for 19.88% of all deaths in Colombia. Colombia has the second lowest ASR of mortality among selected Latin American countries at 79.2 deaths per 100,000 (higher than Mexico, but lower than Argentina, Chile, or Brazil), but projected to have 95,692 total deaths from cancer in 2040, an additional 49,635 deaths from what Colombia experienced in 2018, a 107.8% increase from that in 2018.

Colombia's National Cancer Control Plan (*Plan Decanal para el Control del Cáncer de Colombia 2012-2021, or PDCCC*) has set objectives informed by a series of national and international standards and regulations, and goals to: promote primary prevention through control of cancer risks; improve early detection; improve quality of cancer care and recovery of cancer patients and survivors; strengthen national information systems; and improve the training and development of practitioners.

The primary challenges, as identified through a survey of responses from 38 stakeholders, were organized into four health system areas: 1) Organization and Governance, 2) Financing, 3) Resource Management, and 4) Service Delivery. A common challenge identified in both stakeholder surveys and virtual workshops was the fragmentation within the health system, resulting in inequitable health outcomes, costs, and quality of services between the public and private systems and among geographic regions. Other issues included: inconsistent enforcement of the regulatory frameworks related to cancer prevention, control and care, high costs of cancer services, lack of transparency in decisions, and inconsistent level and quality of services across the country.

Policy options to address the identified challenges were also categorized by the four health system areas. Suggestions for Resource Management included anti-corruption measures, alignment of existing enforcement mechanisms, and restructuring of resource allocation systems. Suggestions for Organization and Governance included centralizing and harmonizing policies for cancer care that are coordinated across regions and sectors, improving the incentive structures and standards of care, and strengthening a national cancer law with accountability and enforcement mechanisms. Financing policy proposals included increasing the national budget allocated for cancer, incentivizing innovative cancer technologies and treatments through such reformed budgets, and instituting regulations for inspection, reporting, and monitoring mechanisms for cancer services. Lastly, suggestions for service delivery included establishing comprehensive and integrated services delivery processes, improving provider training, and creating a central entity to monitor and manage cancer care to ensure consistency and high quality.

Recommendations

The study collaborators propose nine overarching recommendations for the Colombian health system to address the rising burden of cancer and the challenges that exist.

Highest Priority:

1. Evaluate the degree of implementation of current cancer policies and laws and propose strengthening mechanisms for their implementation.
2. Update comprehensive cancer care standards and policies with leadership and technical support from the National Cancer Institute of Colombia.
3. Strengthen population-based cancer registries throughout the country.

High Priority:

4. Strengthen the mechanisms established in the current regulatory framework to combat inappropriate practices around cancer control.
5. Strengthen inspection, surveillance and control mechanisms aimed at the adequate use of resources for cancer control.
6. Develop mechanisms and procedures for the permanent review and adjustment of the resources necessary for cancer control.

Medium Priority:

7. Restructure existing mechanisms for health resource allocation and service delivery to improve continuity of cancer care.
8. Restructure delivery of healthcare services for cancer and strengthen regional health authorities to reduce fragmentation and ensure provision of consistently high quality and equitable cancer services.
9. Improve training of healthcare providers on multidisciplinary approach to cancer care and service delivery.

2. Introduction

The objectives of the Integrated Cancer Control Initiative in Latin America (ICCI-LA) are to (i) identify and fill the knowledge gaps in relation to the burden of cancer and health system responses to cancer prevention, care and control in selected countries (ii) determine the main challenges that need addressing in these countries (iii) detail potential interventions that are needed at country level to develop an effective response, and (iv) build an inclusive coalition of stakeholders to mount a sustained and lasting response in order to improve health outcomes, enhance financial protection and reduce inequalities. Colombia is the second country of focus for ICCI-LA.

The purpose of the current study is to identify and examine major issues relating to the rising cancer burden in Colombia and its management. The objectives of this report are to discuss the overall context of the Colombian health system related to cancer, present major health system challenges identified by stakeholders via a survey and in-person meetings, and identify policy options, as suggested by the leading experts in Colombia and internationally who were involved in the ICCI-LA study, aimed at improving Colombia's response to the rising burden of cancer.

This study used a mixed methods approach to ascertain primary challenges and opportunities within the Colombian health system around cancer. The methods of inquiry included: a literature review of published data, a novel online survey conducted among Colombian experts, and, moderated virtual stakeholder workshops that involved leading experts on the health system and cancer prevention, control and care in Colombia.

The framework for health systems analysis that was used in the literature review builds on earlier approaches on analyzing health systems (1–5) and emphasizes a systems view (6) when analyzing context and health system performance. The analytical framework has been used in single-country and multi-country analyses (7,8) and can be used to explore contextual factors and health systems functions that interact to influence the achievement of health system goals and objectives. Appendix A provides more information on the framework and each section of the analysis.

This report is organized into 3 major sections. The first section is an analysis of the health system context in Colombia related to cancer, including demographic, epidemiological, political, and legal/regulatory environment which influence the trajectory of change in the health system. The second section is an analysis of health system challenges related to cancer and the policy options identified by stakeholders for addressing these challenges. The third section is focused on recommendations and proposed next steps to address the challenges identified and to improve the response of the Colombian health system to the rising burden of cancer.

3. Methods

The Harvard research team worked with collaborators in Colombia to establish a core team to undertake the study. The methodology (details provided in Appendix B) included:

1. A literature review of published articles, policies, and datasets;
2. A novel online survey conducted among topic experts; and
3. Four virtual stakeholder workshops.

The data emerging from the literature review were collected and analyzed between January and July 2020. Online surveys were conducted from May to June 2020, and four virtual stakeholder workshops were held between mid-August and mid-September 2020. During the data collection and analysis, there was constant guidance and feedback from the different working groups involved in the stakeholder workshop.

4. Analyzing the Cancer Context in Colombia

This section provides an analysis of the context of the health system in Colombia. In this section we discuss demographic, epidemiological, political and regulatory context related to cancer, including an overview of Colombia's National Cancer Control Plan. We also provide in Appendix C additional analysis of demographic and epidemiological transitions, political, legal and regulatory environment, and the economic, socio-cultural and technological factors affecting Colombian health system context.

4.1. Demographic and Epidemiological Transitions

When studying cancer, crude incidence figures portray an incomplete contextualization of Colombia's cancer burden as these figures do not account for the substantial difference in population sizes and age structures between countries. For example, Colombia understandably has more cases of cancer than less populous countries like Peru or Chile, yet significantly fewer cases than more populous countries like Brazil (13). Hence, using rates standardized per 100,000 people more accurately depicts the cancer burden in a country. Additionally, given that cancer disproportionately affects older populations, having age-standardized metrics enables a more accurate comparison across countries with different population age structures. As a result, ASRs are the unit used in this report for the subsequent analysis of cancer incidence.

4.1.1. Cancer Incidence

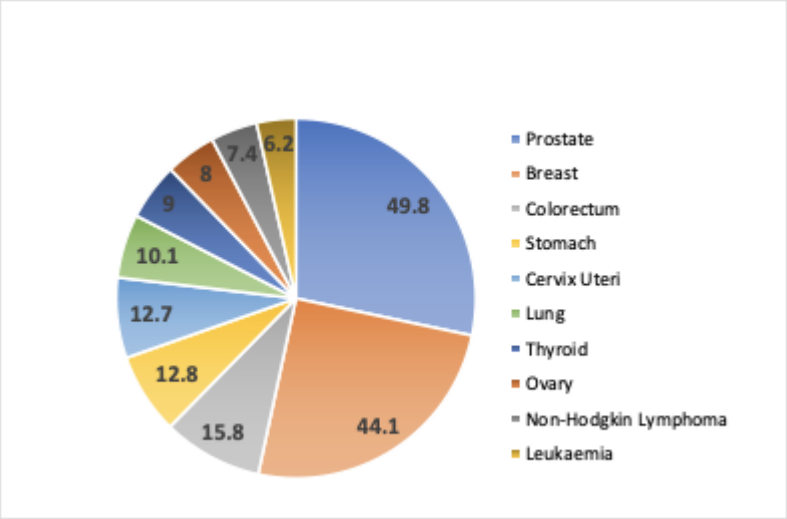
In GLOBOCAN analysis of Colombia's cancer burden, incidence is defined as the number of new cases occurring in a specified period and geographic area (9).

Primary prevention strategies aim to reduce such measures of incidence, though increasing incidence rates do not necessarily reflect failure within the health system in cases where the expansion of early detection, testing, or other programs could result in a temporary rise in incidence rates as more individuals are screened and tested and therefore discovered (9). The methodology for reporting mortality mirrors the

approach taken in the incidence section, where current mortality estimates refer to 2018 age-standardized rates per 100,000 people.

In 2018, Colombia was estimated to have an ASR of 178.8 new cases of cancer per 100,000 people. The top 5 cancers were prostate, breast, colorectal, stomach and cervical cancers. Figure 1 below shows Colombia's top 10 cancer types according to ASR of incidence.

Figure 1: Estimated Incidence Rate of Cancer per 100,000 People for Top 10 Cancer Types in Colombia, 2018 (Source: IARC Cancer Today (13))



The ASR of 178.8 new cases of cancer per 100,000 people in Colombia is on the lower end of levels observed in other large Latin American countries chosen for comparison with only Mexico having a lower ASR at 142.7 new cases per 100,000 people. Colombia's levels are between that in Mexico and the higher-incidence cluster of Argentina, Brazil, and Chile – each with approximately 200 new cases per 100,000. Figure 2 illustrates the comparison of cancer ASR across select Latin American countries, and Figure 3 shows comparison limited to the 5 most common cancer in Colombia by ASR for ease of reading. The comparison continues in Table 1, expanded to include the 10 most common cancer types in Colombia.

Figure 2: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in 2018, All Cancer Types: Selected Comparator Countries in Latin America (Source: IARC Cancer Today (13))

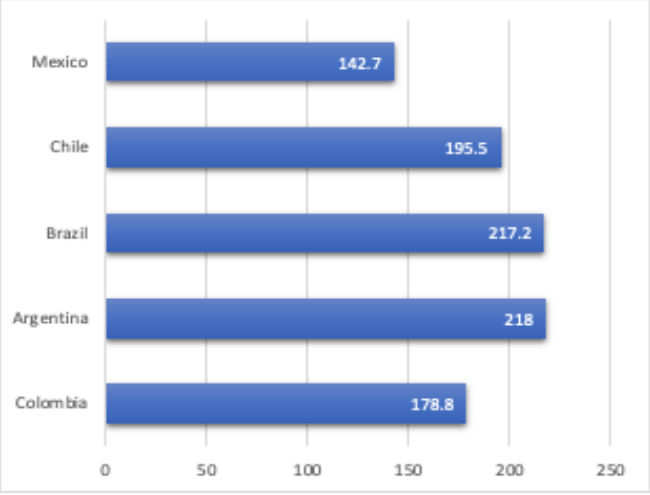


Figure 3: Estimated Age Standardized Incidence Rate ofCancer per 100,000 People in 2018, by Cancer Type: Selected Comparator Countries in Latin America (Source: IARC Cancer Today (13))

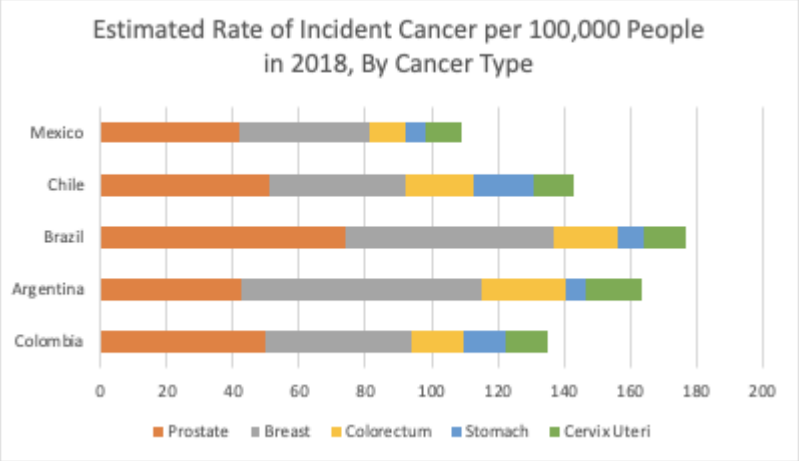


Table 1: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in 2018, by Cancer Type: Selected Comparator Countries in Latin America (Source: IARC Cancer Today (13))

	Colombia	Argentina	Brazil	Chile	Mexico
Prostate	49.8	42.4	74	51.2	41.6
Breast	44.1	73	62.9	40.9	39.5
Colorectum	15.8	25	19.6	20.7	11.2
Stomach	12.8	6.4	7.9	17.8	5.6
Cervix Uteri	12.7	16.7	12.2	12.2	11
Lung	10.1	18.9	13	13.4	5.8
Thyroid	9	6.9	8.6	4.8	8.9
Ovary	8	7.9	4.9	6.5	6.8
Non-Hodgkin Lymphoma	7.4	6.1	5.2	5.8	3.9
Leukemia	6.2	5.3	4.8	6	5
Total Incidence Rates	**178.8**	**218**	**217.2**	**195.5**	**142.7**

4.1.2. Incidence Comparisons: Colombia, Latin America, and the World

Compared to other Latin American countries, Colombia has a higher burden of stomach cancer where it has the 2nd highest ASR of incidence behind Chile at 12.8 new cases per 100,000 people in 2018, a number about double the ASR of incidence for stomach cancer in Argentina (6.4 new cases per 100,000) and Mexico (5.6 new cases per 100,000). Colombia also has the highest burden of ovarian cancer at 8 new cases per 100,000, though Argentina has nearly the same ASR of incidence at 7.9 cases per 100,000.

The age-standardized incidence rates for prostate cancer and breast cancer are high in Colombia, at 49.7 and 44.1 per 100,000 population respectively, and consistent with other Latin American countries.

Colombia's statistics are in the middle of the levels observed in selected Latin American comparisons for prostate cancer, with Brazil being the primary outlier at 74 cases per 100,000 as the other countries hover around or below 50 cases per 100,000. A similar statement can be said for breast cancer, only with Argentina representing the primary outlier at 73 cases per 100,000 against Colombia's 44.1 cases per 100,000. Cervical uterine cancer estimates are similar for Argentina, Brazil, Chile, Colombia, and Mexico.

Colombia performs relatively well in relation to estimated levels of colorectal cancer at 15.8 new cases per 100,000, with only Mexico having a lower ASR of incidence at 11.2 cases per 100,000. Lung cancer follows a similar pattern, with Colombia as the second lowest ASR of incidence among Latin American comparators. Figures 4, 5, and Table 2 provide a comparison of age standardized incidence rates globally and regionally (9).

Figure 4: Estimated Age Standardized Cancer Incidence per 100,000 People in 2018, All Cancer Types: Colombia, Selected World Regions and World (Source: IARC Cancer Today (13))

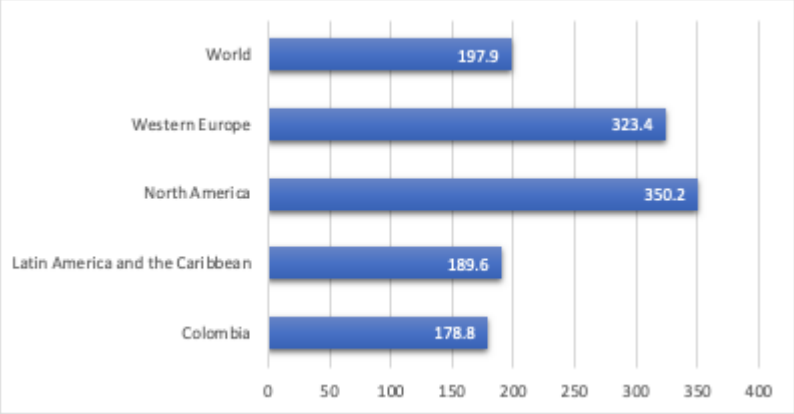


Figure 5: Estimated Age Standardized Rate of Incidence of Cancer per 100,000 People in 2018, by Colombia's 5 Most Common Cancer Types: Colombia, Selected World Regions and World (Source: IARC Cancer Today (13))

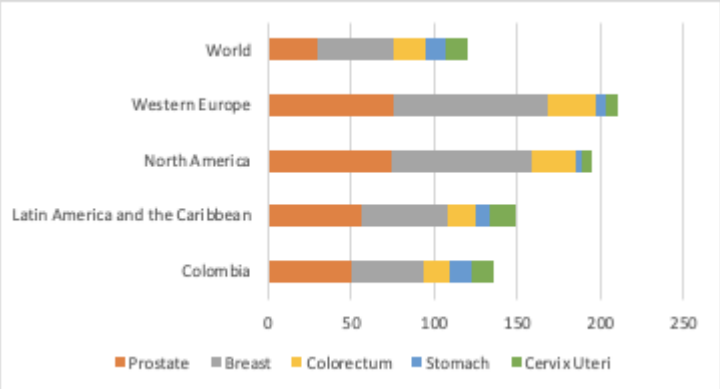


Table 2: Estimated Age Standardized Rate of Incidence of Cancer per 100,000 People in 2018, by Cancer Type: Colombia, Selected World Regions and World (Source: IARC Cancer Today (13))

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
Prostate	49.8	56.4	73.7	75.8	29.3
Breast	44.1	51.9	84.8	92.6	46.3
Colorectum	15.8	16.8	26.2	28.8	19.7
Stomach	12.8	8.7	4.1	5.8	11.1
Cervix Uteri	12.7	14.6	6.4	6.8	13.1
Lung	10.1	11.8	34.5	33.9	22.5
Thyroid	9	7.6	15	8.5	6.7
Ovary	8	6.1	8.4	7	6.6

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
Non-Hodgkin Lymphoma	7.4	5.4	12.5	10.1	5.7
Leukemia	6.2	5.4	9.9	8.5	5.2
Total Incidence Rates	**178.8**	**189.6**	**350.2**	**323.4**	**197.9**

Expanding the analysis to other regions of the world, Colombia has slightly lower estimated age standardized incidence rates for common cancer types than regions like Latin America and the World, but much lower estimated levels than North American and Western Europe. Regarding variation in cancer types, North America and Western Europe have substantially higher ASR of incidence for prostate, lung, and breast cancers. However, Colombia has higher incidence rates of stomach and cervical uterine cancer, both of which have infectious etiologies (13).

Cervical cancer is particularly important in that the Human Papilloma Virus (HPV) vaccine is estimated reduce cervical cancer incidence by 90% (11). While Colombia introduced a national HPV vaccination program in 2012, the program has had issues of public mistrust which hampered its efficacy (12). We provide in Appendix D Cancer age standardized incidence projections for Colombia and comparator countries in Latin America and incidence levels for the most common cancer types.

4.1.3. Cancer Mortality

Cancer mortality levels has been increasing steadily in recent years in Colombia; it is currently the second cause of mortality from all causes at 19.88% of all deaths and a major contributor to disability-adjusted life-years lost (DALYs) at 8.25% of all DALYs. The percentage of deaths attributed to cancer according to different age groups is shown in Table 3.

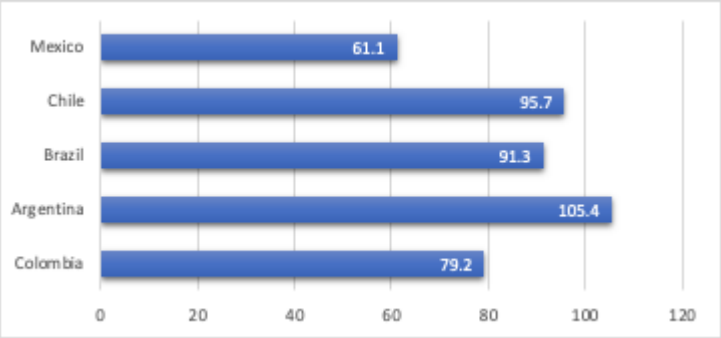
Table 3: Percentage of Deaths Attributed to Cancer According to Age Groups (Source: IARC Cancer Today (13))

Age	% of deaths related to Cancer
<5	2.37
5 – 14	21.37
15 – 49	14.74
50 – 69	31.59
>70	18.05

Colombia has an age-standardized mortality rate for cancer of 79.2 deaths per 100,000 people, the second lowest rate among selected Latin American countries. The ASR may be higher than that of Mexico (61.1

deaths per 100,000 people) but is lower than the cluster of Argentina (105.4 per 100,000), Chile (95.7 per 100,000), and Brazil (91.3 per 100,000). Figure 6 displays the age-standardized mortality rate for selected countries.

Figure 6: Estimated Age Standardized Mortality Rate per 100,000 People in 2018, All Cancer Types (Source: IARC Cancer Today (13))



The cancers with the highest age-standardized mortality rate mortality rates in Colombia, in descending order, are prostate cancer (12 deaths per 100,000 people), breast cancer (11.9), stomach cancer (9.4), and lung cancer (13). Figure 7 below shows the ten most common cancers by age standardized mortality rate in Colombia and Figure 8 age standardized mortality rate in Colombia in comparison with other Latin American countries.

Figure 7: Estimated Age Standardized Mortality Rate per 100,000 People in 2018 in Colombia, by Cancer Type (Source: IARC Cancer Today (13))

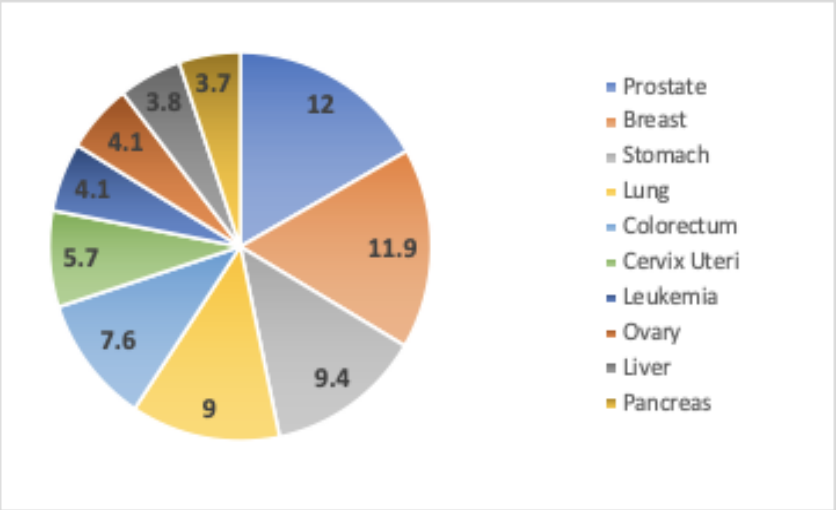
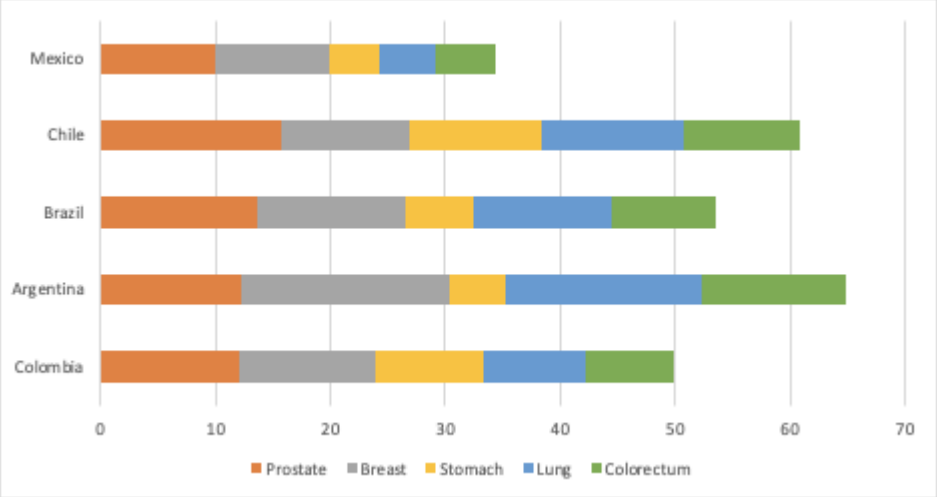


Figure 8: Estimated Age Standardized Mortality Rate per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today (13))



4.1.4. Comparison of Cancer Mortality Levels: Colombia, Latin America, and the World

Cancer is the second leading cause of death after cardiovascular disease (CVD) among Latin American and Caribbean (LAC) countries, responsible for more than 670,000 deaths in 2018 in the region. The regional average for cancer mortality was 120 per 100,000 population in 2017. The rate of cancer deaths is lower in Nicaragua, Mexico, Colombia, Panama and Honduras with rates of less than 90 deaths per 100,000 (17). Cancer mortality rates are higher in men than in women in almost all LAC countries (17).

Contextualizing these rates within other Latin American countries, Colombia has relatively low mortality rates for lung, prostate, and colorectal cancer. Mortality rates for breast and cervical cancer are consistent with peers, with the exception of Argentina's breast cancer mortality rate of 18 deaths per 100,000 women. Colombia performs poorly, however, with higher age standardized mortality rates of stomach cancer and leukemia. Stomach cancer at a rate of 9.4 deaths per 100,000 is the second highest among selected Latin American countries, only behind Chile's 11.5 deaths per 100,000. These figures are much higher than those of Mexico (4.4 per 100,000), Argentina (4.9), and Brazil (5.9). Colombia has the highest ASR of mortality for leukemia among selected countries at 4.1 deaths per 100,000, but this estimate is relatively close to that of Chile (3.5 per 100,000), Argentina (3.5), Mexico (3.4), and Brazil (3.2). Table 4 details the age-standardized mortality rates for the top 10 cancers in Colombia and for selected Latin American countries.

Table 4: Estimated Age Standardized Mortality Rate per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today (13))

	Colombia	Argentina	Brazil	Chile	Mexico
Prostate	12	12.3	13.6	15.8	10
Breast	11.9	18	13	11.1	9.9
Stomach	9.4	4.9	5.9	11.5	4.4
Lung	9	17.1	12	12.3	4.9

	Colombia	Argentina	Brazil	Chile	Mexico
Colorectum	7.6	12.6	9	10.2	5.2
Cervix Uteri	5.7	7.7	5.8	5	5.8
Leukemia	4.1	3.5	3.2	3.5	3.4
Ovary	4.1	4	2.9	3.3	4
Liver	3.8	3.2	4.4	4.9	5.1
Pancreas	3.7	6.9	4.4	5.4	3.3
Total	**79.2**	**105.4**	**91.3**	**95.7**	**61.1**

Colombia's has a lower age-standardized mortality rate than the world regions chosen for comparison. Age-standardized mortality rate for lung cancer is the largest for cancer mortality for North America (22.3 deaths per 100,000) and Western Europe (24.6 deaths per 100,000). In contrast, prostate cancer mortality rates are higher in Colombia than both North America and Western Europe, though by a much smaller margin. Additionally, breast and colorectal cancer mortality rates hold similar patterns for each of the regions.

Figures 9, 10, and Tables 5, 6 extend the mortality rate comparisons to Latin America and the Caribbean, North America, Western Europe, and the World.

Figure 9: Estimated Mortality Rate per 100,000 People in 2018, All Cancer Types (Source: IARC Cancer Today (13))

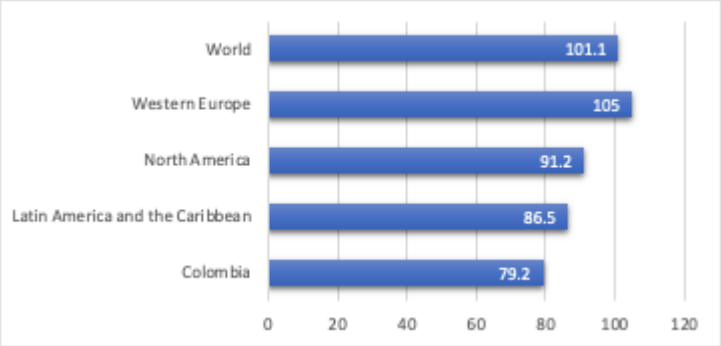


Figure 10: Estimated Age Standardized Mortality Rate per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today (13))

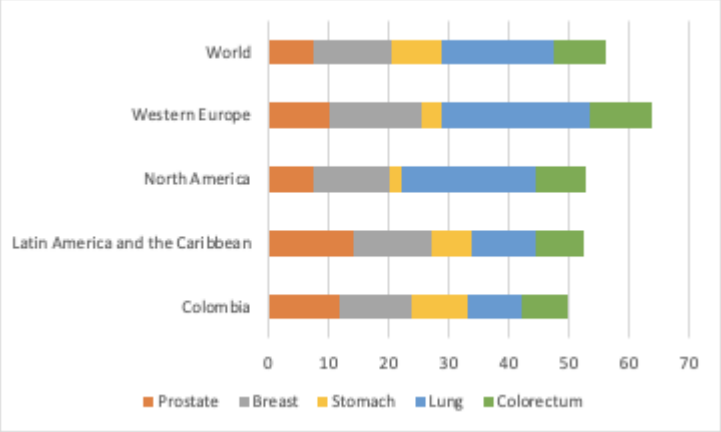


Table 5: Estimated Age Standardized Mortality Rate per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today (13))

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
Prostate	12	14.2	7.7	10.1	7.6
Breast	11.9	13	12.6	15.5	13
Stomach	9.4	6.6	1.8	3.4	8.2
Lung	9	10.6	22.3	24.6	18.6
Colorectum	7.6	8.1	8.4	10.3	8.9
Cervix Uteri	5.7	7.1	1.9	2.1	6.9
Leukemia	4.1	3.6	3.4	3.6	3.5
Ovary	4.1	3.4	4.1	4.4	3.9
Liver	3.8	4.7	4.8	4.5	8.5
Pancreas	3.7	4.2	6.5	7.6	4.4
Total Mortality	**79.2**	**86.5**	**91.2**	**105**	**101.1**

Table 6: Ranking in descending order Age Standardized Mortality Rates of Cancer per 100,000 People Across Different World Regions and the World (Source: IARC Cancer Today (13))

Rank	Colombia	Latin America and the Caribbean	North America	Western Europe	World
1	Prostate	Prostate	Lung	Lung	Lung
2	Breast	Breast	Breast	Breast	Breast

Rank	Colombia	Latin America and the Caribbean	North America	Western Europe	World
3	Stomach	Lung	Colorectum	Colorectum	Colorectum
4	Lung	Colorectum	Prostate	Prostate	Liver
5	Colorectum	Cervix Uteri	Pancreas	Pancreas	Stomach

Understandably, the region providing the closest comparison to Colombia is Latin America and the Caribbean, having the most similar total mortality ASR and relatively similar mortality profile. We provide in Appendix E cancer mortality projections for Colombia and comparator countries in Latin America and mortality rates for most common cancer types.

4.1.5. 5 – Year Net Survival for Colombia's Most Common Types of Cancer

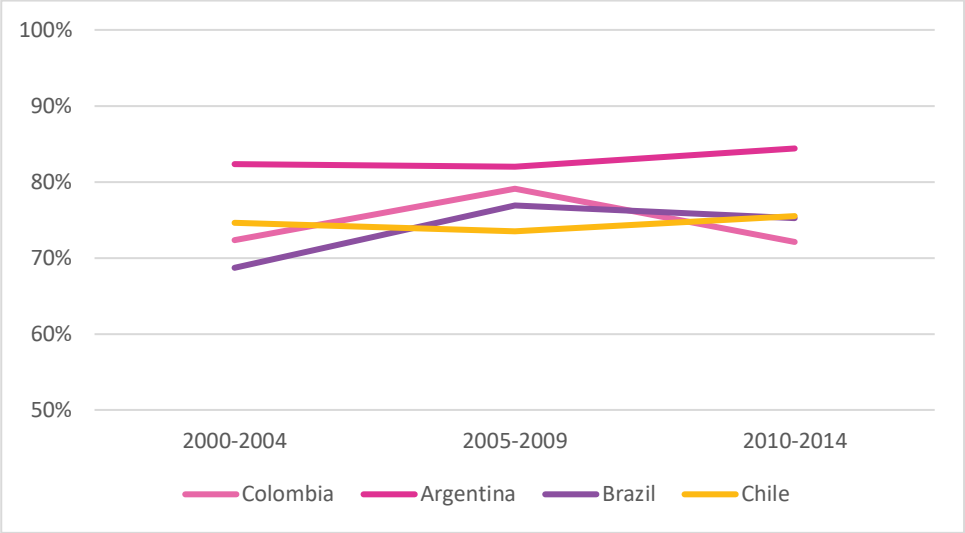
To support the cancer burden analysis of the GLOBOCAN study data, the ICCI-LA study team at Harvard University conducted analysis of published data from the CONCORD-3 study, which published 5-year net survival from 2000 to 2014. Using the 5-year net survival as a percentage of all patients diagnosed provides a useful measure of health system performance in managing cancer. To model the estimates in Colombia, CONCORD-3 study used 4 participating cancer registries which together cover 9% of the total population, a population coverage figure consistent with Latin America peers like Argentina (9.2%), Brazil (7.7%), and Chile (13.8%). Colombia's level of population coverage represents an improvement from the previous iteration of the CONCORD study, CONCORD-2, where only 6.9% of the population was covered. However, this coverage level remains well-below countries like the US and France, whose registries used in the study cover 85.6% and 21.7% of the total population respectively (10).

Figures 11-15 below use CONCORD-3 data to compare 5-year net survival for Colombia's five cancers with the highest mortality rates per 100,000 people in 2018, namely prostate, breast, lung, and colon cancers. A difference in methodology exists between the CONCORD-3 study and IARC's GLOBOCAN study. The data from IARC groups all colorectal cancers together, specifically cancers of the bowel, colon, and rectum. However, the CONCORD data disaggregates this group with colon cancer being the most common among these three cancer types. Hence, subsequent figures with CONCORD data report only that of colon cancer and not the aggregation of colon, bowel, and rectal cancers.

Another note is that the asterisks in the figure denote data points that are considered less reliable than others because 15% or more of patients in the registry used for CONCORD-3 study were either:

1. Lost to follow-up or censored alive within 5 years of diagnosis or, if diagnosed in 2010 or later, before Dec 31, 2014.
2. Registered only from a death certificate or at autopsy.
3. Registered with unknown vital status or with incomplete dates like unknown year of birth, unknown month or year of diagnosis, or unknown year of last known vital status.

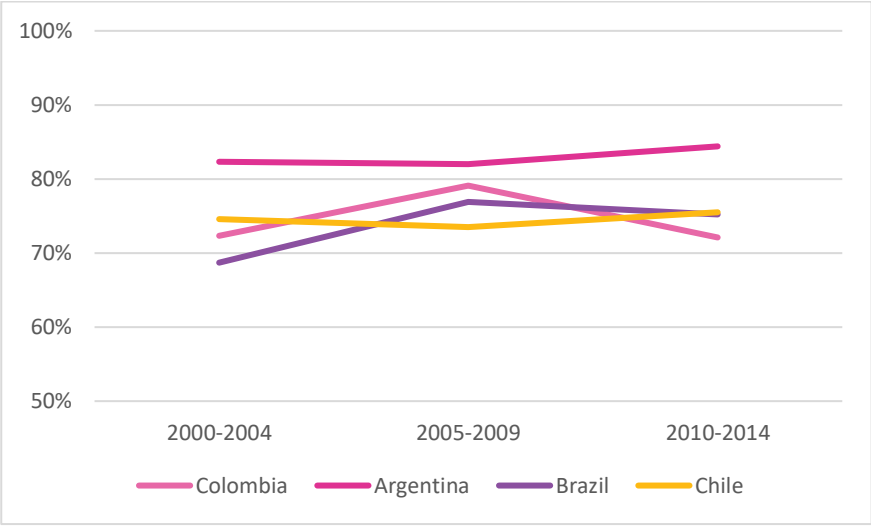
Figure 11: 5-Year Net Survival in Adults Diagnosed with Prostate Cancer in Selected Countries in Latin America (Source: CONCORD-3 (10))



5-Year Net Survival for Prostate Cancer in Selected Countries in Latin America

	Colombia	Argentina	Brazil	Chile
2000-2004	83.60%	83.50%	90%	82.60%
2005-2009	87.80%	83.60%	92.50%	84.40%
2010-2014	80.3%*	87.60%	91.60%	82%*

Figure 12: 5-Year Net Survival in Adults Diagnosed with Breast Cancer in Selected Countries in Latin America (Source: CONCORD-3 (10))

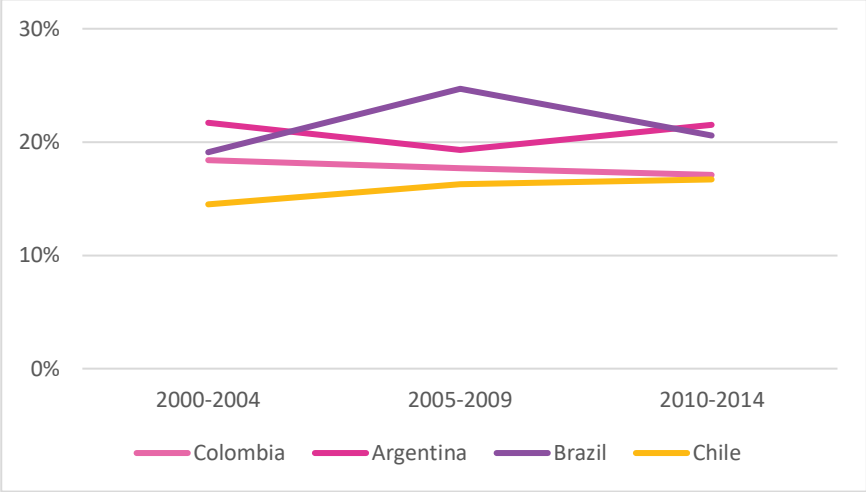


5-Year Net Survival for Breast Cancer in Selected Countries in Latin America

	Colombia	Argentina	Brazil	Chile
2000-2004	72.30%	82.30%	68.7%*	74.60%

	Colombia	Argentina	Brazil	Chile
2005-2009	79.10%	82%	76.9%*	73.50%
2010-2014	72.1%*	84.40%	75.2%*	75.5%*

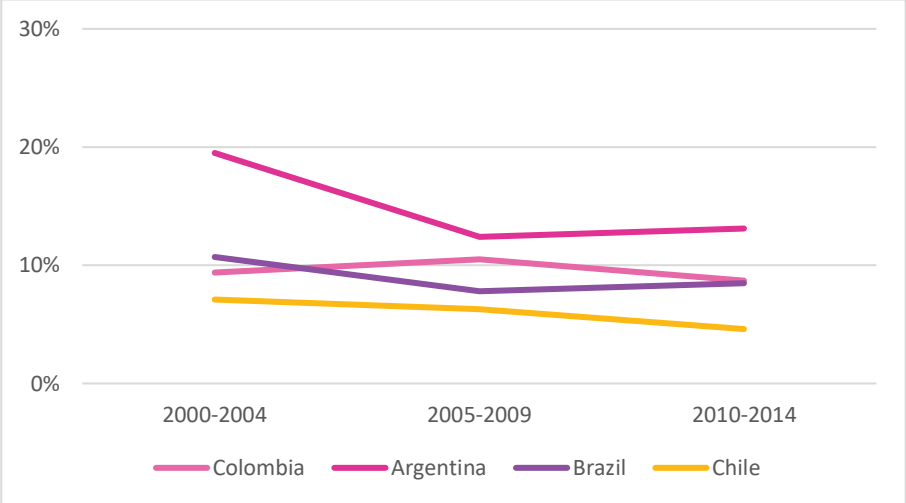
Figure 13: 5-Year Net Survival in Adults Diagnosed with Stomach Cancer in Selected Countries in Latin America (Source: CONCORD-3 (10))



5-Year Net Survival for Stomach cancer in Selected Countries in Latin America

	Colombia	Argentina	Brazil	Chile
2000-2004	18.40%	21.7%*	19.1%*	14.50%
2005-2009	17.70%	19.3%*	24.7%*	16.30%
2010-2014	17.1%*	21.5%*	20.6%*	16.70%

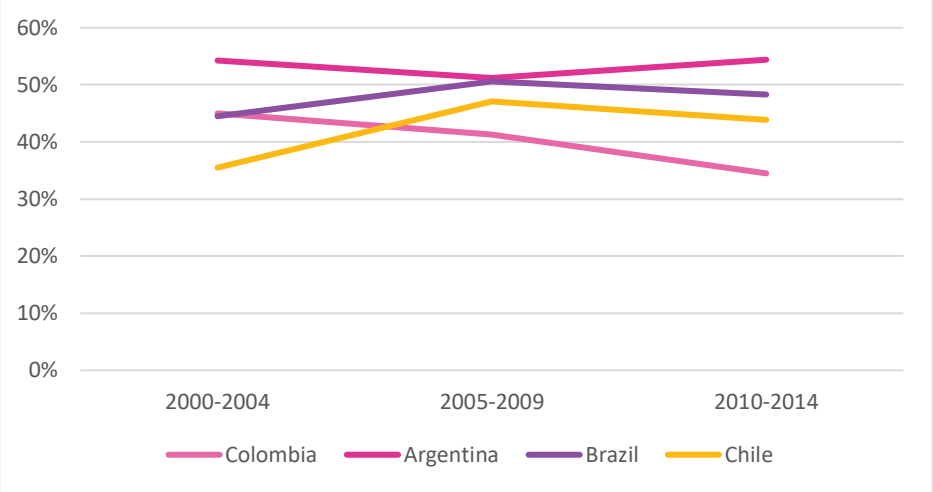
Figure 14: 5-Year Net Survival in Adults Diagnosed with Lung Cancer in Selected Countries in Latin America (Source: CONCORD-3 (10))



5-Year Net Survival for Lung Cancer in Selected Countries in Latin America

	Colombia	Argentina	Brazil	Chile
2000-2004	9.40%	19.5%*	10.70%	7.1%*
2005-2009	10.50%	12.4%*	7.80%	6.3%*
2010-2014	8.7%*	13.1%*	8.50%	4.6%*

Figure 15: 5-Year Net Survival in Adults Diagnosed with Colon Cancer in Selected Countries in Latin America (Source: CONCORD-3 (10))



5-Year Net Survival for Colon Cancer in Selected Countries in Latin America

	Colombia	Argentina	Brazil	Chile
2000-2004	45%	54.2%*	44.5%*	35.50%
2005-2009	41.30%	51.2%*	50.6%*	47.10%
2010-2014	34.5%*	54.4%*	48.3%*	43.9%*

The cancers with the highest 5-year net survival from 2010 to 2014 were prostate and breast cancers, despite also having the highest mortality rate for any cancer type. The cancers with the lowest 5-year net survival were lung cancer and stomach cancer at 17.1% and 8.7% respectively.

In general, Colombia performs on-par with other selected comparator Latin American countries. To further contextualize Colombia's performance, Figure 16 lists the country with the highest 5-Year net survival for the top five cancers that have the highest mortality rate in Colombia.

Figure 16: Countries with the Highest 5-Year Net Survival of Cancer in 2000 to 2014 in Selected Countries (Source: CONCORD-3 (10))

Type of Cancer	Country with the Highest 5-Year Net Survival	5-Year Net Survival (%)	5-Year Net Survival in Colombia (%)
Prostate	Puerto Rico	98.4%	80.3%*
Breast	USA	90.2%	72.1%*
Stomach	South Korea	68.9%	17.1%*
Lung	Japan	32.9%	8.7%*
Colon	South Korea	71.8%	38%*

4.1.6. Relationship between GDP per capita and cancer

The relationship between health and the economy has been extensively studied. In most cases, higher levels of Gross Domestic Product (GDP) per capita and higher GDP per capita allocated to health are associated with better indicatorsof population health, such as average life expectancy at birth, infant mortality, under-5 mortality and maternal mortality ratio. In this section, we analyze the relationship between GDP and GDP per capita and outcomes related to the three main types of cancer in Colombia.

Expenditure and Breast Cancer

For breast cancer, 5-year net survival in each of the comparator countries range from 72.1% in Colombia to 85.6% in the UK. By comparison, the US has the highest 5-year net survival level for breast cancer in the world from 2010 to 2014 at 90.2% of all diagnosed cases. Plotting these levels of 5-year net survival against GDP per capita finds a positive correlation, with the trend stronger in figures for GDP per capita at Purchasing Power Parity (PPP). Figures 17 and 18 show this comparison for GDP per capita and GDP per capita, PPP for Argentina, Brazil, Chile, Colombia and the UK (Table 7).

Figure 17: GDP per Capita vs Breast Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

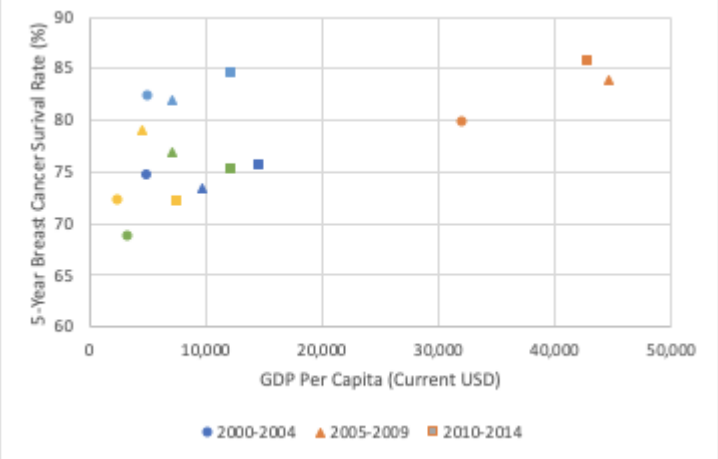
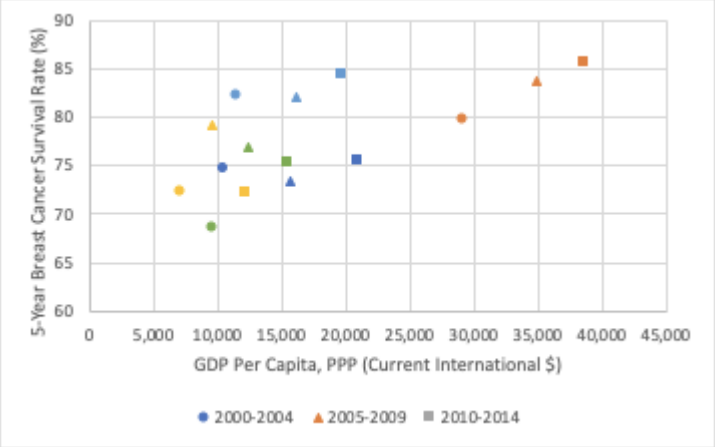


Figure 18: GDP per Capita, PPP vs Breast Cancer 5-Year Net Survival for Colombia and Selected Countries (99)



Health expenditure per capita shows a tighter positive correlation between variables, as seen in Figures 19 and 20.

Figure 19: Health Expenditure per Capita vs Breast Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

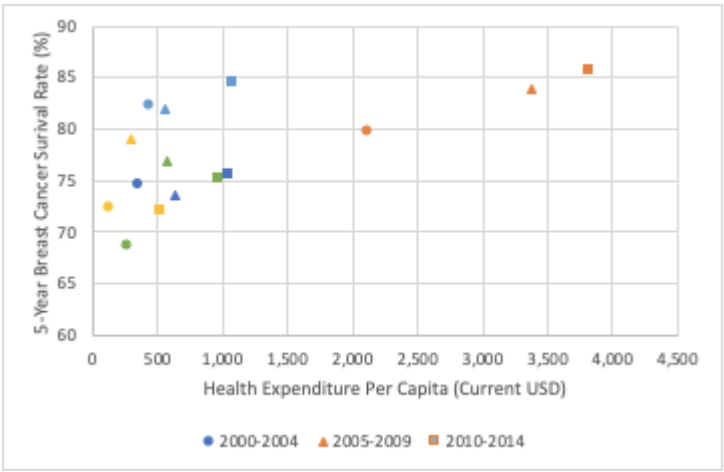
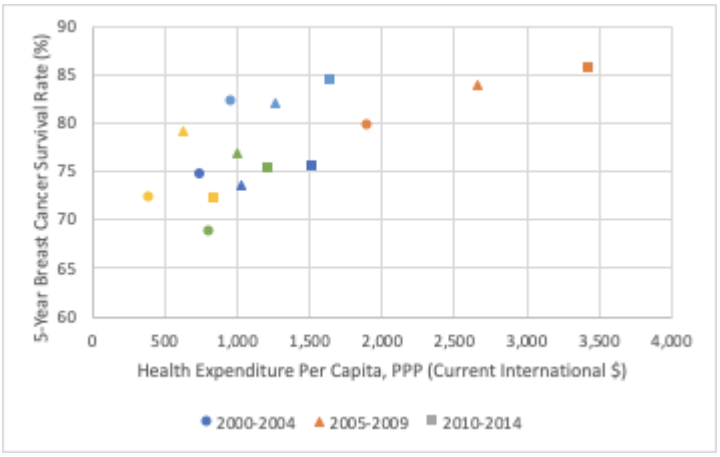


Figure 20: Health Expenditure per Capita, PPP vs Breast Cancer 5-Year Net Survival for Colombia and Selected Countries (99)



In general, the correlation is stronger for GDP per capita at PPP which allow for a more accurate comparison between countries than the nominal GDP per capita figures. This is evident through the R2 value, which is the percentage of the dependent variable variation and is in this case the 5-year net survival for breast cancer. In general, the higher the percentage, the better the linear model fits the data. Both PPP graphs have higher R2 values than their nominal counterparts, with a linear trendline explaining 60% of all variation for GDP per capita, PPP versus 48.6% for GDP per capita in the data points from 2010 to 2014. With health expenditure, the trendline explained more of the survival variation than GDP per capita in the same set and yet again, the PPP metric explained the variation more than its nominal metric. Health expenditure per capita, PPP, has its trendline explain 65.5% of the variation compared to the nominal figure trendline explaining 53.4% of the variation. Table 7 details the inputs used for the respective scatterplot analysis.

Table 7: Breast Cancer 5-Year Net Survival for Argentina, Brazil, Chile, Colombia and the United Kingdom (% of patients diagnosed)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	72.3	82.3	68.7	74.6	79.8
2005-2009	79.1	82	76.9	73.5	83.8
2010-2014	72.1	84.4	75.2	75.5	85.6

Health Expenditure and Colon Cancer

Five-year net survival for colon cancer is considerably lower than that for breast cancer, with South Korea having the highest survival level in the world in 2010-2014 at 71.8% of all diagnosed patients. Colombia, by comparison, has a five-year net survival of just 34.5% in the same time period. This figure for five-year net survival is below that achieved by other comparator countries, like Argentina (54.4%), Brazil (48.3%), Chile (43.9%), and the UK (60%). Like breast cancer, colon cancer survival is also positively correlated with both GDP per capita and health expenditure per capita.

Figure 21: GDP per Capita vs Colon Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

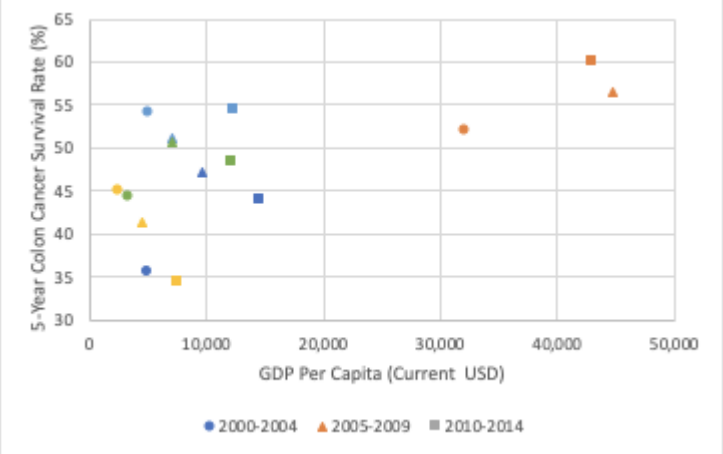


Figure 22: GDP per Capita, PPP vs Colon Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

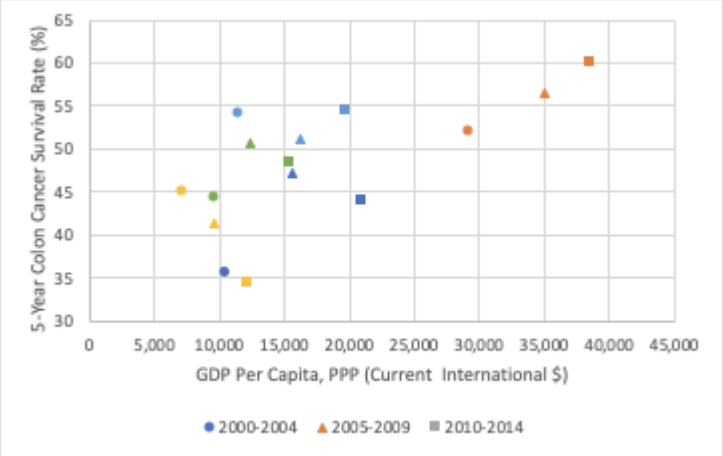


Figure 23: Health Expenditure per Capita vs Colon Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

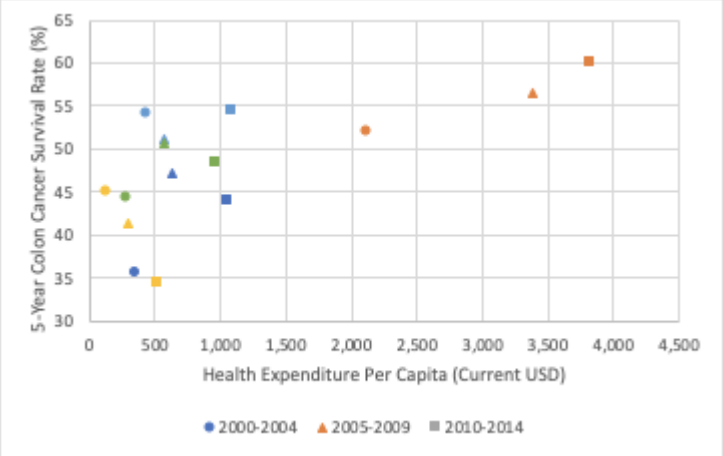


Figure 24: Health Expenditure per Capita, PPP vs Colon Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

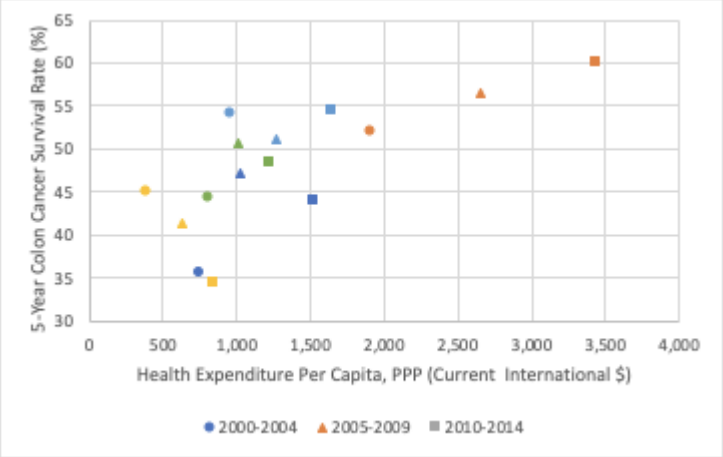


Table 8: Colon Cancer 5-Year Net Survival for Colombia and Selected Countries (% of patients diagnosed)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	45	54.2	44.5	35.5	52.0
2005-2009	41.3	51.2	50.6	47.1	56.5
2010-2014	34.5	54.4	48.3	43.9	60.0

Of particular note is the R2 value of the health expenditure per capita, PPP, where the trendline explains 69.1% of the variation in the 2010 to 2014 data set, the highest of any metric for colon cancer. This is followed by GDP per capita, PPP (R2 value of 63.4%), health expenditure per capita (59.7%), and GDP per capita (55.8%).

Expenditure and Lung Cancer

Five-year net survival for lung cancer is significantly lower than those of breast cancer and colon cancer, with the highest survival kevel in the world from 2010 to 2014 being 32.9% of diagnosed adults in Japan. The five-year net survival of 8.7% for Colombia during 2010 to 2014 is situated in the middle of levels achieved by comparator countries – Chile (4.6%) and Brazil (8.5%) lower than Colombia, and Argentina (13.1%) and the UK (13.3%) higher. Plotting these survival estimates against GDP per capita and health expenditure per capita, shows a much weaker positive correlation between financial metrics and lung cancer survival. Figures 25, 26, 27, 28, and Table 9 display these findings.

Figure 25: GDP per Capita vs Lung Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

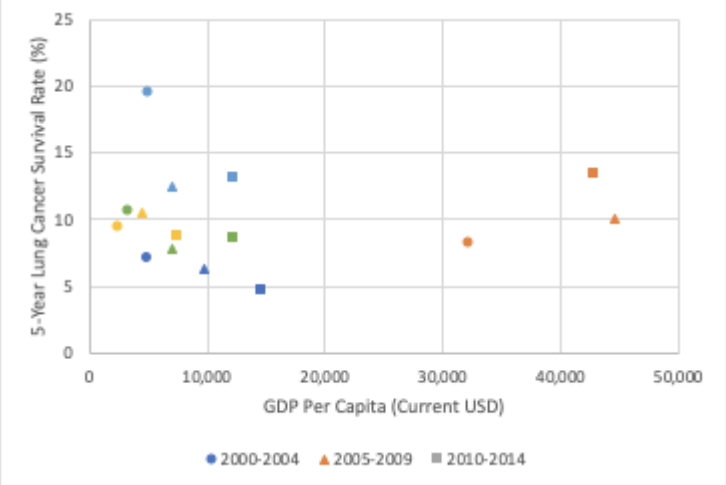


Figure 26: GDP per Capita, PPP vs Lung Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

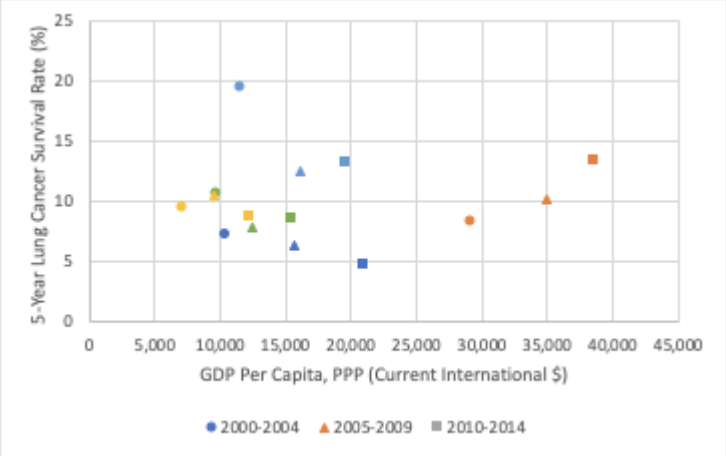


Figure 27: Health Expenditure per Capita vs Lung Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

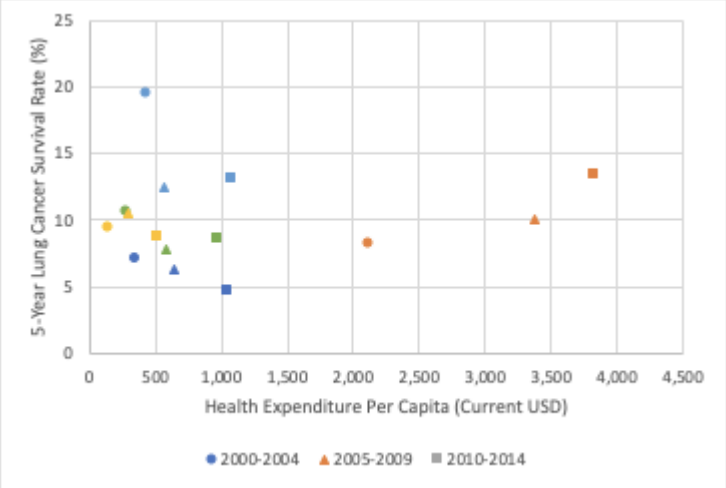


Figure 28: Health Expenditure per Capita, PPP vs Lung Cancer 5-Year Net Survival for Colombia and Selected Countries (99)

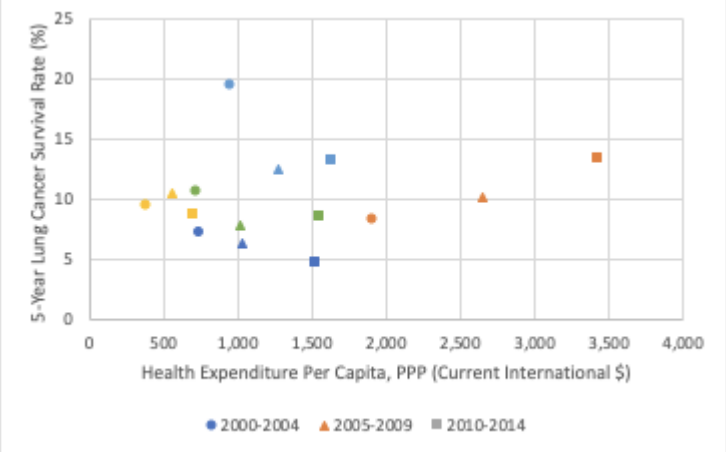


Table 9: Lung Cancer 5-Year Net Survival for Colombia and Selected Countries (% of patients diagnosed)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	9.4	19.5	10.7	7.1	8.3
2005-2009	10.5	12.4	7.8	6.3	10.1
2010-2014	8.7	13.1	8.5	4.6	13.3

The R2 values for the 2010 to 2014 trendlines are substantially lower across the board, suggesting weaker correlations and significant variation in lung cancer survival levels. None of the values are above 32%, with health expenditure per capita having the highest at an R2 of 31.6%. The R2 values continue to decline for health expenditure per capita, PPP (30.1%), GDP per capita (25.8%), and GDP per capita, PPP (24.9%).

4.1.7. Childhood Cancer in Colombia

A recent report in the Lancet Oncology modeled global incidence, diagnosis, and 5-year net survival levels for the 48 most common childhood cancers around the world. The model estimated that there will be 13.7 million new cases of cancer between 2020 and 2050 globally, 44.9% percent of which will remain undiagnosed (14).

Scaling up cost-effective interventions is projected to avert more than half of the 6.2 million deaths between 2020 to 2050, thereby producing a gain of 318 million life-years over the time period. The productivity gains from averting such needless deaths total a net benefit of $1.986 trillion on the global investment, equaling a net return of $3 for every $1 invested (14).

Tables 10 and 11 outline the projected number of cases for the 48 most common types of childhood cancer and the number of diagnosed cases in 2030 for Colombia and selected Latin American counterparts. The upper and lower bounds of the respective measurements indicate the 95% uncertainty interval for the projections. According to these figures, 70.9% of cases of childhood cancer are actually diagnosed in Colombia, a proportion on par with those of Brazil (70.3% of cases are diagnosed), Chile (68.9%), and Argentina (68.9%).

Table 10: Projected Number of Cases of Childhood Cancer in 2030 (Source: Harvard Dataverse (63))

Country	Mean Incidence in 2030	Incidence Upper Bound	Incidence Lower Bound
Colombia	2003	2690	1369
Argentina	2088	2760	1578
Brazil	7934	10472	5588
Chile	647	863	452

Table 11: Project Number of Diagnosed Cases of Childhood Cancer in 2030 (Source: Harvard Dataverse (63))

Country	Diagnosed Cases in 2030	Diagnosed Upper Bound	Diagnosed Lower Bound
Colombia	1420	1753	1102
Argentina	1438	1729	1160
Brazil	5578	6826	4361
Chile	446	551	337

Comparing 5-year net survival of childhood cancer to other Latin American countries, Colombia presents mixed results. For instance, Colombia has similar 5-year survival level in each of its top 10 childhood cancer types when compared to Brazil and Chile, but below Argentina. In some cases, Colombia performs better, as with Hodgkin Lymphoma (79.63% survival in Colombia compared to 71.40% in Brazil) and with Astrocytoma (49.91% survival in Colombia compared to 37.83% in Brazil) (63).

Table 12: Estimated 5-Year Net Survival for the Top 10 Childhood Cancer Types by Incidence in Colombia (Source: Harvard Dataverse (63))

Cancer Group	Cancer Type	5 Year Net Survival (% of diagnosis)			
		Colombia	Brazil	Chile	Argentina
Leukaemia	Lymphoid	74.54%	69.42%	74.54%	75.64%
Leukaemia	Acute Myeloid	58.42%	54.84%	57.13%	62.99%
Central Nervous System (CNS) Neoplasms	Astrocytoma	49.91%	37.83%	49.34%	70.68%
Lymphoma & Related	Non-Hodgkin except Burkitt	74.32%	69.79%	72.03%	80.40%
Lymphoma & Related	Hodgkin	79.63%	71.40%	76.69%	88.97%
Renal Tumors	Nephroblastoma	71.26%	61.18%	69.30%	81.62%
CNS Neoplasms	CNS Embryonal	41.51%	28.79%	40.96%	56.93%
Neuroblastoma	Ganglioneuroblastoma	64.70%	55.98%	63.04%	73.87%
Retinoblastoma	Retinoblastoma	71.05%	60.80%	72.34%	83.82%
Bone Tumors	Osteosarcoma	55.02%	49.86%	53.54%	62.15%

4.2. Political, Legal and Regulatory Environment

Although the first policies began in the last century, it is in the last ten years that successive governments in Colombia have placed a greater emphasis on the creation and implementation of policies related to cancer. Laws related to cancer in Colombia have particularly focused on the control of risk factors (tobacco, HPV), and early detection (such as in the case of breast cancer). The National Cancer Control Plan (Plan Nacional para el Control de Cáncer), legislated in 2013, provided a guiding document of the Cancer policies in the country for the next years. Table 13 provides a timeline for key cancer policies and laws in Colombia for the period 1975-2020.

Table 13: Timeline of Key Cancer Policies in Colombia (15)

Year	Legislation	Objective
1975	National Cancer Plan	Creation of cancer units in third level general hospitals, under the coordination of the National Cancer Institute
1980	National Program for the detection and early diagnosis of Cervical Cancer and National Program for the control of Smoking	Measures for the screening of cervical cancer in the national territory and control of tobacco consumption
1984	National Council on Cigarette and Health (Conalci)	Policies for tobacco control and actions for the prevention of cigarette smoking
1993	Law 100	Creation of the Integral Social Security System
1995-2001	Law 55, 68	Health protection through actions aimed at the control, consumption, and sale of cigarettes, tobacco, and its derivatives
2000	Resolution 412	Activities, procedures, and interventions for the protection, early detection, and care of diseases of public health concern – including cervical and breast cancer.
2006	Cancer control model	First attempt to position cancer as a public health problem. Evaluation of the health system, provision of oncological services, epidemiological situation, from a perspective of social determinants.
2009	Resolution 3974	Make determinations regarding the high cost account for diseases such as Cancer
	Law 1335	

Year	Legislation	Objective
Anti-tobacco law	It seeks to contribute to guaranteeing the health rights of the inhabitants of the national territory, especially those under the age of 18 and the non-smoking population.	
2010	Law 1384	
Law Sandra Ceballos	Establishes actions for the comprehensive cancer care, through the guarantee by the States and the actors that intervene in the General System of Social Security in Health	
	Law 1388	
Right to life of children with cancer in Colombia	Guarantee of the social security actors in health, of all the services they require for the early detection and comprehensive treatment of cancer, the application of standardized protocols and care guidelines	
2012	Resolution 163	Regulates the operation of the National Council of Advisers of the Departmental Council on Childhood Cancer
	Resolution 4496	It tries to promote the scope and comprehensiveness of the Integral Information System of Social Protection.
	Resolution 4005	Registration of protection activities, early detection and application of comprehensive care guidelines for diseases of interest in public health of mandatory compliance
	Resolution 2590	Creates the Integrated Network System and the National Information System for the monitoring, follow-up and control of cancer care in children under 18 years of age
	Resolution 4496	Creates the National Cancer Information System and the National Cancer Observatory
2013	Resolution 1383	
National Plan for Cancer Control	Its purpose is to place cancer on the public agenda as a public health problem and to mobilize state action, intersectoral action, corporate social responsibility, and individual co-responsibility for cancer control.	

Year	Legislation	Objective
	Law 1626	Guarantees free and compulsory vaccination for the Colombian population to control cervical cancer.
	Resolution 1419	It establishes the parameters and conditions for the organization and comprehensive management of the networks for the provision of oncology services and the functional units for the comprehensive cancer care
	Resolution 1440	It establishes the conditions of the passing homes as a social support service for children under 18 with a presumptive diagnosis or a confirmed diagnosis of cancer.
	Resolution 1442	Adopts the Clinical Practice Guidelines for the management of leukemias and lymphomas in children and adolescents, breast, colon. rectal and prostate cancer.
2014	Norm 000004	Instructions regarding the provision of health services in people with suspected and diagnosed cancer
	Resolution 247	Report by the companies administering benefit plans for the registration of cancer patients for the country to the high cost account
	Resolution 0418	Care route for boys and girls with suspected or diagnosed leukemia
	Law 1733	
Law Consuelo Devis Saavedra	Regulates palliative care services for the comprehensive management of patients with terminal, chronic, degenerative and irreversible diseases at any stage	
2015	Resolution 1868	Establishes the criteria for the creation of the Virtual Network of Childhood Cancer Care Units
	Law 1751	It guarantees the fundamental right to health, regulate it and establish its protection mechanisms

Year	Legislation	Objective
	Cancer Patient Care Model	Proposal prepared by the National Cancer Institute that aims to serve as a foundation for the organization of oncology services in the health system network
2016	Resolution 1477	Defines standards, criteria and procedures for comprehensive rehabilitation care units for adult and childhood services.
	Resolution 1441	Establishes the standards, criteria and procedures for the implementation of comprehensive networks of health service providers, including the provision of oncological services.
	Resolution 2003	Upgrade of Resolution 1441.
	Resolution 429	Adopts the Comprehensive Health Care Policy and guides the objectives of the health system to guarantee the population's right to health.
	Comprehensive routes of health care for the population at risk or with the presence of cancer	Guarantees comprehensive health care for individuals, families, and communities, based on holistic health assessment interventions in cervical cancer, breast and pediatric leukemias and lymphomas.
2019	Resolution 3100	Establishes the new standards, criteria and procedures for the implementation of comprehensive networks of health service providers, including the provision of oncological services. Upgrade of Resolution 2003 of 2016.
2020	Law 2026	Ley Jacobo, for right to life of children with cancer in Colombia. Update of Law 1388 of 2010. It establishes, among others, mechanisms to promote comprehensive care in providers, such as direct transfer of resources without the intermediation of health insurers.

4.2.1. Colombia's National Cancer Control Plan

The main goals of the National Cancer Control Plan (also referred to as the National 10-year Plan for Cancer Control, Plan Decenal Para el Control del Cáncer [PDCCC]) (16) are to:

1. Reduce the prevalence of modifiable risk factors for cancer,
2. Reduce preventable cancer deaths by improving early detection and quality of care,
3. Improve the quality of life of cancer patients and survivors,
4. Guarantee the generation, availability, and use of knowledge and information for decision-making, and
5. Strengthen the management of skills and capacity of human resources for cancer control.

The National Cancer Plan bases its principles on a series of national and international standards that support and give a normative framework to its recommendations and policies.

Table 14: Regulatory Framework of the National Cancer Plan 2012 – 2021 (16)

International	National
International Labor Organization World Health Organization Pan American Health Organization Multilateral agreements concerning Cancer risk factors	Political Constitution 1991 Law 30-1986 National Narcotic Statute Law 100-1993 General System of Social Security in Health (SGSSS) Law 52-1993 Construction safety Law 375-1995 Youth Law Law 430-1998 Hazardous waste Law 715-2001 Organization and provision education and health services Law 1109-2006 Tobacco control Law 1122-2007 Reform SGSSS Law 1196-2008 Organic pollutants Law 1335-2009 Protection of non-smokers Law 1355-2009 Obesity and Chronic, non-communicable disease Law 1384-2010 Comprehensive cancer care Law 1388-2010 Right to life for children with cancer Law 1438-2011 SGSSS Reform

The National Program for the Control of Cancer (PNCC) has six strategies, each with corresponding activities and verifiable goals that are aimed at achieving the five main objectives of the plan:

- Risk control (Primary prevention)
  - Control of the risk of consumption and exposure to products of

  - Tobacco and related products.
  - Control of excessive and harmful alcohol consumption
  - Promotion of fruit and vegetable consumption and healthy foods
  - Promotion of physical activity
  - Risk control against occupational carcinogens
  - Risk control against exposure to solar Ultra Violet radiation
  - Specific protection to cancer-related viruses
- Early detection of disease
  - Cervical cancer
  - Breast cancer
  - Prostate cancer
  - Colorectal cancer
  - Childhood Cancer (Pediatric Acute Leukemias)
- Care, recovery and overcoming the damage caused by cancer
  - Rehabilitation of cancer services
  - Organization of the supply and demand for cancer services
  - Quality control in the provision of oncological services
- Improving the quality of life of cancer patients and survivors
  - Expand quantity and quality of types interventions of palliative care for cancer patients and cancer survivors.
- Knowledge management and technology for cancer control
  - National Cancer Information System and Cancer Observatory
  - Expanding Colombia's role in promoting and completing cancer research.
- Training and development of human talent.
  - Basic and continuous training of human talent in oncology.
  - Well-being and development of human talent in oncology.

Financing plan with SGSSS

According to the Ten-Year Plan for Cancer Control in Colombia for the period 2012-2021, the General System of Social Security in Health (SGSSS) has the following sources that contribute to resourcing of the Plan (16):

1. Capitation payment under both the contributory and subsidized regime: These resources cover the expenses corresponding to the provision of services contained in the scheme's benefit plans contributory and subsidized. Per capita resources for promotion and prevention of the contributory regime are intended to finance actions (promotion and prevention) of those affiliated to contributory scheme.
2. Resources from the General Participation System: Supply resources for the comprehensive care of the poor uninsured population. Public health resources for financing of the National Public Health Plan and Collective Intervention Plan at the territorial level.

3. Resources of the General Budget of the Nation: Intended for promotion, prevention, and research.
4. Own resources of territorial entities: Intended for promotion, prevention, and provision projects of health services.
5. Promotion and prevention resources for Insurers of Occupational Risks (ARL): Financing of actions to promote and prevent occupational cancer.
6. Resources by Law 643 of 2001, which establishes healthcare taxes imposed on gambling and lottery revenues: The resources are obtained by exploiting the monopoly of gambling games and chance other than the ballot and lottery, should be distributed to health in a 80% proportion to meet supply and demand in the provision of health services in each territorial entity and 7% for the Health Research Fund.

5. Health System Analysis

The purpose of this section is to identify areas for improvement for the Colombian health system in relation to cancer. To do so, we present analysis of data from two sources: a qualitative online survey conducted with stakeholders and from four virtual roundtable workshops with stakeholders in Colombia.

In both the survey and workshops stakeholders were asked to identify the major challenges related to cancer in the Colombian health system, and to suggest policy options to address the challenges identified. This section will first report the challenges identified in both the survey and workshop, and then present the policy options that were suggested to help the Colombian health system overcome these challenges.

5.1. Health System Challenges related to Cancer

A total of 38 stakeholders responded to the online survey. Survey respondents were from various backgrounds, including academia (29%), private sector (21%), civil society (19%), public sector or government (15%), healthcare provider or other healthcare employee (13%), and other not specified (3%).

Respondents ranked challenges in the Organization and Governance category as the top priority of the Colombian health system that needed addressing in relation to cancer, followed by challenges in relation to Resource Management, Service Delivery, and Financing (Table 15).

Table 15: Challenges for the Colombian health system in relation to cancer organized by category and priority rank identified in stakeholder survey.

Rank within Category	Top Priority Category	Second Priority Category	Third Priority Category	Fourth Priority Category
	Organization and Governance	**Resource Management**	**Service Delivery**	**Financing**
1	Poor planning and coordination of policies	Need for regulation, surveillance, and monitoring	Lack of access	Lack of financial resources

Rank within Category	Top Priority Category	Second Priority Category	Third Priority Category	Fourth Priority Category
2	Weak regulation	Poor coordination and planning	Poor coordination, management, and planning	Unaffordability of cancer care
3	Lack of accessibility	Lack of transparency	Need for comprehensive cancer care	Need to reform payment systems
4	Lack of centralized leadership	Need to reform insurance system	Low-quality of provided services	Poor budget coordination and management
5	Lack of focus on comprehensive care	Need for standard guidelines for cancer care and quality	Lack of resources	High costs for health services
6	Lack of surveillance, monitoring, and evaluation	Inefficiency	Lack of regulation and monitoring	Low-quality of provided services
7	Lack of stakeholder participation	Lack of resources	High costs	Lack of focus on preventive care
8	Lack of evidence to inform policy	Lack of patient focus	Lack of stakeholder engagement	Lack of regulation around health financing

These challenges identified in the online survey are similar to the ones that emerged from the discussions at the virtual stakeholder workshops (Table 16). The roundtable format of stakeholder workshops allowed the participants to discuss more comprehensively the specific details of each challenge. Common challenges identified both in the survey and at the workshop were: fragmentation, improper and inefficient enforcement of established laws, regulations and policies, as well as issues relating to accessibility, transparency and divergent outcomes between public and private sectors.

Table 16: Challenges for the Colombian health system in relation to cancer organized by health system area, as identified at the virtual roundtable workshops involving key stakeholders

Opportunity Area	Challenge Category	Specific Challenges
Organization and Governance	Fragmentation	• Inconsistent care process and poor integration of actors in health system: 80% of health services are provided in private sector – Private sector has disproportionate influence in health sector, and different standards of care to that in the public sector

Opportunity Area	Challenge Category	Specific Challenges
		• Inconsistent outcomes and pervasive inequality in service delivery and access based on geography • Inadequate vertical integration between primary and secondary levels (Health Promotion Agency (EPS) and IPS) • 10-year national cancer plan aligned with different actors in different sectors; decentralization of decision making across regions
	Inconsistent enforcement of regulations	• Extensive set of regulations that are difficult to implement effectively • Poor enforcement of existing regulations • Delayed diagnostic times; problems with health system administration creates delays • Insurance authorization for care takes too long • Health system currently lacks the tools to properly enforce the existing laws and regulations which are not being followed
	Lack of transparency	• State is not sufficiently attentive to its primary role as the regulator of the health system • Lack of understandable and readily available information and data for patients • Chasm between legislators and actors/stakeholders; corruption, mismanagement, private interests of decision-makers – Stakeholders and relevant actors are not involved in crafting legislation and regulation
	Equity	• Divergent health outcomes between public and private sectors, with poorer outcomes in the public sector • Different levels of access to health services based on region and socioeconomic status • Specialization of healthcare services for cancer more available in urban centers and less available in rural areas • Weak mechanisms to ensure effective inclusion of stakeholders in decision-making process when developing regulations that govern health system regulation
Resource Management	Fragmentation	• Gaps and differences in the availability of resources between public and private sectors of health system • Concerns on the role of universities in terms of research and participation in health system • Lack of integrated information systems; differences in how information and data are processed/shared • Specific challenges for collecting and accessing data for children with cancer; multiple actors are involved with different requirements
	Poor planning	• Lacking long-term strategy, insufficient focus on sustainability • The health system does not adequately prioritize issues that need attention or address them based on level of need and urgency • Inefficient use of health system assets and resources

Opportunity Area	Challenge Category	Specific Challenges
	Lack of capacity and resources	• Poor quality control despite regulations • Need to adjust protocols and guidelines for medical staff to provide some professional autonomy in decisions related to patient care • High costs; depending on type of cancer, diagnostics can be incredibly expensive and this can hinder effectiveness of treatment as appropriate diagnostics are not used • Not enough international cooperation, exacerbating shortages of resources across the health system • Lack of specialists, and insufficient staffing in rural and low-income settings • High costs, which are consistent barriers to adequate treatment and care
	Limited effectiveness of legislative framework	• Lack of enforcement mechanisms for implementation of care guidelines allow administrative delays that adversely affect patient outcomes • Insurance authorizations are regularly delayed despite regulations, which harm/threaten effectiveness of early treatment protocols • Pervasive culture of norms over regulations, reducing effectiveness • Many existing laws and regulations deal with access, but do not properly address financing barriers that hinder access to care
Service Delivery	Corruption and fraud	• Financial issues become actual health issues • Suppression of data, and publication of misleading/inaccurate data • Private interests are included when crafting legislation; disproportionate power dynamics affect costs, coverage, and care
	Inefficiencies	• Poor availability of diagnostics, leading to long wait times for diagnostic tests • Insurers delay care and do not authorize funding for provision of care in time • Low-quality standards of the healthcare services provided • Funding and resource allocation do not reflect priorities • Quality control issues in relation to the contracts of doctors
	Equity	• Consistent geographic and socio-economic barriers to access • Lack of human resources and specialized services in rural areas despite recent improvements
	Fragmentation	• Fractured health system of public and private sectors; 80% of health services are provided by the private sector • Networks aren't properly integrated, especially between primary and secondary levels of care
	Lack of focus on prevention	• Lack of national health service coverage and screening hampers early detection of cancer – and early symptoms can be missed

Opportunity Area	Challenge Category	Specific Challenges
		• Policies and funding do not prioritize health promotion, disease prevention and primary care • Shortage of screening services exacerbated by COVID-19
Financial	Inconsistent enforcement of regulations	• Need to better clarify and refine the financial ceilings for cost coverage for Maximum Recovery Budgets (PMR) (*presupuestos máximos de recobro*) for rare diseases • Need to address tax avoidance and evasion which reduces income from a major revenue source for the government and the social insurance system • Instances of perceived conflicts of interest in crafting and/or enforcing regulations
	Poor use of resources	• Certain more expensive services are overused while lower-cost and more cost-effective preventive services are not provided adequately • Public should be incentivized for behaviors that lead to less waste in the health system; e.g. keeping appointment times to reduce administrative waste • Clearer communication regarding individual and collective responsibility to stress that overuse of services by some takes away resources from others • Planning and priority setting should emphasise more cost-effective strategies - more services are not always better
	Low investment in prevention	• More resources should be allocated to prevention, early detection, and early screening of cancer so that people do not present late in emergency rooms/clinics to seek treatment: care for cases where there is a delay in diagnosis and care is more costly and less effective • Regional balance of needs and expenditures are not uniform • Incentives are misaligned and result in suboptimal care

5.2. Suggested Policy Options to Address The Challenges Identified

In the online survey, the respondents provided policy options to address their identified health system challenges in each of the four health system areas. The proposed policy options are summarised in Table 17 and presented in the order in which the respondents ranked them in importance for addressing the respective challenges identified for each health system area, namely (1) Resource Management, (2) Organization and Governance, (3) Service Delivery, and (4) Financing.

Table 17: Policy opportunities for the Colombian health system in relation to cancer identified in the survey, organized by health system area.

Policy Option	Specific Policy Actions
Top Priority Policy Area: Resource Management	
1. Enact anti-corruption legislation to improve transparency of decisions and to eliminate improper practices.	• Decentralize control of resources to regional health authorities. – Eliminate intermediaries when managing resources for cancer care. – Allocate resources directly to provincial government health entities. • Strengthen mechanisms for improved surveillance, oversight (including by civil society and NGOs), and control of corruption by entities that control resources. – Institute greater punitive measures for corruption offenses in health. – Work jointly with the prosecutor's office, the attorney general, and the comptroller to encourage continuity in oversight. • Enact a Territorial Transparency Policy that requires transparency in financing, planning of activities, and management.
2. Use population-level data to estimate the cost of the disease and determine resource allocation policies.	• Systematically collect data to create a national evidence base to monitor and evaluate the performance of cancer programs, and to assess which populations and territories have higher cancer risks. • Analyze the impact of costs and quality of cancer services on cancer outcomes. • Disincentivize application of practices and interventions that are shown to not improve health outcomes. • Disincentivize activities that do not adhere to standardized resource allocation guidelines. • Collect data to assess and evaluate the costs of each Healthcare Providers Institution (Instituciones Prestadoras de Salud; IPS).
3. Re-structure existing resource allocation systems to enable continuity in cancer care.	• Designate an institution to coordinate a comprehensive model for the care of all cancers in the country. • Develop mandatory standardized guidelines for cancer care with expert group and enforce adherence to guidelines by all actors. – Establish a research group comprising cancer specialists, surgeons, pathologists and general practitioners in guideline development. • Convert entirely to electronic fee collection and payment systems. • Transfer resources directly from the government to the IPS (not only the EPS) that are able to meet the standards defined by Law for the provision of healthcare services and do not allow provision of care in healthcare institutions that do not meet the standards defined by law. • Identify and eliminate unnecessary bureaucratic steps and vestigial structures that hinder timely access to cancer services.
Secord Priority Policy Area: Organization and Governance	
1. Enact public policies for cancer care that are centralized and coordinated among different regions health authorities.	• Create comprehensive care centers in each department (region) of the country and centralize health service providers in each region. • Incentivize improvements in the provision of specialized cancer services, including implementing programs for training human talent for oncology.

Policy Option	Specific Policy Actions
	• Establish a system to unify complaints at the national level to show performance level by region and IPS, identify complaints on actions that adversely impact on patient health to take, and put in place mechanisms to take corrective measures effectively and quickly. • Implement a program with an emphasis on primary and secondary prevention, including selective screening in high-risk population. • Ensure cancer policies adopt a multisectoral approach and identify direct and clear responsibilities of other institutions beyond those in the health sector.
2. Enact a national cancer law with monitoring and accountability mechanisms to enforce policies.	• Define comprehensive cancer management to include diagnosis, treatment, and palliative care, with an emphasis on efficient, and effective services. – Clarify and enforce care standards for IPS. • Define entities responsible for monitoring compliance with health laws and ensure each actor in the sector fulfills their responsibilities. – Enforce economic and moral accountability mechanisms for actors who do not comply with cancer laws. • Improve cancer prevention and promotion to address inequalities in care. • Optimize the referral and counter-referral mechanisms to ensure timely and accessible follow-up of care by insurers and providers. • Within the existing comprehensive care policy, define EPS contracting for patient care in authorized cancer centers to appropriately meet demand and to improve continuity of cafe by a single entity. • Include in a new national cancer law, regulations on the responsibility of the state to identify and address social determinants in health. • Enact policies that discourage unregulated consumption or exploitation of environmental resources or practices that increase the population's exposure to environmental risk factors.
3. Finance and implement a national cancer registry.	• Create a national population registry to centralized cancer data and the management of these data to quantify the burden of cancer in the country. • Create systems that enable joint analysis of the cancer data in registries by registry staff and researchers working in academic institutions. • Strengthen regulatory agencies, such as the health superintendence, by creating guidelines and training officials on the processes of care for cases of suspected and diagnosed cancer. • Make cancer data reporting mandatory.
4. Implement policies to engage stakeholders and involve the public in decision-making around cancer.	• Ensure participatory, broad public policy with mechanisms of transparency and control for citizens. • Involve communities, civil society, and other stakeholders when developing cancer control policies. • Strengthen the legislative framework to ensure greater participation of civil society and patient organizations in policy design.
Third Priority Policy Area: Service Delivery	
1. Create a central institution to monitor and manage cancer care in the country.	• Centralize cancer services and providers under an entity whose sole purpose is to manage the country's response to cancer.

Policy Option	Specific Policy Actions
	• Develop accountability and enforcement mechanisms to ensure all actors comply with laws and regulations related to cancer. • Ensure regular audit of insurers and healthcare service providers to evaluate the quality of cancer services and incentivize provision of high-quality services. • Strengthen civil society organizations focused on cancer to improve capabilities for monitoring the quality of cancer services and outcomes. • Establish public-private integrated networks that are defined territorially to guarantee provision of integrated cancer services independent of insurer.
2. Establish comprehensive and integrated service delivery processes focused on quality assurance in cancer prevention, diagnosis, and treatment.	• Create incentives for healthcare provider institutions that provide high-quality services and achieve high patient satisfaction. – Require EPS to contract with only high-quality care institutions. • Implement special care pathways to achieve rapid patient referral and reduce fragmentation of care management across the care continuum. – Use care pathways to encourage immediate referral of new cancer cases to large centers with sufficient psychosocial support for patients and family.
3. Re-structure the cancer service delivery system to strengthen regional health authorities.	• Conduct analysis of cancer care at regional level to identify ways of improving access to diagnostic, preventive and therapeutic services. • Update payment rates for health services and establish an annual review process for the rates. – Restrict the EPS board of directors from being paid by the Capitation Payment Unit (UPC). • Promote the development of integrated cancer centres that can provide comprehensive cancer care. • Allow timely adoption of new cost-effective technologies and innovations.
4. Improve provider training around cancer care and service delivery with a multisectoral approach.	• Require academic training and continuing education for primary care providers on cancer prevention, diagnosis and treatment through a joint effort between the Ministry of Health, Ministry of Education, and Colombian Association of Schools of Medicine (ASCOFAME). – Increase training and certification of specialists for cancer treatment. – Improve training in cancer care in undergraduate courses for general physicians and nurses. – Integrate training in palliative care into continuous professional development of all physicians involved in the care of cancer patients. • Create guidelines and training for national and regional government officials on the cancer burden and strategies for managing cancer.
Fourth Priority Policy Area: Financing	
1. Implement policies to gradually increase the national budget allocated for cancer.	• Modify government budget allocation to increase resources for cancer care, for example spending less on the military and more on education and health. • Evaluate the national budget with the goal of supporting transparent allocation and management of resources. • Provide more resources to non-governmental organizations and advocacy organizations working in cancer care. • Unify financing between public and private sectors to lessen fragmentation.

Policy Option	Specific Policy Actions
2. Increase funding to make innovative cancer technologies, medicines, and treatments accessible to all patients in need.	– Increase tax contributions from large companies and corporations and allocate them towards the state. Create a special fund for high cost cancer treatments to Improve access to medicines in vulnerable populations. • Encourage the use of latest generation of cost-effective health technologies and medicines and their incorporation in health benefits plans. • Accelerate cost-effectiveness assessment of new health technologies and medicines by assigned government agencies. – Involve expert scientific societies in the economic evaluation of new health technologies and medicines. • Adjust the amount of the UPC for Enhanced Primary Care (EPC) that takes into account the higher disease burden for cancer. • Increase funding for remote access via telemedicine and tele-education in health.
3. Institute regulations for inspection, surveillance and control mechanisms for national and regional health budgets.	• Improve monitoring of quality of the services provided by private providers. • Review and improve policies for priority setting and resource allocation. • Establish a Territorial Transparency Policy that requires transparency in financing, planning of activities, and management. • Establish price controls for all cancer drugs. • Ensure cost of the treatments approved for patients can be met. – Prohibit insurers and providers from denying patients service because of cost and ability to pay.
4. Create economic policies that support comprehensive cancer management starting at prevention and early detection.	• Increase allocation of funding to health promotion, prevention, and early detection activities to balance that for treatment. • Create common guidelines for all territorial health plans to implement minimum care and treatment standards with tangible quality indicators. • Fund prevention and early detection activities for high-risk populations.

As with the challenges identified, the moderated roundtable discussions enabled the participants to discuss more comprehensively and deeply specific details of each policy option (Table 18).

Table 18: Policy opportunities for the Colombian health system in relation to cancer organized by health system area as identified at the stakeholder meeting.

Opportunity Area	Policy Category	Specific Policy Options
Resource Management	Restructure existing resource allocation mechanisms to prioritize and incentivize long-term sustainability, improved efficiency and integration.	• Prioritize specific indicators and develop strategies to achieve targets and objectives articulated in the Plan Decanal. • Establish accountability mechanisms for achieving targets in the national health plan. • Anticipate needs and develop a long-term strategy to plan for not just what is needed now but also in the future.

Opportunity Area	Policy Category	Specific Policy Options
		• Identify and address institutional inefficiencies as well as unnecessary diagnostics and procedures, and publicly publish the data on inefficiencies. • Build trust, improve communication and enable more collaborative and collective action between agencies, actors, sectors, and decision-makers in terms of cancer care. • Focus on the holistic care of Colombia's citizens, not just individual treatment plans.
	Close equity gap through existing regulatory and legislative framework.	• Develop national health plan with guidelines that include prevention and promotion, medication policy, and cost-effective treatments based on scientific evidence. • Ensure equitable distribution of resources across regions. • Update education and training to improve understanding of social determinants of health, epidemiological and social benefits of prevention and promotion. • Expand primary care. • Include risk management in training programs for oncologists and residents so that issues can be managed more efficiently and effectively.
	Align enforcement mechanisms, implement regulatory review process to prevent improper practices.	• Build trust among health professionals, cooperation, and collaboration to improve adherence to existing policies and reduce frequency of errors in care delivery. • Foster greater coordination between actors, sectors, and provincial jurisdictions, to ensure protocols are agreed upon by all actors prior to enacting legislation. • Develop a regulatory review process for existing laws. • Develop and implement guidelines for implementation of specific interventions in accordance with regulations
Organizational	Centralize and coordinate plans among regional health authorities.	• Use a multisectoral approach to foster policies that ensure collaboration between public and private sectors. • Prioritize implementation of national policies at subnational levels according to local needs of each department. • Ensure regular review of how services are integrated across primary and secondary levels in order to minimize inefficiency, waste and ineffective care. • Establish coordination systems for actors, decision-makers, and stakeholders in different sectors. • Ensure universities and research entities are represented when designing national cancer control policies.
	Strengthen existing policies and improve incentive structures for implementation of policies.	• Create a commission to review effectiveness of existing regulations. • Reduce inefficiencies in service delivery in different sectors by holding regular meetings to streamline care.

Opportunity Area	Policy Category	Specific Policy Options
		• Address incentive structures with regards to resource allocation, administration, and service provision.
	Improve data transparency by involving public in review and decision-making process.	• Enable Superentendencía de Salud to review handling of information, data, and complaints, and require data to be published. • Standardize information systems to ensure consistency in quality of data, improved decision-making process and better outcomes. • Define/strengthen entity responsible for data collection.
Service Delivery	Create integrated service delivery processes that improves collaboration.	• Simplify existing regulations regarding public and private sector collaboration. • Incentivize inter-sectoral flexibility by improving access to effective diagnostics and treatments across public and private sectors. • Establish stronger alliances within the health system and reduce restrictions that impede collaboration between public and private sectors.
	Focus on prevention.	• Prioritize implementation of cost-effective prevention, promotion, early detection and early screening interventions. • Shift focus to primary care, by increasing Ministry of Health and Social Protection of Colombia (MINSALUD) funding for Primary Healthcare (PHC) infrastructure and human resources. • Develop policies that are outcomes-based across public and private sectors.
	Incentivize innovation.	• Incentivize approval and use of treatment breakthroughs. • Incentivize competition on quality of care rather than price. • Ensure actors in various sectors share information to improve early detection and enhance treatment plans.
	Enhance training and education with a multisectoral and multidisciplinary approach.	• Improve health provider training to improve their capacity in patient-centered communication, prevention and promotion, and management of social determinants of health. • Increase the number of health professionals with better training, to specifically address disparities between regions.
	Expand telehealth to address inequities.	• Increase investment in broadband/internet infrastructure to expand telehealth to close care gaps due to COVID-19, and to ensure follow-up for cancer treatment and care.
Financial	Modify incentive structure, gradually increase allocation for cancer care, prevention & promotion.	• Create financial incentives to expand prevention, early detection, screening and early-stage treatment. • Modify payment mechanisms with suitable indicators; establish pay-for-outcomes instead of pay-for-service.

Opportunity Area	Policy Category	Specific Policy Options
		• Integrate financing mechanisms to include bundling of diagnostics, treatment, recovery, and palliative care.
	Expand transparency guidelines by instituting regulations for inspection and reporting mechanisms.	• Improve accountability and reporting mechanisms; publicly publish data on performance of providers and report how the funds in health system are used.
	Address inefficiencies in the use of the health budget and increase national health budget.	• Reduce delays between providers and insurers to prevent treatment delays that increase costs, morbidity and mortality. • Require health plans to justify financial allocations. • Increase taxes on tobacco, alcohol, and beverages/foods that are harmful to health.

6. COVID-19 Pandemic and its Implications for Cancer in Colombia

Since March 6, 2020, when the first case of COVID-19 (novel coronavirus disease) was diagnosed in Colombia, the country has been fighting to contain the spread of the SARS-CoV-2 virus. Not long after, on March 12, the Colombian Ministry of Health acted to isolate travelers arriving in Colombia from countries with high levels of COVID-19 infections. By March 22, 2020, the government had instituted a mandatory quarantine across the country (88).

Despite relative early success in containing the spread of COVID-19, the country experienced exponential growth in new cases starting in June 2020, when there were almost 60,000 confirmed cases and 2,000 deaths, and a 7-day average of about 1,000 cases per day. By August this number rose to 500,000 confirmed cases and 14,000 deaths, with a 7-day average of approximately 13,000 cases per day. The government extended mandatory quarantine at least until the end of August 2020, keeping schools and universities closed and restricting domestic and international travel (96). In September 2020 President Iván Duque announced the extension of selective isolation zones until at least the end of October (89). As of October 2020, Colombia had the eighth highest confirmed number of cases in the world with more than 1,000,000 reported cases and an excess of 30,000 reported deaths.

Quarantine measures have had significant social and economic consequences for Colombia. The frequency of domestic violence cases, particularly violence against women, have increased significantly since the beginning of quarantine (95). Penitentiary institutions have been disproportionately affected and all too often unable to contain the spread of the virus (91).

The national lockdown, while helping to stop the spread of SARS-CoV-2, has interrupted economic activity, leading many businesses to close. Many Colombians do not work in sectors that allow working remotely from home and thus lost wages during lockdown (92,93). As a result, the unemployment rate has hit almost 24% in

some urban centers. Due to the adverse effects of policies aimed at containing the pandemic on economic activity and the already declining oil prices, by November 2020, the Colombian government raised fiscal deficit targets to 8.9% of GDP, up from a previous estimate of 5.5% (97). The second trimester of 2020 was the worst level of economic contraction since the statistics on economic activity began in Colombia more than 100 years ago. During the first year of the pandemic the country's GDP fell 15.7% compared to the same period in 2019. The economic sectors that were hit the hardest included wholesale and retail trade, motor vehicle repairs, transportation and storage, accommodation and food service, manufacturing industries, and production.

The measures the Colombian government put in place to contain the virus were initially successful, though at times controversial. Bogotá issued ordinances to limit the amount of people out on the streets at any one time by instituting a gender-based virus-prevention measure; women can leave home on even-numbered days and men on odd-numbered days (90). Additionally, the country's urban hubs instituted a policy called "*pico y cédula*" restricting access to certain sectors by the last number of individuals' national ID. This policy was rescinded in late September in efforts to return the cities to a sense of economic normalcy (94). Yet, for the vast majority of working-class Colombians, in addition to hundreds of thousands of Venezuelan migrants (for additional information, see Appendix C) working in the bustling informal economy, working from home is not an option. With informality rates in the country exceeding 60% (92,93) (46% in urban areas; 85% in rural areas), the COVID-19 pandemic continues to highlight and exacerbate protracted issues such as poverty and inequality.

The medium- and long-term impact of the pandemic on the health system is still not entirely clear. There are continued concerns about the pressure on health resources if COVID-19 case numbers and hospitalizations continue to rise. Higher numbers of COVID-19 cases may worsen the existing shortages of medical resources, such as intensive care unit beds and ventilators, which make take away resources from cancer patients.

In addition to the major adverse effect on health outcomes and the stress on the health system, COVID-19 has been detrimental for the Colombian economy and society as a whole. The nationwide loss of jobs will negatively affect tax revenue, a major source of funding for the health system. Less public tax revenue may disrupt the ability to fund cancer activities. Those who receive health insurance through their jobs may lose coverage for time before switching to another compulsory scheme.

It remains clear that coordinating and delivering quality care for cancer during the COVID-19 pandemic remains a challenge. Cancer patients must weigh the additional risk of missing an appointment or treatment to limit exposures during travel and encounters with the general public, as well as in hospitals and in the setting of other healthcare institutions.

Numerous hospitals have taken steps to scale-up their tele-medicine programs to limit exposure for cancer patients. However, limitations remain with regard to treatment and other types of care. Experts and actors in the health system alike stress the importance of ensuring a resilient health system during the COVID-19 pandemic, while simultaneously ensuring equitable access to resources, expertise, and treatment while managing their cancer care.

7. Recommendations and Next Steps

In this section, we draw on the challenges and the policy options identified by stakeholders to address these challenges to present policy recommendations to address the rising cancer burden in Colombia. These recommendations are organized by their priority for the health system (highest, higher, or medium). For each policy recommendation, we categorize the potential cost to implement (high, medium or low) and estimate the length of time needed to implement (short-, medium-, or long-term) (Table 19).

Table 19: Summary of policy recommendations with priority, cost, and timeline assessment.

Recommendation	Priority	Estimated Cost	Potential benefit	Estimated Timeline
Evaluate the degree of implementation of current cancer policies and laws and propose strengthening mechanisms for their implementation.	Highest	Low cost	High	Short term
Update comprehensive cancer care standards and policies with leadership and technical support from the National Cancer Institute of Colombia.	Highest	Medium cost	High	Medium term
Strengthen population-based cancer registries throughout the country.	Highest	Medium cost	High	Short term
Strengthen the mechanisms established in the current regulatory framework to combat inappropriate practices around cancer control.	Higher	Low cost	High	Short term
Strengthen inspection, surveillance and control mechanisms aimed at the adequate use of resources for cancer control.	Higher	High cost	High	Medium term
Develop mechanisms and procedures for the permanent review and adjustment of the resources necessary for cancer control.	Higher	High cost	Medium	Long term
Restructure existing approaches to health resource allocation and service delivery to improve continuity of cancer care.	Medium	High cost	High	Medium term
Restructure delivery of cancer services and strengthen regional health authorities to reduce fragmentation and ensure provision of consistently high quality and equitable cancer services.	Medium	Medium cost	High	Long term
Improve training of healthcare providers on multidisciplinary approach to cancer care and service delivery.	Medium	Medium cost	Medium	Long term

7.1. Highest Priority

1. **Evaluate the degree of implementation of current cancer policies and laws and propose strengthening mechanisms for their implementation.** The government should develop a set of regulations to strengthen mechanisms for enforcing existing cancer policies. The government should monitor and evaluate the implementation of cancer policies in the public and private sectors and across all levels of government to ascertain what has been achieved as a result of these policies. These regulations should:

   – **Define comprehensive cancer management** to include prevention, diagnosis, treatment, and palliative care, with an emphasis on providing high-quality and timely services with continuity of cancer care for patients.
   – **Identify the entities responsible for monitoring compliance with health laws** and grant them authority to ensure all actors who do not fulfill their responsibilities under the national law are held to account.

2. **Update comprehensive cancer care standards and policies with leadership and technical support from the National Cancer Institute of Colombia.** The national government should develop cancer policies with engagement of stakeholders and involvement of the public, and coordinate policies among regional cancer authorities by:

   – **Designating the National Cancer Institute to coordinate a comprehensive model for cancer care across the country** that will manage delivery of cancer services and budgets across regional and local health authorities, health insurers, and providers.
   – **Implementing a national cancer program that emphasizes primary and secondary cancer prevention**, including selective cancer screening in high-risk populations, as well as social determinants of health.
   – **Unifying collection of performance indicators at the national level** to systematically measure impact of cancer services on patient health and on the health system and efficiently take corrective measures.

3. **Strengthen population-based cancer registries throughout the country.** The government should support the development of a virtual national population-level cancer registry by pooling data from the existing registries since there are already existing registries and the constitution of a new structure for a national registry would prove to be legally and politically very complex. These data can be used to generate an evidence base to inform national, regional, and local decisions on cancer care delivery and resource management. Through this registry, the government should:

- **Require mandatory collection of cancer data** at the national, regional, and local levels in conjunction with regional health authorities and for the data to be made available for evaluation, jointly with the cooperation of academic institutions.
- **Generate evidence to better understand the cancer burden in the country**, and use this evidence to inform resource allocation and health financing based on need.

- **Strengthen regulatory agencies** by establishing guidelines and training for national and regional health officials on the standards and processes of providing comprehensive and consistent high-quality cancer care.

7.2. Higher Priority

1. **Strengthen the mechanisms established in the current regulatory framework to combat inappropriate practices around cancer control.** The government should enact accountability and enforcement mechanisms that aim to ensure all actors in the health sector comply with health and cancer laws and regulations by:
   - **Designating the National Cancer Institute as the central institution to develop care standards** that all health institutions must adopt and implement.
   - **Defining which public and private entities are responsible for monitoring the compliance with national health laws** and for enforcing mechanisms to hold to account actors who do not comply.
   - **Carrying out regular audits of health insurers and providers** to evaluate the quality of the services and incentivize provision of high-quality services.
2. **Strengthen inspection, surveillance and control mechanisms aimed at the adequate use of resources for cancer control.** The government should improve the monitoring of resource allocation, budget management, and service delivery by:
   - **Defining national and regional authorities to oversee health budget management, spending, and need.** These authorities will routinely audit resource flows to ensure they are allocated according to budget.
   - **Publishing health and cancer resource flows on digital** media to make them widely available to the public and encourage transparency in management of health resources.
   - **Allowing non-public auditors, such as civil society and non-governmental organizations, to monitor allocation of resources to cancer**, providing them a direct line of communication with public health authorities to report inefficient management of resources for cancer.
3. **Develop mechanisms and procedures for the permanent review and adjustment of the resources necessary for cancer control.** The government should aim to increase funding for cancer in order to make innovative health technologies, medicines, and treatments more accessible to patients, by:
   - **Increasing tax on tobacco and harmful substances.**
   - **Increasing tax contributions to state resources from large companies and corporations** and by modifying resource flows to increase resources for cancer care, for example by spending less on the military and more on education and health.
   - **Creating a special fund for high-cost cancer treatments** to improve access to medicines for low-income populations.
   - **Updating the reimbursement rates for health services and establishing an annual review of their appropriateness** based on the evidence generated from analyses of cost of cancer services.

7.3. Medium Priority

1. **Restructure existing approaches to health resource allocation and service delivery to enable continuity of cancer care.** The government should aim to improve efficiency and continuity of cancer care for patients by:

   - **Identifying and eliminating unnecessary bureaucratic steps and vestigial structures that hinder timely access to cancer services**. This assessment should consider the experiences of stakeholders when determining how to improve service flows and care pathways.
   - **Using population-level data to estimate the cost of cancer and determine resource allocation policies**. Analyze the impact of costs and quality of cancer services on cancer outcomes.
   - **Systematically collecting data to create a national evidence base to monitor and evaluate the performance of cancer programs**, and to assess which populations and territories have higher cancer risks.

2. **Restructure delivery of cancer services and strengthen regional health authorities to reduce fragmentation and delays in care and to ensure provision of consistently high-quality and equitable cancer services.** The health sector should work to strengthen the authority of regional and local health entities by:

   - **Unifying financing between the public and private sectors** through formation of regional integrated public-private networks to guarantee provision of services independent of insurer.
   - **Decentralizing control of cancer resources** to regional health authorities and eliminating intermediaries when managing resources for cancer care.
   - **Operating a coordinated referral and counter-referral network of cancer services** across regions with clear guidelines and standards to ensure timely and accessible follow-up with insurers and providers.

3. **Improve training of healthcare providers on multidisciplinary approach to cancer care and service delivery.** The national government should require academic training and continuing education for health providers around cancer prevention, diagnosis, and treatment, through a joint effort between the Ministry of Health, Ministry of Education, and ASCOFAME. Other aspects of improved training should focus on skills and knowledge to:

   - **Create guidelines and training for national and regional government officials on the cancer burden and processes of cancer care**. Establish a research group comprising cancer specialists, surgeons, pathologists and general practitioners to develop these guidelines. Require regular up-to-date training around cancer for providers and government officials.
   - **Incentivize improvements in the provision of high-quality specialized cancer services and achieving high patient satisfaction**, including training programs to develop human talent in oncology. Similarly, the government should disincentivize practices that do not adhere to standard guidelines or improve health outcomes.
   - **Increase required training and certification of specialists around cancer treatment**, improve training on cancer in undergraduate medical and allied health courses and in training of general physicians and nurses, and integrate palliative care into continuous professional development of all physicians involved in the care of cancer patients.

References

8. References

1. Frenk J. Dimensions of health system reform. Health Policy. 1994 Jan 31;27(1):19–34.
2. WHO | The world health report 2000 - Health systems: improving performance [Internet]. WHO. [cited 2019 Dec 31]. Available from: https://www.who.int/whr/2000/en/
3. Getting Health Reform Right - Marc Roberts; William Hsiao; Peter Berman; Michael Reich - Oxford University Press [Internet]. [cited 2019 Dec 31]. Available from: https://global.oup.com/academic/product/getting-health-reform-right-9780195371505?cc=pe&lang=en&
4. World Health Organization Maximizing Positive Synergies Collaborative Group, Samb B, Evans T, Dybul M, Atun R, Moatti J-P, et al. An assessment of interactions between global health initiatives and country health systems. Lancet. 2009 Jun 20;373(9681):2137–69.
5. Atun RA, Menabde N, Saluvere K, Jesse M, Habicht J. Introducing a complex health innovation--primary health care reforms in Estonia (multimethods evaluation). Health Policy. 2006 Nov;79(1):79–91.
6. Atun R. Health systems, systems thinking and innovation. Health Policy Plan. 2012 Oct;27 Suppl 4:iv4-8.
7. Atun R, Aydın S, Chakraborty S, Sümer S, Aran M, Gürol I, et al. Universal health coverage in Turkey: enhancement of equity. Lancet. 2013 Jul 6;382(9886):65–99.
8. Atun R, de Andrade LOM, Almeida G, Cotlear D, Dmytraczenko T, Frenz P, et al. Health-system reform and universal health coverage in Latin America. Lancet. 2015 Mar 28;385(9974):1230–47.
9. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians. 2018;68(6):394–424.
10. Allemani C, Matsuda T, Di Carlo V, Harewood R, Matz M, Nikšić M, et al. Global surveillance of trends in cancer survival: analysis of individual records for 37,513,025 patients diagnosed with one of 18 cancers during 2000–2014 from 322 population-based registries in 71 countries (CONCORD-3). Lancet. 2018 Mar 17;391(10125):1023–75.
11. NCI Staff. Study Confirms HPV Vaccine Prevents Cervical Cancer. National Cancer Institute. https://www.cancer.gov/news-events/cancer-currents-blog/2020/hpv-vaccine-prevents-cervical-cancer-sweden-study#:~:text=In%20the%20study%20of%20nearly,who%20had%20not%20been%20vaccinated. Published October 14, 2020. Accessed March 7, 2021.
12. Simas C, Munoz N, Arregoces L, Larson HJ. HPV vaccine confidence and cases of mass psychogenic illness following immunization in Carmen de Bolivar, Colombia. Hum Vaccin Immunother. 2019;15(1):163-166. doi:10.1080/21645515.2018.1511667
13. Cancer today [Internet]. IARC. [cited 2019 Dec 31]. Available from: http://gco.iarc.fr/today/home

14. Atun R, Bhakta N, Denburg A, et al. Sustainable care for children with cancer: a Lancet Oncology Commission. Lancet Oncol. 2020 Apr;21(4):e185-e224. doi: 10.1016/S1470-2045(20)30022-X. PMID: 32240612.

15. Normatividad Resoluciones. Instituto Nacional de Salud; 2021 [cited 2021Mar18]. Available from: https://www.ins.gov.co/Normatividad/Paginas/resoluciones.aspx

16. Plan Nacional para el Control del Cancer en Colombia: 2012-2020 [Internet]. Ministerio de Salud; 2012 [cited 2021Mar18]. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/IA/INCA/plan-nacional-control-cancer-2012-2020.pdf

17. Censo general 2005 [Internet]. DANE. 2021 [cited 2021Mar18]. Available from: https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/censo-general-2005-1

18. Análisis de Situación de Salud (ASIS) [Internet]. Ministerio de Salud y Protección Social de Colombia; 2018 [cited 2021Mar18]. Available from: https://www.minsalud.gov.co/salud/publica/epidemiologia/Paginas/analisis-de-situacion-de-salud-.aspx

19. Sawe BE. What Are The Biggest Industries In Colombia? [Internet]. WorldAtlas; 2019 [cited 2021Mar19]. Available from: https://www.worldatlas.com/articles/what-are-the-biggest-industries-in-colombia.html

20. Colombia; [Internet]. World Bank; 2021 [cited 2021Mar19]. Available from: https://data.worldbank.org/country/colombia 52.

21. Colombia (COL) - Demographics, Health & Infant Mortality [Internet]. UNICEF DATA. 2020 [cited 2021Mar19]. Available from: https://data.unicef.org/country/col/

22. Despite challenges, Venezuelan Migration into Colombia can boost its growth [Internet]. World Bank. 2018 [cited 2021Mar19]. Available from: https://www.worldbank.org/en/news/feature/2018/11/06/despite-challenges-venezuelan-migration-into-colombia-can-boost-its-growth

23. Cifuentes A, Murad R, Sanchez S et al. Health services inequalities affecting the Venezuelan migrant and refugee population in Colombia: How to improve the local response to the humanitarian emergency?. USAID. 2020.

24. Cause of death, by non-communicable diseases (% of total) [Internet]. World Bank; 2020 [cited 2021Mar19]. Available from: https://data.worldbank.org/indicator/SH.DTH.NCOM.ZS

25. MMP: National Liberation Army (ELN) [Internet]. Center for International Security and Cooperation. Stanford University; 2019 [cited 2021Mar19]. Available from: https://cisac.fsi.stanford.edu/mappingmilitants/profiles/national-liberation-army-eln 61.

26. Colombia: Background and U.S. relations [Internet]. Congressional Research Service. Federation of American Scientists; 2019 [cited 2021Mar19]. Available from: https://fas.org/sgp/crs/row/R43813.pdf

27. COVID-19 Pandemic Must Not Be Allowed to Derail Colombia Peace Agreement; Special Representative Tells Security Council | Meetings Coverage and Press Releases [Internet]. United Nations; 2020 [cited 2021Mar19]. Available from: https://www.un.org/press/en/2020/sc14160.doc.htm

28. Age dependency ratio, old (% of working-age population) - Colombia [Internet]. World Bank; 2020 [cited 2021Mar19]. Available from: https://data.worldbank.org/indicator/SP.POP.DPND.OL?locations=CO

29. The Effects of Covid-19 on Latin America's Economy [Internet]. Center for Strategic and International Studies. 2020 [cited 2021Mar20]. Available from: https://www.csis.org/analysis/effects-covid-19-latin-americas-economy

30. Colombia [Internet]. United States Trade Representative. Executive Office of the President; 2019 [cited 2021Mar20]. Available from: https://ustr.gov/countries-regions/americas/colombia 66.

31. Education Statistics - All Indicators. World Bank. (2021). Retrieved January 15, 2021, from https://databank.worldbank.org/reports.aspx?source=education-statistics-~-all-indicators

32. Human Development Indices and Indicators: 2018 Statistical Update: Colombia. UNDP. 2018. Retrieved from http://hdr.undp.org/sites/default/files/Country-Profiles/COL.pdf

33. Censo Nacional de Población y Vivienda 2018 [Internet]. DANE. 2020 [cited 2021Mar20]. Available from: https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/censo-nacional-de-poblacion-y-vivenda-2018

34. Subnational Human Development Index (SHDI) - Area Database [Internet]. Global Data Lab. Radboud University; 2021 [cited 2021Mar20]. Available from: https://globaldatalab.org/areadata/shdi/COL/

35. Colombia [Internet]. Migration Policy Institute. 2021 [cited 2021Mar20]. Available from: https://www.migrationportal.org/country/colombia/

36. Carvajal D. As Colombia Emerges from Decades of War, Migration Challenges Mount [Internet]. migrationpolicy.org. 2018 [cited 2021Mar20]. Available from: https://www.migrationpolicy.org/article/colombia-emerges-decades-war-migration-challenges-mount#:~:text=According%20to%20the%20United%20Nations,returning%20migrants%20holding%20dual%20citizenship

37. Colombia [Internet]. Departments; Major Cities - Population Statistics, Maps, Charts, Weather and Web Information. City Population; 2020 [cited 2021Mar20]. Available from: https://www.citypopulation.de/en/colombia/cities/

38. Camargo G, Sampayo AM, Peña Galindo A, Escobedo FJ, Carriazo F, Feged-Rivadeneira A. Exploring the dynamics of migration, armed conflict, urbanization, and anthropogenic change in Colombia. 2020:PLoS ONE 15(11): e0242266. https://doi.org/10.1371/journal.pone.0242266

39. Poverty and inequality: Colombia Reports [Internet]. Colombia Reports. 2021 [cited 2021Mar20]. Available from: https://colombiareports.com/colombia-poverty-inequality-statistics/

40. Ramírez-Barbosa P, Acuña Merchán L. Cancer risk management in Colombia, 2016. Colomb Med (Cali). 2018;49(1):128-134. Published 2018 Mar 30. doi:10.25100/cm.v49i1.3882

41. Informe Carga de Enfermedad Ambiental en Colombia [Internet]. Instituto Nacional de Salud. Ministerio de Salud; 2019 [cited 2021Mar20]. Available from: https://www.ins.gov.co/Noticias/Paginas/Informe-Carga-de-Enfermedad-Ambiental-en-Colombia.aspx

42. Loayza F, Acerbi M, Ruta G. COLOMBIA SECOND SUSTAINABLE DEVELOPMENT AND GREEN GROWTH : DEVELOPMENT POLICY FINANCING [Internet]. World Bank; 2017 [cited 2021Mar20]. Available from: http://documents1.worldbank.org/curated/en/165821513479626035/pdf/PD-Revised-11-20-2017-11202017.pdf

43. Cardona A. For Colombia, 2019 was a year of environmental discontent [Internet]. Mongabay Environmental News. 2020 [cited 2021Mar20]. Available from: https://news.mongabay.com/2020/01/for-colombia-2019-was-a-year-of-environmental-discontent/

44. Medicamentos y Tecnologías en Salud [Internet]. 2021. Ministerio de Salud y Protección Social de Colombia; 2021 [cited 2021Mar20]. Available from: https://www.minsalud.gov.co/salud/Paginas/home-medicamentos-y-tecnologias.aspx

45. Resolución No. 2654 del 2019 [Internet]. Ministerio de Salud; 2019 [cited 2021Mar20]. Available from: https://www.minsalud.gov.co/Normatividad_Nuevo/Forms/DispForm.aspx?ID=5754

46. Cancer tomorrow [Internet]. [cited 2019 Dec 31]. Available from:http://gco.iarc.fr/tomorrow/hom

47. Indicadores Basicos 2015. MinSalud. 2016. [cited 2020 March 20]. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/vs/ED/GCFi/indicadores-basicos-en-salud-2015.pdf

48. Directorio Entidades: Instituto Nacional de Cancerologia [Internet]. Instituto Nacional de Cancerologia. 2021 [cited 2021Mar20]. Available from: https://www.cancer.gov.co/directorio-entidades

49. Pardo C, Cendales R. Cancer incidence estimates and mortality for the top five cancer in Colombia, 2007-2011. Colomb Med (Cali). 2018;49(1):16-22. Published 2018 Mar 30. doi:10.25100/cm.v49i1.3596

50. Observatorio Nacional de Cancer [Internet]. MinSalud; 2018 [cited 2021Mar20]. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VS/ED/GCFI/guia-ross-cancer.pdf

51. López JA, Vries E, Restrepo MTE, et al. Análisis de Instituto Nacional de Cancerología [Internet]. Instituto Nacional de Cancerología; 2017 [cited 2021Mar20]. Available from: https://www.cancer.gov.co/Situacion_del_Cancer_en_Colombia_2015.pdf

52. ENSIN: Encuesta Nacional de Situación Nutricional [Internet]. Portal ICBF - Instituto Colombiano de Bienestar Familiar ICBF. 2015 [cited 2021Mar20]. Available from: https://www.icbf.gov.co/bienestar/nutricion/encuesta-nacional-situacion-nutricional

53. Ramos FJDC. Pobreza Monetaria y Multidimensional en Colombia 2018 [Internet]. DANE; 2018 [cited 2021Mar20]. Available from: https://www.dane.gov.co/index.php/estadisticas-por-tema/pobreza-y-condiciones-de-vida/pobreza-y-desigualdad/pobreza-monetaria-y-multidimensional-en-colombia-2018#pobreza-nacional-en-colombia-2018

54. Encuesta nacional de calidad de vida (ECV) [Internet]. DANE; 2019 [cited 2021Mar20]. Available from: https://www.dane.gov.co/index.php/estadisticas-por-tema/pobreza-y-condiciones-de-vida/calidad-de-vida-ecv

55. Health Benefit Plans in Latin America Health Benefit Plans ... [Internet]. Inter-American Development Bank; 2014 [cited 2021Mar20]. Available from: https://publications.iadb.org/en/bitstream/handle/11319/6484/Health-Benefit-Plans.pdf

56. Access to comprehensive, equitable, and quality health services [Internet]. Health in the Americas 2017. PAHO; [cited 2021Mar21]. Available from: https://www.paho.org/salud-en-las-americas-2017/?tag=preventive-health-services

57. Ministerio de Salud y Protección Social y Profamilia. 2017. Colombia Encuesta Nacional de Demografía y Salud 2015. Bogotá, Colombia: Profamilia/Colombia. Available at http://dhsprogram.com/pubs/pdf/FR334/FR334.pdf

58. Arboleda Arango, Ana M., Chernichovsky, Dov, & Esperato, Alexo. (2018). Encuestas de Satisfacción del Paciente en Colombia: Una Oportunidad para Mejorar. Revista Salud Uninorte, 34(1), 33-46. Retrieved March 19, 2021, from http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-55522018000100033&lng=en&tlng=es. https://www.redalyc.org/jatsRepo/817/81759538004/html/index.html

59. ENCUESTA NACIONAL DE EVALUACIÓN DE LOS SERVICIOS DE LAS EPS [Internet]. MinSalud; 2017 [cited 2021Mar21]. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/DE/CA/Informe-encuesta-satisfaccion-eps-2017.pdf

60. Andia, T.S., Lamprea, E. Is the judicialization of health care bad for equity? A scoping review. Int J Equity Health 18, 61 (2019). https://doi.org/10.1186/s12939-019-0961-y

61. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on Community-Based Solutions to Promote Health Equity in the United States; Baciu A, Negussie Y, Geller A, et al., editors. Communities in Action: Pathways to Health Equity. Washington (DC): National Academies Press (US); 2017 Jan 11. 3, The Root Causes of Health Inequity. Available from: https://www.ncbi.nlm.nih.gov/books/NBK425845/

62. Kline H. La Violencia, dictatorship, and democratic restoration [Internet]. Encyclopædia Britannica. Encyclopædia Britannica, inc.; 2021 [cited 2021Mar22]. Available from: https://www.britannica.com/place/Colombia/La-Violencia-dictatorship-and-democratic-restoration

63. Ward Z, Yeh J, Bhakta N, Frazier AL, Girardi F, Atun R. Simulation Results: Global Childhood Cancer Survival [Internet]. V1 ed. Harvard Dataverse; 2019. Available from: https://doi.org/10.7910/DVN/PWPA9E

64. Bermedo-Carrasco S, Peña-Sánchez JN, Lepnurm R, Szafron M, Waldner C. Inequities in cervical cancer screening among Colombian women: a multilevel analysis of a nationwide survey. Cancer Epidemiol. 2015 Apr;39(2):229-36. doi: 10.1016/j.canep.2015.01.011.

65. Bermedo-Carrasco, S., Waldner, C.L. The role of socio-demographic factors in premature cervical cancer mortality in Colombia. BMC Public Health. 2016;16, 981. https://doi.org/10.1186/s12889-016-3645-1 .

66. Hernández Vargas, J.A., Ramírez Barbosa, P.X., Gil Quijano, A.M. et al. Patterns of breast, prostate and cervical cancer incidence and mortality in Colombia: an administrative registry data analysis. BMC Cancer. 2020;20, 1097. https://doi.org/10.1186/s12885-020-07611-9 .

67. Murillo, R., González, A., Galvis, J. C., Hidalgo, I., Marín, A., Muñoz, J. E., & Sánchez, R. Radiation Oncology Workforce in Colombia. JCO Glob Oncol. 2020;6:190-194. doi:10.1200/JGO.19.00195

68. Vries, E., Buitrago, G., Quitian, H., Wiesner, C., & Castillo, J. Access to cancer care in Colombia, a middle-income country with universal health coverage. Journal of Cancer Policy. 2018;15. doi:10.1016/j.jcpo.2018.01.003.

69. Garcia-Ramirez, J., Nikoloski, Z. & Mossialos, E. Inequality in healthcare use among older people in Colombia. Int J Equity Health. 2020;19, 168. https://doi.org/10.1186/s12939-020-01241-0

70. Murillo R, Díaz S, Sánchez O, et al. Pilot Implementation of Breast Cancer Early Detection Programs in Colombia. Breast Care (Basel). 2008;3(1):29-32. doi:10.1159/000114446

71. Garcia-Subirats I, Vargas I, Mogollón-Pérez AS, et al. Barriers in access to healthcare in countries with different health systems: A cross-sectional study in municipalities of central Colombia and north-eastern Brazil. Social Science and Medicine. 2014;106:204-213. https://doi.org/10.1016/j.socscimed.2014.01.054.

72. Torres FM., Acevedo OB. Colombia case study: The subsidized regime of Colombia's national health insurance system. The World Bank. 2013;15. http://documents1.worldbank.org/curated/en/727721468239997995/pdf/749610NWP0COLO00Box374316B00PUBLIC0.pdf .

73. Colombians will receive non Mandatory Health Plan (no POS) services without Health Promotion Organization (EPS) authorization. Ministry of Health. https://www.minsalud.gov.co/English/Paginas/Colombians-will-receive-non-Mandatory-Health-Plan-(no-POS)-services-without-Health-Promotion-Organization-(EPS)-authorizati.aspx . Published 2016. Accessed February 7, 2021.

74. Ramirez O, Aristizabal P, Zaidi A, Ribeiro RC, Bravo LE; VIGICANCER Working Group. Implementing a Childhood Cancer Outcomes Surveillance System Within a Population-Based Cancer Registry. J Glob Oncol. 2018;4:1-11. doi:10.1200/JGO.17.00193

75. Colombia Cancer Profile. PAHO. 2013. Accessed Feb 2021. https://www.paho.org/en/file/35998/download?token=vLGB6hkp .

76. Salamanca, MSM., Garzón, JCE., Muñoz EG., et. al. Actualización integral del plan obligatorio de salud del sistema general de seguridad social en salud, año 2011. Health Regulatory Commision: Ministry of Health. 2011;1-152. https://www.minsalud.gov.co/Normatividad_Nuevo/Acuerdo%20029%20de%202011%20%E2%80%93%20Documento%20Tecnico%20-%20Actualizaci%C3%B3n%20Integral%20del%20POS%20del%20SGSSS%202011.pdf

77. Calderón, Carlos Alberto Agudelo, Botero, Jaime Cardona, Bolaños, Jesús Ortega, & Martínez, Rocio Robledo. The Colombian healthcare system: 20 years of achievements and problems. Ciência & Saúde Coletiva. 2011;16(6): 2817-2828. https://doi.org/10.1590/S1413-81232011000600020

78. Escobar ML, Giedon U, Giuffrida A, Glassman A. Colombia: After a decade in reform. In: Glassman A, Giedon U, Escobar ML, eds. From Few to Many: Ten Years of Health Insurance Expansion in Colombia. Washington, DC: Inter-American Development Bank; 2009:1-13.

79. ABECÉ: Administradora de recursos del sistema general de seguridad social en salud – ADRES. MinSalud; 2017:1-5. https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/DE/COM/abece-adres.pdf . Accessed February 14, 2021.

80. Manual de usuario módulo único de ingresos ambiente web. MinSalud; 2019:1-45. https://iservicios.adres.gov.co/Portals/0/ADRES-MDU-MUI-WEB-Manual%20de%20Usuario%20V1.0.pdf . Accessed February 14, 2021.

81. Lamprea E, García J. Closing the Gap Between Formal and Material Health Care Coverage in Colombia. Health Hum Rights. 2016;18(2):49-65.

82. Quintana S. Access to health care services in Colombia - Colombia. ReliefWeb. https://reliefweb.int/report/colombia/access-health-care-services-colombia . Published 2001. Accessed February 16, 2021.

83. Guerrero R, Prada SI, Pérez AM, et al. Universal health coverage assessment: Colombia. Global Network for Health Equity. 2015:1-18. http://gnhe.org/blog/wp-content/uploads/2015/05/GNHE-UHC-assessment_Colombia-1.pdf . Accessed February 16, 2021.

84. Uribe AG, Gómez FR, Muñoz NJM, et al. Aseguramiento en riesgos laborales. MinSalud. https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VP/DOA/RL/Aseguramiento%20en%20riesgos%20laborales.pdf . Accessed February 16, 2021.

85. Prada-Ríos SI, Pérez-Castaño AM, Rivera-Triviño AF. Clasificación de instituciones prestadores de servicios de salud según el sistema de cuentas de la salud de la Organización para la Cooperación y el Desarrollo Económico: el caso de Colombia. Rev Gerenc Polít Salud. 2017;16(32): 51-65. https://doi. org/10.11144/Javeriana.rgps16-32.cips

86. Resolución número 2481 de 2020 y sus anexos. MinSalud. 2020. https://www.minsalud.gov.co/salud/POS/Paginas/plan-obligatorio-de-salud-pos.aspx

87. Registro Poblacional de Cáncer de Cali [Internet]. [cited 2020 Mar 13]. Available from: http://rpcc.univalle.edu.co/es/index.php

88. Jaramillo Sierra, Isabel C. General Quarantine, Social Emergency, and Economic Crisis: COVID-19 in Colombia. 2020 May 21 [cited 2020 Oct 23]. Available from: https://blog.petrieflom.law.harvard.edu/2020/05/21/colombia-global-responses-covid19/ .

89. El País. Duque anunció extensión del aislamiento selectivo hasta octubre. 2020 Sept 28 [cited 2020 Oct 23]. Available from: https://www.elpais.com.co/colombia/duque-anuncio-extension-del-aislamiento-selectivo-hasta-octubre.html

90. Turkewitz, Julie. To Beat the Virus, Colombia Tries Separating Men and Women. 2020 April 15 [cited 2020 Oct 23]. Available from: https://www.nytimes.com/2020/04/15/world/americas/virus-colombia-bogota-men-women.html

91. BBC. Coronavirus: The Colombian jail with 859 cases. 2020 May 12 [cited 2020 Oct 23]. Available from: https://www.bbc.com/news/world-latin-america-52632919

92. El País. "Informalidad supera el 86% en el campo": Presidente de la SAC. 2019 Apr 15 [cited 2020 Oct 23]. Available from: https://www.elpais.com.co/economia/informalidad-supera-el-86-en-el-campo-presidente-de-la-sac.html

93. DANE. Mercado Laboral | Información junio 2020 - agosto 2020. 2020 Aug [cited 2020 Oct 23]. Available from: https://www.dane.gov.co/index.php/estadisticas-por-tema/mercado-laboral/empleo-informal-y-seguridad-social

94. Maldonado, Silvia. Pico y cédula se mantiene durante la Nueva Realidad de Bogotá. 2020 Sept 21 [cited 2020 Oct 23]. Available from: https://bogota.gov.co/mi-ciudad/salud/coronavirus/hay-pico-y-cedula-en-septiembre-en-bogota

95. Wight, Andrew. In Colombia, Silence Is the Price Paid for Coping With Coronavirus. 2020 April 12 [cited 2020 Oct 23]. Available from: https://www.forbes.com/sites/andrewwight/2020/04/12/in-colombia-silence-is-the-price-paid-for-managing-coronavirus/#226a62002af0

96. Colombia coronavirus quarantine to be extended until Aug 30 [Internet]. Reuters. Thomson Reuters; 2020 [cited 2021Mar21]. Available from: https://www.reuters.com/article/us-health-coronavirus-colombia/colombia-coronavirus-quarantine-to-be-extended-until-aug-30-idUSKCN24U019

97. Colombia raises 2020 deficit target due to pandemic effects on economy [Internet]. Reuters. Thomson Reuters; 2020 [cited 2021Mar21]. Available from: https://www.reuters.com/article/colombia-economy/colombia-raises-2020-deficit-target-due-to-pandemic-effects-on-economy-idUSL1N2HZ2SK

98. PLAN DECENAL PARA EL CONTROL DEL CÁNCER EN COLOMBIA, 2012-2021. Ministerio de Salud y Proteccion Social - Colombia; 2012.

99. Share of population with cancer vs. GDP per capita [Internet]. Our World in Data. University of Oxford; 2021 [cited 2021Mar22]. Available from: https://ourworldindata.org/grapher/share-of-population-with-cancer-vs-gdp

100. World Population Ageing 2017 [Internet]. United Nations. United Nations; 2017 [cited 2021Mar22]. Available from: https://www.un.org/en/development/desa/population/theme/ageing/WPA2017.asp

101. NCDs IN COLOMBIA: A CALL TO ACTION [Internet]. US Chamber of Commerce; 2015 [cited 2021Mar22]. Available from: https://www.uschamber.com/sites/default/files/023305_colombia_onepager_fin_web.pdf

102. Chang AY, Cowling K, Micah AE, Chapin A, Chen CS, Ikilezi G, et al. Past, present, and future of global health financing: a review of development assistance, government, out-of-pocket, and other private spending on health for 195 countries, 1995–2050. The Lancet. 2019;393(10187):2233–60.

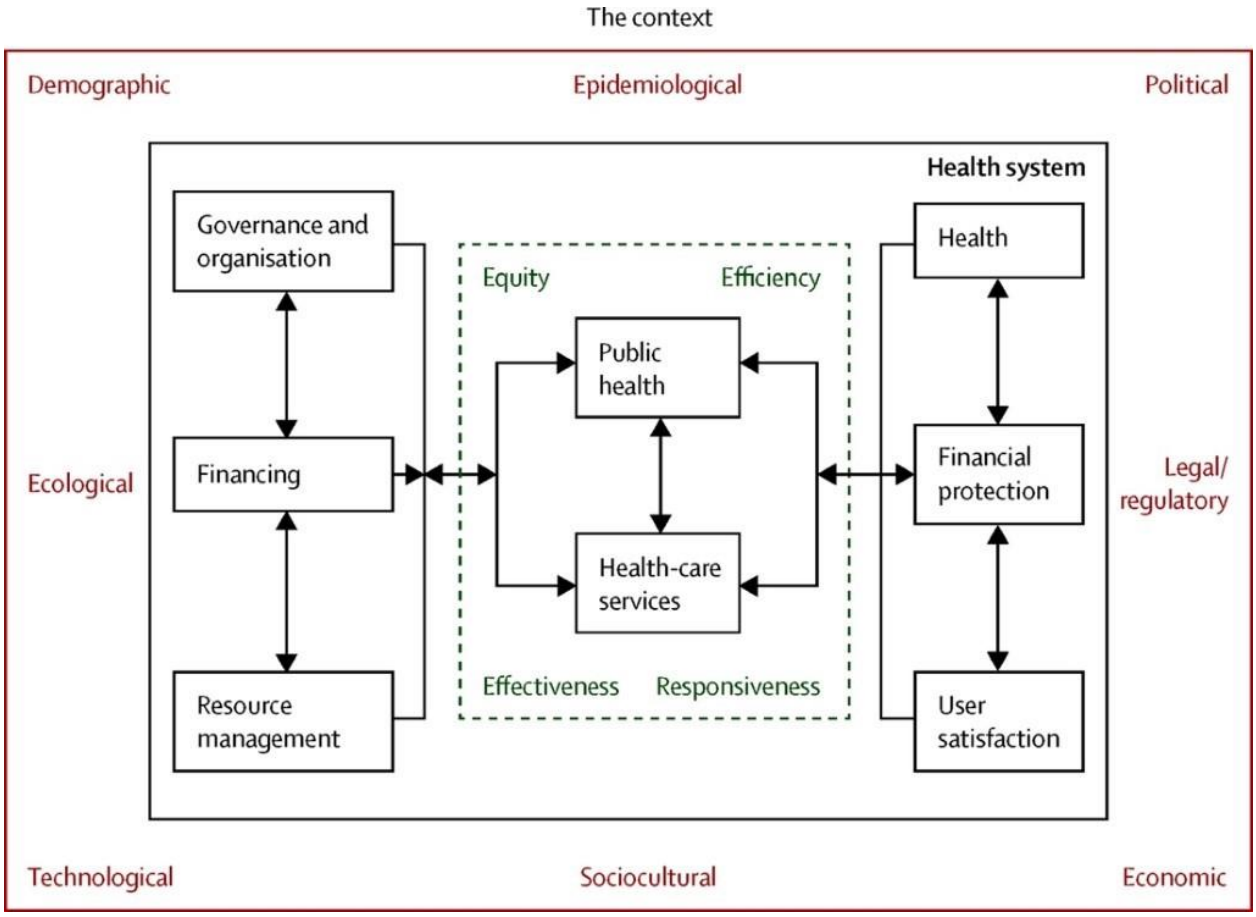
103. Ward Z, Yeh J, Bhakta N, Frazier AL, Girardi F, Atun R. Simulation Results: Global Childhood Cancer Incidence [Internet]. V1 ed. Harvard Dataverse; 2019. Available from: https://doi.org/10.7910/DVN/CTJN63

9. Appendix A: Health System Framework

Analytical Framework

The framework for health systems analysis (Appendix Figure 1) builds on earlier approaches (1-5) and emphasizes a systems view (6) in analysis of context and health system performance. The analytical framework has been used in single- and multi-country analyses (7,8) and can be used to explore contextual factors and health systems functions that interact to influence system performance and achievement of health system goals and objectives.

Appendix Figure 1: Analytical framework.



PART I: Context

The context refers to the interplay of the demographic, epidemiological, political, economic, legal/regulatory, ecological, socio-cultural and technological changes, which individually and through their interactions influence trajectory of change in health systems. These changes create 'opportunities' or 'threats' for health systems in the short- or long-run.

While historical antecedents, political systems and socio-cultural norms shape direction of health system reform, critical events, such as government change, economic crises (or growth) and natural or human-led catastrophes, create external shocks on health systems and provide opportunity for change and reform. Analysis of context aims to answer five questions:

1. What are the contextual changes?
2. How are these changes affecting the health system?
3. What is the likely magnitude of impact of these changes on the health system?
4. How and when will these changes impact the health system?
5. How certain is the likely impact?

In relation to "opportunities" analysis should identify contextual changes that are conducive for attaining desired health system goals and objectives in line with the values embraced by stakeholders. In relation to "threats" analysis should identify contextual changes that may hinder the attainment of desired health outcomes or may worsen health system performance.

Elements of context

- **Demographic transition**: How are the general population dynamics changing in the country of analysis (life expectancy, mortality rate, birth rate, population growth, population structure, urban and rural differences, emigration and immigration)? What are the implications of the demographic transition?
- **Epidemiological transition**: How is the epidemiological profile changing (infant mortality, maternal mortality, morbidity and mortality levels by different disease groups and population segments)? Which conditions are rising or falling (incidence, prevalence for key non-communicable and communicable diseases)? How is the prevalence of risk factors (smoking and obesity for example) and social determinants of health changing?
- **Political environment**: What are the prevailing values of the government that shape broad policy objectives, especially those related to social sectors; political stability; political economy.
- **Legal and regulatory environment**: What international treaties or important laws of the country are likely to affect the health system.
- **Economic changes**: What is the economic outlook, such as: Gross Domestic Product (GDP) growth trends, government debt levels, current account balance, inflation level, unemployment levels, income distribution, and what is the likely impact of the economic environment on the government fiscal space for allocations to public sector health budget, or on private sector investment.
- **Socio-cultural dynamics**: Relates to values and expectations of citizens; lifestyles, behavioral choices (for example smoking, diet and physical activity) and risk perceptions, which might affect the health system.
- **Ecological changes**: Relates to physical and ecological environment affecting health.
- **Technological changes**: Technological developments – for example communication and information technologies, analytic capability, geographic information systems – that can be harnessed to enhance provision of services.

PART II: Health Systems Analysis

Health systems analysis should explore performance in relation goals and objectives and analyze how health system design might affect performance.

Health System Goals

1. **Population health**: concerned with both the level and distribution of health, (for example as measured by life expectancy at birth, or at age 30 or 60 years), mortality (mortality levels), or burden of disease (as measured by disability adjusted life years), as well as specific population health outcomes of interest – such as infant or under-five mortality rate, maternal mortality ratio, standardized mortality rate for key diseases, or premature mortality from key diseases.
2. **Financial risk protection**: relates to fairness in health financing (distribution of health expenditures) and extent of financial risk protection for general population and specific population segments, (levels of out of pocket expenditures as a percentage of total health spending, and impoverishing health expenditures by income quintiles).
3. **User satisfaction**: examines citizens' satisfaction with health system.

Health System Objectives

1. **Equity** relates to fairness in the allocation of resources or services among different individuals or groups, health service coverage, access to health services by population segments and subsequent health outcomes; it considers equality and differential ability of various groups in accessing care and treatment, and assesses whether those in equal need are treated equally, irrespective of other characteristics.
2. **Efficiency** relates to (a) Macroeconomic efficiency – level of health expenditure as a fraction of the GDP and (b) Micro-economic efficiency – 'allocative efficiency' (producing right outputs to achieve goals, i.e. what is produced for available resources in terms of a mix of services to maximize a combination of health outcomes and user satisfaction) and 'technical efficiency' (producing outputs at minimum costs, i.e. how the services are produced – inputs or costs should be minimized for target output)
3. **Effectiveness** related to the extent to which a desired outcome is achieved when a cost-effective intervention is applied to a population and includes an assessment of technical quality of clinical care and the extent to which evidence-based interventions are used.
4. **Responsiveness** relates to the ability of the health system to meet legitimate expectations of citizens in relation to perceived service quality and experience as patients.

Health System Functions

The framework identifies four health system functions, which policy makers can modify to achieve health system goals and objectives:

1. **Governance and Organization**; (a) institutional relationships, in particular the role of the Ministry of Health in relation to other actors in the health system; (b) extent of decentralization, (c) extent of regulation and competition, and (d) organizational design – extent of public and private sector involvement;
2. **Financing**; the analysis should briefly discuss sources of financing, how finances are pooled, and how they are allocated to agencies or intermediary organizations (such as local authorities), and financial coverage provided for population groups. The analysis should also briefly explore which provider payment methods are used to remunerate healthcare service providers and the pros and cons of the methods used;
3. **Resource Management**; The analysis should explore how and where financial, physical, human and intellectual resources are allocated, and whether resource shortages or distributional imbalances exist;
4. **Service Delivery**; The analysis should discuss organization of public health and personal healthcare services, and assess whether health system is able to effectively meet current needs: i.e., whether the system offers comprehensive set of services, provides continuity of care, and achieves effective coordination of patients' journey in health system along the care continuum through effective referral- and counter-referral-systems. The analysis should also discuss public-private mix of services, and the balance of hospital services with those provided in primary health care and in the community.

10. Appendix B: Methods

10.1. Literature Review

A literature review was conducted by three researchers from Harvard University to quantify the burden of cancer in Colombia and compare this burden within other large Latin American countries like Chile, Brazil, Argentina, and Mexico, as well as other, more developed countries like France and the United Kingdom. To analyze cancer incidence and mortality figures in Colombia and in selected countries and to ensure comparability, we used data from the International Agency for Research on Cancer (IARC) Cancer Today and Cancer Tomorrow, data visualization tools inclusive of 36 cancer types in 185 countries or territories of the world in 2018 as part of the Global Cancer Observatory (GLOBOCAN) project (9). Supporting data was obtained from the CONCORD-3 study (10), which tracks global cancer survival data for 18 cancer types in 71 countries based on population-based cancer registries.

The team performed a critical analysis of the available literature concerning the different aspects of the Colombian health system. Sources of information were divided into three components:

- **Context**: We used journal reports and analyses by various organizations, such as the International Monetary Fund, the World Bank, Latin American agencies, as well as official government bulletins, mostly from the Ministry of Health and official websites of national and regional governments, which describes the political, social, economic, ecological and technological context through which the Colombian health system.

We also reviewed articles published in the last 5 years related to the different aspects of the health system and the problem of cancer in Colombia. Most of these articles were published in newspapers with extensive international and national circulation and in local news outlets.

- Health System: We examined the performance of the Colombian health system. Data was taken from national and international reports that evaluated different aspects of the health system at the national level, band compared Colombia with other Latin American countries.

  Our main source of information on the health system was the “Análisis de Situación en Salud – Colombia (18), which was published in 2016, and constitutes the most updated report from the government. This report evaluates some aspects of the health system in general, such as such as health determinants, health system resources and epidemiological and vital profiles in the country. In this section, we also used the reports and data available on the official page of the Colombian Ministry of Health.

  Other sources of information that were consulted within the national scope were the reports from the different provinces, which, which are independent entities and function autonomously in most health decision-making in their geographical area.

  Finally, we used information sources from multilateral organizations, such as the reports and data available on the PAHO/WHO website, which shows the official data of the country, and health systems within the Latin American context, when comparing the statistics of Colombia with its neighbors.

- **Cancer**: One of our primary information sources was the "Plan Decenal para el Control del Cancer en Colombia 2012 - 2021" (98), which was prepared in 2012, in collaboration between the "Ministerio de Salud y Protección Social", and the "Instituto Nacional de Cancerologia”. This report tries to establish a Model for Cancer Control at national level. In its structure, the document has an introduction to the problem and highlights the main antecedents in this regard. In the second chapter, it presents the cancer situation in Colombia, organized according to the determinants and the social response. The third chapter deals with the most relevant political and regulatory aspects of the subject, to present the plan proposal in a fourth chapter. The last chapter identifies the responsibilities of different actors for the development and implementation of the plan.

Another of the main sources of information was the National Cancer Observatory (9), which structures and organizes information on cancer in adults and children in the country and has knowledge management as its main role. It monitors indicators for cancer as well as other conditions that can influence the development of cancer Colombians. Finally, we obtained information from other institutions related to information gathering and policy making reports, such as: Instituto Nacional de Cancerologia, Instituto Nacional de Salud, Cuentas de Alto Costo and Infocancer.

We conducted analysis of this available online data to quantify the burden of cancer in Colombia and compare this burden within other large Latin American countries like Argentina, Chile, Brazil, and Mexico, as well as other, more developed countries like France and the United Kingdom. To analyze cancer incidence and mortality figures in Colombia and in selected countries, we used data from the IARC Cancer Today and Cancer Tomorrow data visualization tools inclusive of 36 cancer types in 185 countries or territories of the world in 2018 as part of the GLOBOCAN project (9). Supporting data was obtained from

the CONCORD-3 study, which tracks global cancer survival data for 18 cancer types in 71 countries based on population-based cancer registries (10).

The CONCORD-3 study, published in The Lancet in 2018, analyzes the trends in cancer survival worldwide between 2000 and 2014. CONCORD-3 includes individual records for 37. 5 million patients diagnosed with cancer during the 15-year period 2000–14. Data were provided by 322 population-based cancer registries in 71 countries and territories, 47 of which provided data with 100% population coverage. The study includes 18 cancers or groups of cancers: esophagus, stomach, colon, rectum, liver, pancreas, lung, breast (women), cervix, ovary, prostate, and melanoma of the skin in adults, and brain tumors, leukemias, and lymphomas in both adults and children (10).

The GLOBOCAN is an interactive web platform developed by the IARC, an agency that is part of the World Health Organization (WHO). This tool provides data visualization tools to explore the current scale and profile of cancer using estimates of the incidence, mortality, and prevalence of 36 specific cancer types and of all cancer sites combined in 185 countries or territories of the world in 2018, by sex and age group. These two sources helped us to evaluate standardized data related to cancer and comparable with other countries not only in Latin America, but also in other regions of the world (9).

When determining cancer estimates, the GLOBOCAN study used the best available sources of cancer incidence and mortality data within a given country, therefore the validity of national estimates largely depends on the degree of representativeness and quality of data within the country (9). The specific Colombian cancer registries used in incidence and mortality estimates and projections were the Cancer Registry of the Metropolitan Area of Bucaramanga, the Cali Cancer Registry, the Cancer Registry of Manizales, and the Cancer Registry of Pasto (87). Further specifications about the methodology used in the GLOBOCAN study, its estimates, and projections can be found at Bray et. al, 2018 (9).

In the GLOBOCAN analysis, incidence is defined as the number of new cases occurring in a specified period and geographic area, conveyed either as an absolute number of annual cases or as a rate per 100,000 people per year. It is important to note that incidence is calculated only among individuals who are at risk for a specific outcome. Incidence rates are used to approximate the average risk of developing cancer and allows comparisons between countries or regions with different population sizes which nominal metrics may obscure. Age-standardized rate (ASR) per 100,000 person-years enhance such comparisons across geographies by accounting for differences in population age structures. Primary prevention strategies aim to reduce measures of incidence, though increasing incidence rates do not necessarily reflect failure within the health system in cases where the expansion of early detection, testing, or other programs result in a transient rise in incidence rates as more cases are tested and therefore discovered (9).

Mortality is defined as the number of deaths occurring in a specified region or period, with the mortality rate defined as the number of deaths per 100,000 people per year. With mortality as a product of the incidence and the proportion of patients who die, mortality rates measure the average risk of death in the population from a specific cancer. Similar to incidence, the degree of detail and quality of mortality data varies considerably between countries, with only 1 in 5 countries reporting high-quality death registrations (9).

An additional feature of the GLOBOCAN study is the inclusion of 95% uncertainty intervals, which take into account uncertainties linked to the geographic coverage of cancer registries and death registrations, the timeliness of data reporting, and the quality of data (9). In Colombia, there were an estimated 101,893 new cases of cancer in 2018, with an uncertainty interval between 99,153 and 104,708 cases, indicating a relatively small uncertainty interval (3).

The analysis of Colombia's cancer burden can be bifurcated into two primary sections pertaining to incidence and mortality, and one section transitioning between the two metrics. Countries or regions for comparison with Colombia were chosen either by status as large Latin American countries, namely Argentina, Brazil, Chile, and Mexico, or as other regions of the world, as defined by the United Nations Population Division, encompassing higher-income countries, like North America and Western Europe, and mid- and lower-income countries, like Latin America and the Caribbean and the World.

The incidence section is further subdivided into three subsections: incidence today, future incidence projections, and disaggregated future incidence projections. Current incidence uses the 2018 estimates of the GLOBOCAN study and uses ASR per 100,000 people to enhance comparisons between countries and regions. The tables in the section outline the 10 cancers with the highest incidence rates in Colombia and corresponding rates of those cancers in Argentina, Brazil, Chile, Mexico, Latin America and the Caribbean, North America, Western Europe, and the World. These 10 cancers represent 98.3% of all cancer incidence rates within Colombia (3). Graphs visualizing the cancer comparison across contexts show the 5 cancers with the highest incidence rates to facilitate ease of reading. Together, these top 5 cancers represent 75.6% of the total cancer incidence rate in Colombia. Other cancers representing significant rates left off of the bar graphs include lung cancer, thyroid cancer, non-Hodgkin lymphoma, and leukemia. The final table compares the top 5 cancers in each of the former comparison countries or regions. For instance, the top 5 incidence rates of cancer in Colombia in order of ASR are prostate, breast, colorectal, stomach, and cervical uterine cancers, while in Argentine the order is breast, prostate, colorectal, lunch and cervical uterine cancers (3). Future incidence projections use crude numbers of cancer cases because ASRs were not available in the dataset. Though an imperfect metric because nominal numbers do not inherently account for differences in population sizes or age structures, percentage change in the crude number over time can be a useful indicator to understand how cancer burden will change within a country over time. The projections follow the total cancer cases from 2018 to 2040, with percentage changes calculated as the difference from 2018. When comparing geographies, the World was left off of analysis because the sheer scale of global crude numbers obfuscates the other geographic comparisons. Disaggregated future incidence projections analyze specific cancer types, ordered by the incidence rates for the same 10 cancers as above. Note that some cancers primarily affect one gender, and incidence is calculated only among people that have the risk for a condition. Because the numbers reported are crude numbers yet ordered according to the incidence rate, some cancers may have higher crude numbers than those shown should one of them primarily affect one gender.

A transitory section between incidence and mortality is used to compare the cancers with the top 10 incidence and mortality rates in Colombia. This section signifies that most common cancers are not necessarily the ones that kill the most people. For instance, thyroid cancer is 7th in raking in terms of incidence rate, yet not in the top 10 for mortality rates. In contrast, liver and pancreatic cancers are not in the top 10 for incidence rate, yet are 9th and 10th, respectively, by mortality rate (13).

The methodology for reporting mortality mirrors that of incidence, being separated into three sections of mortality today, future mortality projections, and disaggregated future mortality projections. Current mortality estimates denote 2018 ASR per 100,000 people, with tables showing the top 10 cancers for Colombia and in different geographic contexts. These 10 cancers collectively represent 90.03% of the total cancer mortality rate. Graphs comparing Colombia to different countries or regions show the top 5 cancers to facilitate easier interpretation yet represent 63% of the total mortality rate in Colombia. When reporting disaggregated future mortality projections, the issue of cancers primarily affecting one gender appearing higher on the lists yet having lower crude numbers is more pronounced than in the incidence reporting (13).

To support the cancer burden analysis of the GLOBOCAN study data, the research team included analysis of the CONCORD-3 study data on estimated 5-year net survival between 2000 and 2004, between 2005 and 2009, and between 2010 and 2014. 5-year net survival as a percentage of all patients diagnosed provides a useful metric for health system performance in managing cancer, with estimates age-standardized to facilitate comparison (10). In total, the population covered by the four participating registries in Colombia was 9%, a figure consistent with Latin America peers like Argentina (9.2%), Brazil (7.7%), and Chile (13.8%) (10). This figure represents an improvement from the previous iteration of the CONCORD study, where only 6.9% of the population was covered by participating cancer registries, yet a far cry from countries like the US (85.6%) and France (21.7%) (10). Colombia's survival estimates are considered less reliable than certain countries because 15% or more of patients were either:

1. Lost to follow-up or censored alive within 5 years of diagnosis or, if diagnosed in 2010 or later, before Dec 31, 2014.
2. Registered only from a death certificate or at autopsy.
3. Registered with unknown vital status or with incomplete dates like unknown year of birth, unknown month or year of diagnosis, or unknown year of last known vital status (10).

The team's analysis of CONCORD-3 data selected 5 cancers in Colombia with the highest mortality rates per 100,000 people in 2018, namely prostate, breast, stomach, lung, and colon cancers. The analysis expanded to compare Colombia's 5-year net survival level with Latin American counterparts (Argentina, Brazil, and Chile), as well as the countries with the highest reported survival level for each of the respective cancers.

10.2. Online Stakeholder Survey

An electronic survey was conducted with stakeholders via the online survey program Qualtrics CoreXM™. The purpose of the survey was to gather opinions from important stakeholders before the virtual stakeholder workshop. The survey (Appendix A) asked participants to identify major challenges for the Colombian health system related to cancer, suggest policy options to solve those challenges, and rank the identified challenges and policies in order of importance to address. Respondents were asked to suggest challenges and policy suggestions under four main categories of opportunity for health system reform: (1) organization and governance, (2) financing, (3) resource management, and (4) service delivery. All responses will be open-ended.

Challenges for the health system in relation to cancer were analyzed using qualitative thematic analysis. Coders categorized free text responses using pre-defined themes based on hypotheses (deductive codes) and new themes that arose organically in the data (inductive codes). Qualitative analysis of health system challenges around cancer included three parts:

1. **Deductive coding**: First, deductive codes were used to organize all open-ended responses by the four opportunity categories for which respondents are asked to identify challenges: (1) organization and governance, (2) financing, (3) resource management, and (4) service delivery.
2. **Inductive coding**: Then, responses under each of these four categories were organized into eight sub-categories using inductive codes which labelled major themes that arose in the data.
3. **Frequencies of rankings**: Lastly, the frequencies in which respondents applied each rank, from most (1) to least (4) important, to challenges in each of the eight sub-categories were calculated to identify the most frequently identified challenges under each of the four opportunity categories.

Policy suggestions to improve cancer prevention and control were also deductively coded using the four opportunity categories under which respondents were asked to identify solutions: (1) organization and governance, (2) financing, (3) resource management, and (4) service delivery. Once organized into these categories, related policies were grouped together. Any policy suggestions that overlapped were consolidated to remove repetition and redundancy. Lastly, policies were ranked by the authors in their priority for the health system to enact (high, medium, or low), potential financial cost to implement (high, medium, or low), and length of time required to implement (short, medium, or long-term).

10.3. Colombia Virtual Stakeholder Workshop

As the COVID-19 pandemic continued its global spread, the Integrated Cancer Control Initiative in Latin America (ICCI-LA) decided to shift its stakeholder workshops from an in-person roundtable event to a series of virtual roundtables. These virtual roundtables, conducted over the tele-conferencing platform Zoom, occurred over the course of four weeks, each with a specific component of the health system's functions for discussion: Organization and Governance, Financing, Resource Management, and Service Delivery. Approximately 15-30 stakeholders belonging to public and private organizations across numerous healthcare sectors attended each virtual roundtable.

With the representation of several local health committees, medium and large health institutions, as well as nurses and doctors alike, the roundtables generated significant dialogue from a variety of perspectives. The roundtables were divided into two sections, the first to discuss challenges with the health sector and challenges with cancer care, and the second to discuss opportunities for potential policy solutions to the identified challenges.

Furthermore, there was the opportunity for all participants to discuss the impact of the ongoing COVID-19 pandemic on both the health system and cancer care in Colombia. Workshops were split into two parts, the first was devoted to discussing the challenges facing the Colombian health system as it related to the four thematic topics (Organization and Governance, Financing, Resource Management, and Service Delivery). The second part of each workshop was devoted to discussing and proposing policy solutions to the challenges identified in the first part of the workshop.

Transcripts of the workshops were not collected, although bilingual notetakers were present on all video conferences and collected data through notetaking. The workshops were conducted in Spanish and subsequently translated into English for analysis. Agendas, discussion questions, and participants can be found in Appendix I and Appendix J.

The themes emerging from the roundtables were collated and categorized for analysis and comparison with the responses for the survey and explored in more depth some of the issues identified in the survey. The roundtables enabled the participants to discuss and explore not only the challenges in relation to health system functions and outputs (public health/personal services), but also, and importantly, potential solutions that could be developed to address the challenges identified. The solutions were categorized and prioritized in discussion with the participants to develop a set of proposed policies and actions that are appropriately sequenced to improve health system performance to achieve equity, efficiency, effectiveness and responsiveness objectives for cancer and to improve cancer outcomes in terms better health (survival for example), financial protection and user satisfaction.

11. Appendix C: Analysis of Context in Colombia

11.1. Demographic and Epidemiological Transition

Colombia is located in the northwestern coast of South America. It is the fourth largest country in the region and has the third-largest economy after Brazil and Argentina. Globally, it ranks 31st among the largest economies, and by income level it is classified as a upper-middle income country (19).

Colombia has a population of 48,258,494 inhabitants, which makes it the second most populous country in South America after Brazil. Most of the population is located in the center (Andean region) and north (Caribbean region) of the country, while to the east and south (part of the Llanos and Amazon, respectively) are quite large areas without large populations and generally scarcely populated. Around 81% of the population live in urban areas, especially in the region known as the "Golden Triangle", formed by the cities of Bogota, Medellin and Cali, with a male / female ratio of 0.95 (20).

Colombia is undergoing demographic transition, characterized by a change towards an older population structure – a product of the decrease in fertility and mortality rates and an increase in the percentage of the elderly population. It is estimated that the dependency index, the number of dependents in a population divided by the number of working age people, was 46% in 2018, coming down from 60.7% in 2000. In the same period, the percentage of the general population that was considered elderly increased from 5.2% to 8.5%. This change in the population pyramid will have many effects on Colombian society in social, economic, and health terms (28).

Another consequence of the demographic transition, the infant mortality rate decreased from 15.8 deaths per 1000 live births in 2010 to 12.2 in 2018. This rate represented a total of 323 deaths of children under one year old, 3.46% less than in the year 2017, while maternal mortality reached 71.22 per every 100,000 births. Regarding the Neonatal Mortality Rate, it reached its lowest numbers in the last ten years; dropping to 7.7 per 1,000 live births in 2018 (21).

Venezuelan Migration

Colombia faces an unprecedented migratory movement, mainly due to the economic, political, and social crises that Venezuela is experiencing. Historically, Colombia has been a country with high emigration levels, with Venezuela being one of the main migratory destinations for Colombians. However, this trend has been reversed in recent years. The economic, institutional, and political instability in Venezuela has become a humanitarian crisis, resulting in the exile and emigration of Venezuelan citizens to other countries in the region, with Colombia being the country in the world that currently houses the most Venezuelans.

As of 2019, over 5.4 million Venezuelan citizens have fled and now live outside of their country. Nearly two million Venezuelans are in Colombia alone, and more than 3,000 Venezuelans arrive into Colombia per day. It is estimated that by the end of 2020 between 6.5 and 8 million Venezuelans will be living outside of Venezuela, surpassing the scale of the Syria crisis (61).

Migrants are characterized by having complex socioeconomic conditions. The migrant population is twice as likely to be unemployed than the people of the receiving areas and nearly half of living in poverty. In terms of health, the Venezuelan population faces a growing lack of protection in medical care, particularly affecting irregular migrants, who are almost entirely outside the health system. This is due to both the collapse of the Venezuelan health system, and the social, economic, and health vulnerabilities possessed by migrants. Likewise, migration affects access and attendance in the school system of children and youth, with a level of school absences of close to 40% among all migrants, more than double the population's rate in receiving areas. School absenteeism among irregular migrants are almost double that of the entire migrant population (22).

Regarding cancer specifically, there has been an increase in reported cases of cancer of the breast and cervix of Venezuelan migrants. The government has begun to address Venezuelan patients and Venezuelan population at risk. Under the leadership of the National Cancer Institute, a project has been created and managed through international cooperation, which proposes to provide treatment with curative intent and, in some cases, with palliative intent to pediatric cancer patients (22,23).

The purpose of this analysis, however, is to ascertain the burden of cancer, a non-communicable disease (NCD) characteristic of Colombia's demographic and epidemiological transition. NCDs constitute more than 76% of deaths in Colombia (24). They are also the leading cause of years of life lost (YLL). Among the leading causes of death in the population are cardiovascular diseases and cancer.

11.2. Political, Legal, and Regulatory Environment

President Iván Duque Márquez began his presidential term on August 7, 2018, which will end on August 7, 2022.

Colombia's contemporary history has been marked by conflict. The conflict has its origins in the 1950s, when a power-sharing agreement between the two strongest political parties eliminated political competition but failed to address social, political, and economic inequality. Political hostilities compounded into a civil war known as La Violencia (1948-58), leading to the emergence of armed revolt by a number of state and non-state actors. Following this period, the creation of the National Liberation Army (ELN) in 1964 and the Revolutionary Armed Forces of Colombia (FARC) in 1969, as well as the strong presence of drug trafficking, Colombia has experienced intense periods of violence in recent years, which has hampered the country's development (62). Such non-state actors, violently competing with Colombian entities for territory and economic might, resulted in the displacement millions of Colombian civilians. Consequently, Colombia has had the notorious title of having the most registered internally displaced persons (IDPs) in the world.

The creation of Plan Colombia in 1999, between the governments of Colombia and the United States, had the objective of reducing the entry of drugs into the United States, as well as helping Colombia promote peace, economic development, and security in the Andean region. Between 2001 and 2016, the United States has invested $10 billion in Colombia in military aid. Despite lapses, Colombia has succeeded in improving its security through the anti-narcotics strategy, military, and police actions, in addition to other efforts, such as the demobilization and desertion program of violent groups (26).

The weakening of the main rebel groups in the country, (FARC and ELN), gave rise to peace processes under the government of President Santos. On October 2, 2016, after signing a first peace agreement between the parties on September 26 of that year, the government called a referendum to endorse the agreements reached with FARC and ELN, which resulted in the rejection of the agreement by a narrow margin. After negotiating with opponents to the deal, the government and FARC agreed on a new text, which was signed on November 24, 2016.

The Colombian State has yet to fulfill many of the obligations in the agreement, such as establishing an integrated presence in rural regions and implementing programs for land restitution and substitution of illicit crops. The coronavirus pandemic has compromised actions aimed at fulfilling these obligations (27).

11.3. Economic Environment

Colombia is an upper-middle-income economy which has achieved rapid economic growth with strong exports and attractiveness to foreign direct investment. It is the fourth-largest economy in Latin America, after Brazil, Mexico, and Argentina (19).

Colombia's GDP grew by 3.3% in 2019. It is expected that by 2020 the GDP of the country will fall approximately 8.2% due to the coronavirus pandemic (29).

The Colombian economy is fundamentally based on the production of primary goods for export and the production of consumer goods for the domestic market. One of the most traditional economic activities is the cultivation of coffee, being one of the world's largest exporters of this product. Oil production is also an important export product. Colombia is the fourth biggest oil producer in Latin America and the sixth in the entire continent. Extractive industries extend to minerals, and include coal and the production and export of gold and other precious metals. In agriculture, floriculture and banana crops occupy a prominent place, and textiles, automotive, chemical and petrochemical industries stand out in the industrial sector (30).

In recent years, Colombia has oriented its economy towards open trade and exports and has signed numerous free-trade agreements with several regional trade blocks. Additionally, the decrease in violence in the country has accelerated investments in infrastructure and tourism. With all this, Colombia is expected to be one of the countries with the highest economic growth in Latin America in the next decade (30).

11.4. Socio-cultural Dynamics

According to the 2018 national census data from the National Administrative Department of Statistics (DANE), 51.2% of Colombian population is women, and 48.8% is men. Most of the population lives in the Andean and Caribbean region, while to the east and south (Llanos Orientales and Amazon, respectively) are relatively extensive areas without large populations and generally depopulated. The eastern lowland departments (approximately 54% of the total area) have less than 3% of the population and a density of less than one person per square kilometer (33).

The migration of the rural population to urban areas and emigration outside the country has been significant. The urban population increased from 28% in 1938 to 75% in 2005; however, in absolute terms, the rural population has also increased from six to ten million in that period. Regarding emigration, DANE estimates that in 2018, around 3,331,107 Colombians live abroad, mainly in the United States, Spain, Venezuela, and Canada (33).

The total adult literacy rate in 2016 was 94.7%, 94.4% for men, and 94.9% for women (31). According to the Human Development Index, Colombia was ranked 90th worldwide according to the 2018 UN report with an HDI of 0.747 (32). However, not all regions of Colombia present the same level of development. The most developed area corresponds to the Andean Region in cities such as Bogotá, Medellín, and Cali, which constitute the so-called "Golden Triangle," the city of Bucaramanga, and the Caribbean Region and its cities (Barranquilla, Cartagena and Santa Marta) (34).

Colombia is the country with the largest immigrant population of Venezuelan migrants globally, with 1,826,000 people as of 2020 – four out of five Venezuelan migrants have arrived since 2015. Colombia has long been a destination for migration. At the end of the 19th century, Barranquilla received a large number of European and Middle Eastern immigrants (Lebanon, Syria, and Turkey), as well as Americans, Cubans, and Chinese, among others, who dispersed throughout the national geography. Although a large part of the Middle East's migration was population groups of Christian denomination (this, due to the Colombian migration policies of the early 20th century), in Maicao (Guajira), there is the largest Arab and Muslim community in Colombia (35,36).

75% of the Colombian population lives in urban areas. The capital district of Bogotá is the most populous city and the main economic center of the country. Colombia has large urban hubs throughout its territory, the cities of Medellín and Cali have a population of more than two million inhabitants and Barranquilla has more than one million. Twenty-five other cities have populations that exceed 200,000 inhabitants (37).

Colombian cities have grown by an accelerated urbanization due to forced or voluntary displacement, lack of urban planning, and the emergence of social conflicts aggravated by the high urban marginality. In the 20th century, the political violence of the 1940s was the most crucial trigger of migration from the countryside to the city. Political and non-state violence continued into the 21st century. This phenomenon has created severe difficulties in areas of scarce resources, where planning institutions face severe limitations in the amount of land suitable for urbanization and access to essential public health and sanitation services (38).

Rural populations have access to fewer resources and services from the state, in addition to working in worse conditions and obtaining less annual income. Of the approximately eleven million people living in rural Colombia, around seven million are poor, and two million live in extreme poverty. While 30% of the urban population is poor, in the rural regions, this figure rises to 65% (39).

The average income of a rural worker is approximately three times less than that in cities, reflecting the country's marked income inequality. According to World Bank figures, in 2017, Colombia was the second most unequal country in Latin America and the seventh most unequal in the world. Despite the sustained economic growth of the gross domestic product, which was between 6.6% between 2006-2014, the income inequality index as measured by the Gini Coefficient fell during the greatest oil boom (39). In 2018 the Gini Coefficient was 5.17 compared to 5.08 in 2017 nationwide (39).

Concerning Cancer, unfortunately, there are no national data regarding exposure of different socio-economic and geographic population groups to risk factors. However, there is related information in the main urban areas on the nature of cancer care provided due to the availability of specialized personnel for the number of inhabitants and people with the disease. According to figures from the National Cancer Institute in 2016, the largest concentrations of oncology services were in Colombia are in Bogotá (25.1%), Antioquia (12.7%), Valle del Cauca (10.7%), Atlántico (9.1%) and to a lesser extent in Santander (6.6%). Likewise, each capital city of these departments offer more than 88% of the cancer services available in its department (40).

11.5. Ecological Changes

According to a study by the National Institute of Health (INS), air quality in urban areas, and inadequate water sanitation are the main environmental risk factors that affect Colombians' health (41).

From the total deaths caused by the seven most prevalent diseases in the country (ischemic heart disease, cerebrovascular accident, obstructive pulmonary disease, acute respiratory infections, lung cancer, acute diarrheal disease and chronic kidney disease), 17,549 deaths are associated with poor water and air quality and contamination by solid fuels and metals. Air quality is estimated to contribute to 13.9% of deaths from ischemic heart disease, 17.6% of deaths from chronic obstructive pulmonary disease, and the quality of the water to 71.6% of deaths from acute diarrheal disease (41).

The health costs associated with environmental degradation in Colombia amounted to approximately 2.6% of GDP in 2015, and contributed to deaths of 13,718 people. Among these costs, urban air pollution contributed 75%, with 1.93% of GDP (42).

In addition, Colombia faces major environmental challenges due to (43):

- Deforestation in the Amazon
- Exploration of new forms of oil exploitation (fracking)
- Popular consultations to start projects, especially energy and mining
- Budgetary limitations for the care of protected areas
- Legal protection of indigenous peoples
- Use of mercury or other toxic elements in the agricultural and mining exploitation

Actions that have been taken to reduce environmental deterioration include (41,42):

- Increase of air quality surveillance systems.
- Since 2010, the country has had policies in place to prevent and control air pollution that include strategies to reduce polluting emissions and improve air quality monitoring.
- Strengthening the link between the environmental sector and the health sector.
- Implementing fuel quality standards for transportation services in large cities.
- Tax and economic incentives for clean technologies and promotion of technological reconversion.
- Improvement of electrical energy grid coverage and drinking water to homes, especially in rural or resource-poor areas.

11.6. Technological Changes

Colombia has several initiatives aimed at implementing technological tools in health care settings. Primarily, the Directorate of Medicines and Health Technologies was created in 2011. The objective of the Directorate is to evaluate health technologies based on scientific evidence and to produce guides and protocols for medicines, devices, procedures, and treatments. The aim of the Directorate is to recommend procedures that must be covered by public resources through the health system (the General System of Social Security in Health) (44).

The functions of the Directorate are to:

- Develop guidelines for the identification and classification of drugs, medical devices, and health technologies that facilitate sanitation and epidemiological surveillance.
- Establish guidelines and policy guidelines for compliance with good practices in the marketing chain associated with the model of sanitary and epidemiological surveillance in the areas of medicines, medical devices, and health technologies.
- Prepare guidelines for the participation and strategy analysis of issues and interests to harmonize international regulatory standards and integrate policies that address problems concerning access, quality, and use of medicines, medical devices, and health technologies.
- Develop standards in pharmaceuticals, medical devices, and health technologies

Likewise, the Directorate has planned to establish norms by which concepts of telehealth and telemedicine are incorporated into the health model by 2019, with open access of digital technologies in the promotion, prevention, containment, care, monitoring, and recovery. It represents the first firm steps in the digital transformation of health in Colombia (45).

12. Appendix D: Projected Cancer Incidence in Colombia and Selected Comparator Countries

Cancers with the highest incidence rates differ slightly between countries of Latin America, as seen in Appendix Table 1 below.

Appendix Table 1: Cancers Ranked by Incidence Rates per 100,000 People in Argentina, Brazil, Chile, Colombia and Mexico (Source: IARC Cancer Today (13))

Rank	Colombia	Argentina	Brazil	Chile	Mexico
1	Prostate	Breast	Prostate	Prostate	Prostate
2	Breast	Prostate	Breast	Breast	Breast
3	Colorectum	Colorectum	Colorectum	Colorectum	Colorectum
4	Stomach	Lung	Lung	Stomach	Cervix Uteri
5	Cervix Uteri	Cervix Uteri	Cervix Uteri	Lung	Corpus Uteri

There are many similarities in the cancer burdens of each of the Latin American countries: in all prostate, breast, and colorectal cancers are the most common cancer types by incidence rates. Lung cancer and cervical uterine cancer also rank relatively highly in four of the five selected contexts. Stomach cancer is a disproportionately high burden for Colombia and Chile, while lung cancer is not in the top 5 for either Colombia or Mexico.

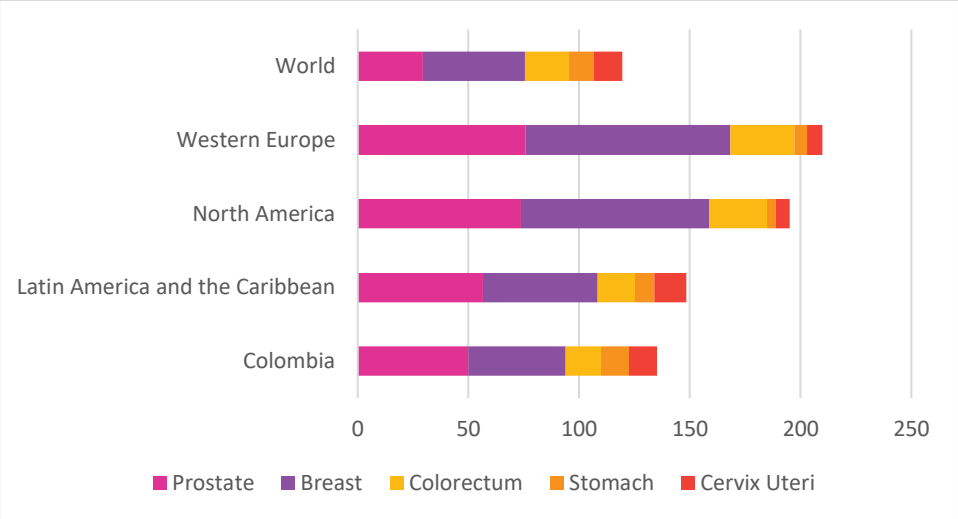
Appendix Tables 2 and 3 further detail the disaggregated comparisons across regions.

Appendix Table 2: Estimated Age Standardized Incidence Rate Rate of Cancer per 100,000 People in 2018, by Cancer Type: Colombia, World Regions and the World (Source: IARC Cancer Today (13))

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
Prostate	49.8	56.4	73.7	75.8	29.3
Breast	44.1	51.9	84.8	92.6	46.3
Colorectum	15.8	16.8	26.2	28.8	19.7
Stomach	12.8	8.7	4.1	5.8	11.1
Cervix Uteri	12.7	14.6	6.4	6.8	13.1
Lung	10.1	11.8	34.5	33.9	22.5

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
Thyroid	9	7.6	15	8.5	6.7
Ovary	8	6.1	8.4	7	6.6
Non-Hodgkin Lymphoma	7.4	5.4	12.5	10.1	5.7
Leukemia	6.2	5.4	9.9	8.5	5.2
Total Incidence Rates	178.8	189.6	350.2	323.4	197.9

Appendix Figure 2: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in 2018, by Cancer Type: Colombia, World Regions and the World (Source: IARC Cancer Today (13))



Echoing the previous analysis of ranked incidence rates across geographies, Colombia has similar cancer incidence rates to other countries of Latin America, the Caribbean, and the World (Appendix Table 3). In each of these general areas, they share the four cancers of the highest incidences: prostate, breast, colorectal, and cervical uterine cancers. For comparison, North America and Western Europe also have prostate, breast, and colorectal cancers, yet the other leading types of cancer are lung and corpus uterine cancer in North America, while Western Europe has higher rates of lung cancer and melanoma of the skin.

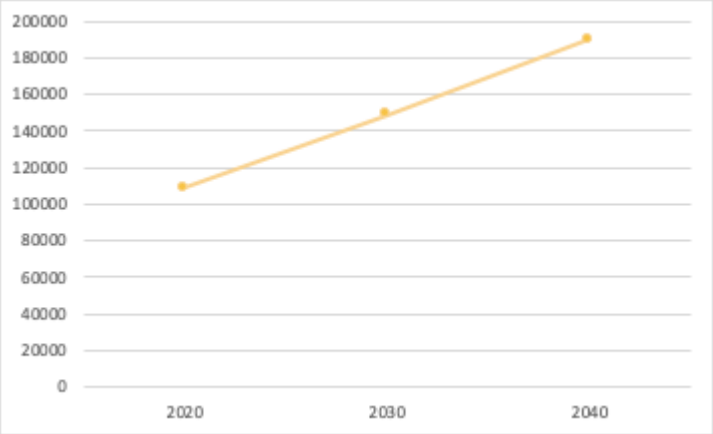
Appendix Table 3: Ranked Incidence Rates per 100,000 People Across Geographies: Colombia, World Regions and the World (Source: IARC Cancer Today (13))

Rank	Colombia	Latin America and the Caribbean	North America	Western Europe	World
1	Prostate	Prostate	Breast	Breast	Breast
2	Breast	Breast	Prostate	Prostate	Prostate
3	Colorectum	Colorectum	Lung	Lung	Lung
4	Stomach	Cervix Uteri	Colorectum	Colorectum	Colorectum
5	Cervix Uteri	Lung	Corpus Uteri	Melanoma of Skin	Cervix Uteri

Incidence Projections in Latin America

Cancer incidence is projected to continue increasing in Colombia, with 148,600 new cases of cancer projected for 2030 and 189,988 new cases projected for 2040. These figures represent a 45.8% increase in cancer cases between 2018 and 2030, and an 86.5% increase between 2018 and 2040. For 2040, this translates to an additional 88,095 new cases of cancer on top of the number of cases in 2018. Appendix Figure 3 presents the estimated cases of cancer in Colombia over the next 20 years.

Appendix Figure 3: Estimated Cases of Cancer in Colombia (2020-2040) (Source: IARC Cancer Today (13))



Though this trend of increasing cancer incidence is consistent across much of Latin America, alarmingly Colombia has the second highest percentage increase among the selected Latin American counterparts. Only Mexico has a higher percentage increase between 2018 and 2040 at 88.6%, just above Colombia's projected 86.5% increase over the same time period. For comparison, Mexico and Colombia are above projected increases in Argentina (47.8%), Chile (77.7%), and Brazil (78.4%). Appendix Table 4 compares the estimated number of cases over time for all cancer sites, with the projected increases in cases calculated from these estimates.

Appendix Table 4: Estimated Number of Cancer Cases Over Time, All Cancer Sites: Argentina, Brazil, Chile, Colombia ad Mexico (Source: IARC Cancer Today (13))

	Colombia	Argentina	Brazil	Chile	Mexico
2020	108,954	133,604	594,908	56,575	202,923
2030	148,600	159,776	789,200	74,973	274,383
2040	189,988	190,779	998,056	94,807	359,542

The percentage increase in the number of cases in Colombia is higher than the increases projected for Latin America and the Caribbean, North America, Western Europe, and the World. In 2040, the number of cases for North America and Western Europe are projected to increase by 46.3% and 27% respectively. These figures are well-below Colombia's estimate (86.5%), which is more consistent with the projection for Latin America and the Caribbean as a whole (78.6%). Appendix Tables 5 and 6, and Figure 4 further detail this global comparison.

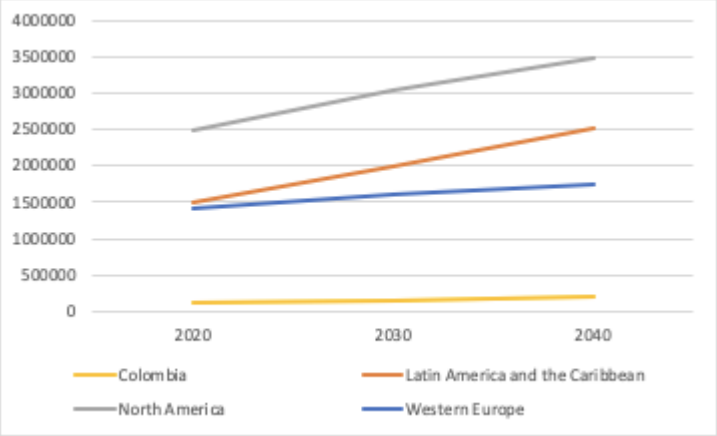
Appendix Table 5: Percentage Increase in Number of Cases from 2018: Colombia, World Regions and the World (Source: IARC Cancer Today (13))

	Colombia	Latin America and the Caribbean	North America	Western Europe	World
2020	6.9%	6.0%	4.4%	2.8%	5.0%
2030	45.8%	40.1%	27.5%	16.4%	33.4%
2040	86.5%	78.6%	46.3%	27.0%	63.4%

Appendix Table 6: Estimated Cancer Cases Over Time (Source: IARC Cancer Today (13))

	Colombia	Latin America and the Caribbean	North America	Western Europe
2020	108954	1497913	2483719	1408162
2030	148600	1979072	3031766	1594721
2040	189988	2523200	3480754	1740989

Appendix Figure 4: Estimated Cancer Cases in Colombia and Selected World Regions (2020-2040) (Source: IARC Cancer Today (13))



Disaggregated Incidence Projections

When disaggregating by cancer type, the projected number of cases in Colombia is predicted to double or nearly double for prostate, colon, stomach, and lung cancer. Prostate cancer, already the cancer with the highest incidence rate, will further increase by 114% between 2018 and 2040. Lung cancer is also projected to increase at a similar rate, rising by 113.4% in the same period to 12,498 new cases of lung cancer in 2040. For a global comparison, prostate cancer is projected to increase 25.5% in France and 38.5% in the UK. Increases in lung cancer show a similar gap between Colombia and Western European countries, with France increasing 21.9% and the UK increasing 41.5%. Cancers like breast cancer (56.6% increase 2018-2040), cervical uterine cancer (50.9% increase), and thyroid cancer (56.6%) are still projected to increase in Colombia, but at lower rates than those mentioned above.

For Latin America, a troubling regional trend is that the projected cases of prostate, colon, stomach, and lung cancers are projected to double or nearly double in Colombia, Brazil, Chile, and Mexico. Argentina's estimates are not as dire as its Latin American counterparts, yet not as low as France and the UK. Appendix Table 7 summarized the percentage increase in cases between 2018 and 2040 for selected Latin American and Western European countries, while Appendix Table 8 exhibits the crude numbers for projected cases by cancer type.

Appendix Table 7: Percentage Increase in Cases of Cancer Between 2018 and 2040, by Cancer Type: Colombia and Selected Comparator Countries (46)

	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
Prostate	114.00%	58.50%	99.10%	104.40%	127.00%	25.50%	38.50%
Breast	56.60%	39.70%	55.50%	44.40%	69.80%	12.20%	20.20%
Colon	102.40%	53.10%	89.90%	85.70%	101.30%	36.90%	41.20%
Stomach	100.30%	53.60%	89.50%	92.80%	106.30%	36.70%	46.70%
Cervix Uteri	50.90%	30.20%	43.10%	39.10%	62.00%	7.40%	7.10%
Lung	113.40%	54.00%	98.30%	89.60%	122.30%	21.90%	41.50%
Thyroid	36.80%	28.90%	27.60%	25.40%	47.30%	4.20%	13.40%
Ovary	58.10%	38.90%	60.00%	42.60%	65.00%	23.30%	25.80%
Non-Hodgkin Lymphoma	79.10%	43.80%	57.70%	61.30%	78.00%	29.40%	32.80%
Leukemia	56.40%	40.50%	66.50%	58.80%	43.70%	31.70%	36.80%

Appendix Table 8: Projected Cases of Cancer by Cancer Type, for 10 Highest Incidence Rates in Colombia Compared with Selected Countries (46)

Prostate Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	13876	12080	91653	7078	27078	67311	58545
2030	20457	14807	128706	10109	39894	76836	69246
2040	27199	18384	169252	13443	56864	81523	78092

Breast Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	14124	22308	90225	5628	28958	57090	56601
2030	17778	26128	112951	6778	37761	60849	62142
2040	20957	30124	133118	7787	46315	63020	66612

Colon Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	6099	12870	29907	3912	11204	30553	32187
2030	8647	15632	40866	5290	15660	35798	38210
2040	11456	19005	53084	6827	21053	40545	43999

Stomach Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	7983	4127	22375	5511	8091	7982	6597
2030	11283	5022	30537	7603	11394	9354	7948
2040	14863	6112	39663	9950	15565	10560	9345

Cervix Uterine Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	4046	4616	17030	1608	8295	3084	3456
2030	4990	5250	20466	1900	10514	3176	3550
2040	5815	5836	23323	2154	12744	3295	3674

Lung Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	6358	12028	37088	4143	8418	48521	54187
2030	9306	14602	51785	5699	12249	54310	64565
2040	12498	17855	68429	7345	17363	57437	74047

Thyroid Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	5332	3581	22227	1114	12701	11814	4917
2030	6301	4059	25411	1250	15505	12164	5233
2040	6994	4487	27405	1356	17851	12188	5501

Ovarian Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	2551	2407	7046	877	5031	5100	6571
2030	3219	2815	8893	1051	6453	5683	7383
2040	3816	3237	10697	1199	7850	6148	8060

Non-Hodgkin Lymphoma Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	4437	3520	13522	1571	5485	15156	16417
2030	5924	4162	16875	1991	7242	17304	18934
2040	7470	4896	20320	2403	9212	19081	21160

Leukemia Cancer Future Incidence Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	3260	3019	11729	1348	6631	12413	11369
2030	4041	3523	14904	1683	7853	14283	13276
2040	4890	4122	18618	2050	9207	15891	15081

13. Appendix E: GDP per Capita and Health Expenditure Trends

Using CONCORD-3 survival estimates, the Harvard research team plotted 5-year net survival for major cancers against metrics for the level of economic development using GDP per capita and investment in health system as measured by health expenditure per capita. These results are presented in the main body of the report. We include below the methodology used to derive GDP per capita and Health Expenditure figures used in the analysis.

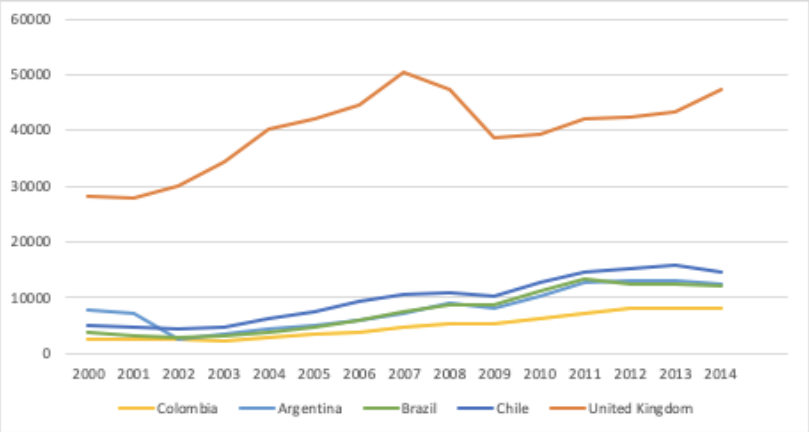
GDP per capita was calculated by dividing a country's annual GDP by its midyear population, with the original figure reported in current US Dollars (USD). Healthcare expenditure pertains to the estimated expenditure on healthcare goods and services consumed each year, also nominally reported in current USD. However, these nominal figures fail to account for the differences in the prices of goods and services in different countries and regions. Hence, purchasing power parity (PPP) is an additional adjustment to the per capita metrics that facilities a clearer comparison between countries. The PPP metrics analyzed are reported in International Dollars (Intl$), which has the same purchasing power as the US dollar has in the United States. The following analysis uses GDP per capita and health expenditure per capita, both nominal and PPP, from 2000 to 2014 in Argentina, Brazil, Chile, and the UK for additional contextualization of Colombia's situation.

Changes in GDP Per Capita

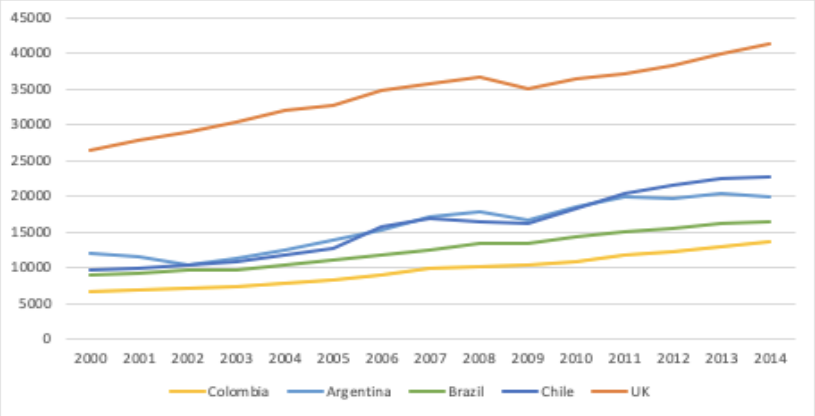
GDP per capita has increased substantially from 2000 to 2014 for each country included in the analysis, despite significant periods of slower economic growth or decline. Of the countries selected, Colombia has the lowest 2014 GDP per capita, PPP, with Intl$13,618, closely followed by Brazil at Intl$16,358. In a different, more economically affluent cluster is Argentina and Chile, with a GDP Per capita, PPP, of Intl$20,008 and $22,786 each. Finally, the UK has a predictably higher GDP per Capita at Intl$41,259. Again, PPP figures are used in lieu of the nominal GDP per capita estimates for a more consistent comparison between countries.

Colombia's GDP per capita, PPP, has increased 103.4%, from Intl$6,694 in 2000 to Intl$13,618 in 2014. This percentage increase in on the higher end, above Argentina (67.9% increase), Brazil (80.3%) and the UK (56.2%), but not more than Chile (138.5%). Appendix Figures 5 and 6 present each country's nominal GDP per capita and GDP per capita, PPP.

Appendix Figure 5: GDP Per Capita, Current USD for Colombia and selected countries (99)



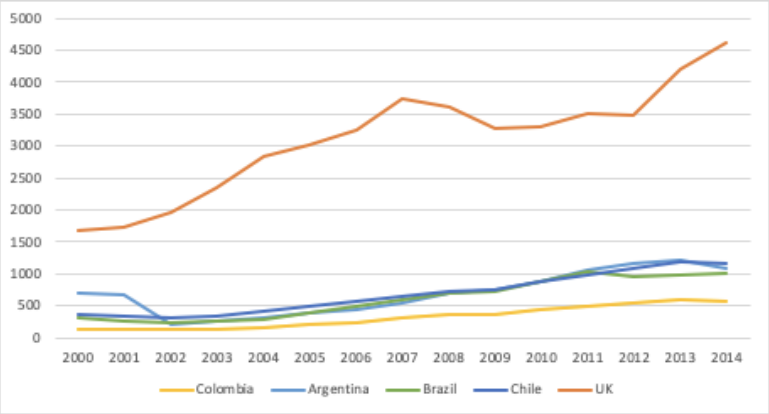
Appendix Figure 6: GDP Per Capita for Colombia and selected countries, PPP, Current International $ (99)



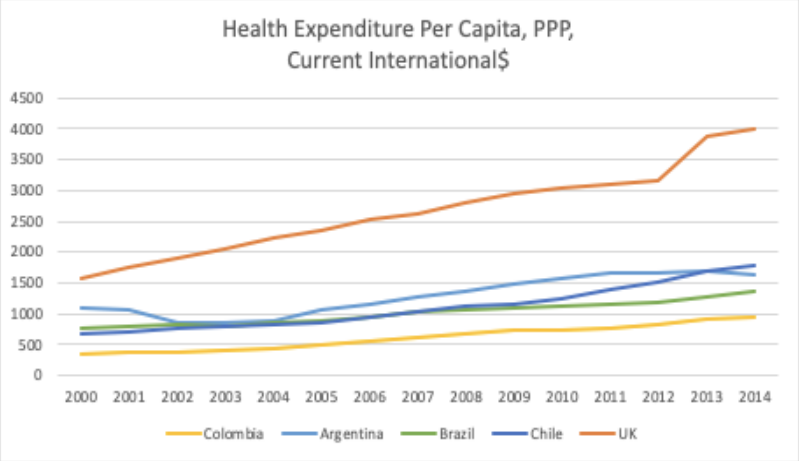
As with GDP per capita, Colombia has the lowest health expenditure per capita, PPP, at Intl$956. Other countries in the comparison group, in order, are Brazil (1,640), Argentina (1,640), Chile, (1,793), the UK (4,003). Though it is the lowest nominal amount, Colombia's health expenditure per capita as a percentage of total GDP per capita (both figures PPP) is only slightly lower than the others. Colombia has a health expenditure per capita that is 7.02% of its GDP per capita (both figures PPP), similar to that of Argentina (8.2%), Brazil (8.3%), Chile (7.87%), and the UK (9.7%).

Each country has also substantially increased its health expenditure per capita. Colombia has increased 177.4% from Intl$344 per person in 2000 to Intl$954 in 2014. This percentage increase is higher than any other country, with Chile (165.5%) and the UK (154.9%) slightly lower, and Argentina (51.1%) and Brazil (81.6%) significantly lower.

Appendix Figure 7: Health Expenditure per Capita, Current USD for Colombia and selected countries (99)



Appendix Figure 8: Health Expenditure per Capita, PPP, Current International$ for Colombia and selected countries (99)



To mirror the CONCORD analysis, each of the financial metrics discussed above were simplified into 5-year averages corresponding to the years for survival estimates: 2000-2004, 2005-2009, and 2010-2014 and are presented in the Table below.

Appendix Table 9: 5-year Averages of GDP Per Capita of Selected Countries

GDP Per Capita (Current US$)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	2484.2	5027.5	3288.8	5012.6	32132.1
2005-2009	4499.1	7104.1	7090.8	9705.2	44639.4
2010-2014	7604.0	12346.5	12263.0	14662.2	42959.9

GDP Per Capita, PPP (Current International $)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	7140.3	11515.4	9627.7	10502.6	29091.8
2005-2009	9522.5	16169.9	12370.6	15620.8	34939.8
2010-2014	12223.7	19696.1	15471.7	21047.6	38608.8

Health Expenditure Per Capita (Current USD)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	134.8	434.0	274.4	358.3	2110.9
2005-2009	296.5	565.3	577.7	637.9	3376.4
2010-2014	524.0	1084.8	970.5	1058.4	3822.7

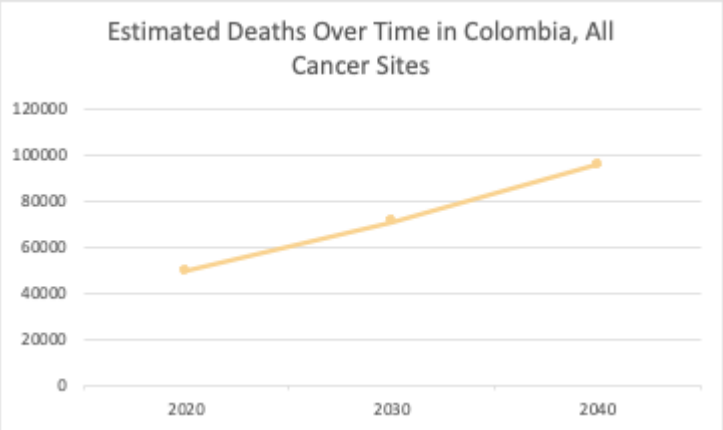
Health Expenditure Per Capita, PPP (Current International $)

	Colombia	Argentina	Brazil	Chile	UK
2000-2004	386.6	952.2	800.9	752.1	1903.8
2005-2009	623.8	1267.9	1006.7	1025.5	2652.6
2010-2014	842.9	1643.1	1226.0	1522.4	3434.4

14. Appendix F: Projected Cancer Mortality in Colombia and Selected Comparator Countries

Colombia is projected to experience 95,692 total deaths from cancer in 2040, an additional 49,635 deaths from what Colombia experienced in 2018 and an 107.8% increase from that in 2018.

Appendix Figure 9: Projected Deaths Over Time in Colombia, All Cancer Types (46)

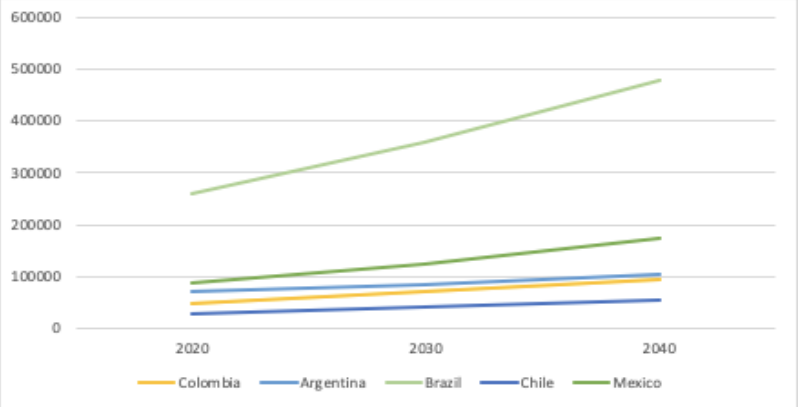


Other than Argentina, that is projected to experience an increase of 53.9% in the number of cancer deaths from 2018 to 2040, the projected increases in Colombia are consistent with other countries whose projected deaths from cancer will double or nearly double within the next 20 years. Namely, deaths in Mexico will increase by 107.2%, in Chile by 95.8%, and in Brazil by 95.5%. Appendix Table 10 and Figure 10 detail the Latin American projections with crude numbers for each country, and thus comparison between countries must be made on the relative increase seen in a country.

Appendix Table 10: Projected Deaths Over Time, All Cancer Types: Colombia and Selected Comparator Countries (46)

	Colombia	Argentina	Brazil	Chile	Mexico
2020	49570	71225	260710	30314	89358
2030	70967	86681	359967	41884	125763
2040	95692	105838	476272	55698	172961

Appendix Figure 10: Projected Deaths Over Time, All Cancer Types: Colombia and Selected Comparator Countries (46)



Mortality Projections in Other Regions

In addition to having a higher increase in cancer cases than other regions, Colombia is also projected to have the highest percentage increase in mortality among the regional averages of Latin America and the Caribbean, North America, Western Europe, and the World. Though the projected mortality levels from cancer in Latin America are projected to nearly double like Colombia, regions like North America and Western Europe have substantially lower projected increases at 59.2% and 38.6% respectively.

Appendix Table 11: Percentage Increase in Number of Deaths from 2018, All Cancer Types: Colombia, Selected World Regions and the World (46)

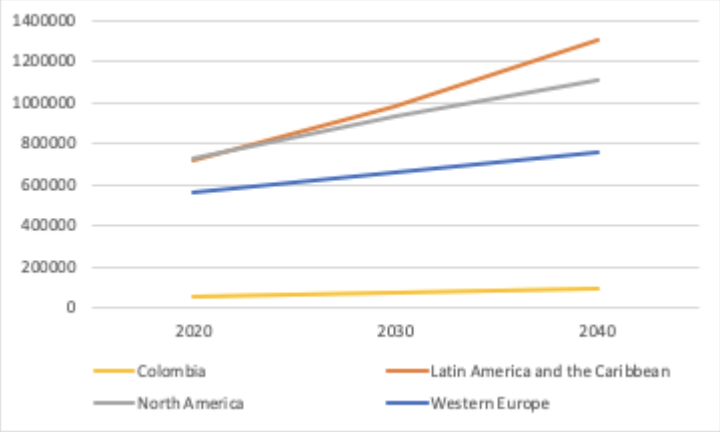
	Colombia	Latin America and the Caribbean	North America	Western Europe	World
2020	7.6%	6.5%	4.8%	3.2%	5.2%
2030	54.1%	45.5%	33.0%	20.9%	36.3%
2040	107.8%	93.4%	59.2%	38.6%	71.5%

This difference in the magnitude of increasing number of cancer deaths is reflected in the slopes of the lines in Appendix Figure 11, though the scale of different regions may observe the visual comparison.

Appendix Table 12: Projected Deaths Over Time, All Cancer Types: Colombia and Selected World Regions (46)

	Colombia	Latin America and the Caribbean	North America	Western Europe
2020	49570	716476	731531	566094
2030	70967	979129	928636	663088
2040	95692	1301388	1111973	760017

Appendix Figure 11: Projected Deaths Over Time, All Cancer Types for Colombia and Selected World Regions (46)



Disaggregated Mortality Projections

Though the incidence of new cancer cases is projected to double in Colombia for 4 major types of cancer (prostate, colon, stomach, and lung), mortality is projected to double for 6 different types of cancer. Already prostate cancer. the cancer with the highest mortality rate per 100,000 men, is projected to increase 160.2% between 2018 and 2040. Furthermore, alarming increases can additionally be seen in cancers of the lung (118.4% increase), colon (117.7%), liver (121.5%), pancreas (116.2%), and stomach (109.6%). Though other cancers will not double in the number of deaths like those mentioned above, significant increases are projected for the remainder of Colombia's top 10 cancer types by mortality ASR, namely breast cancer (78.3% increase), cervical uterine cancer (75.9%), leukemia (69%), and ovarian cancer (80.8%).

Mortality for prostate cancer is expected to rise at a similarly high level in Brazil (147% increase), Chile (154.2%), and Mexico (147%), and to a much lesser extent in Argentina (71% increase), France (74.1%), and the UK (75.9%). Across the cancers analyzed, Colombia performs slightly worse in terms of percentage increase in deaths than Brazil, Chile, and Mexico, and significantly worse than Argentina, France, and the UK. Appendix Table 13 lays out the numbers of projected deaths for each cancer type in 10-year increments until 2040, and Table 14 compares the percentage increase in number of deaths in a country by cancer type.

Appendix Table 13: Projected Number of Deaths by Cancer Type, for 10 Cancers with the Highest Mortality Rates in Colombia: Colombia and Selected Comparator Countries (46)

Prostate Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	3441	4099	18161	2439	7459	9339	13708
2030	5468	5243	27856	3773	11294	12043	18245
2040	8239	6797	41368	5771	17082	15670	23122

Breast Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	3942	6605	19567	1778	7353	13639	12144
2030	5247	7902	25561	2273	9970	15539	14085
2040	6600	9411	31825	2817	12847	17881	16078

Stomach Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	5931	3319	16947	3719	6474	5494	4646
2030	8540	4060	23585	5245	9198	6559	5693
2040	11536	4980	31220	7069	12776	7672	6782

Lung Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	5693	11064	34260	3833	7254	38626	39059
2030	8412	13444	48048	5318	10598	44210	47035
2040	11435	16482	63700	6909	15110	48181	54608

Colon Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	3661	7730	16491	2416	6121	14950	12202
2030	5353	9512	23285	3381	8700	18104	15143
2040	7378	11746	31539	4570	12049	21790	18269

Cervix Uterine Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	1886	2301	8510	761	4386	1492	1055
2030	2497	2659	10693	961	5882	1614	1169
2040	3123	3017	12759	1166	7568	1772	1275

Leukemia Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	2302	2163	8361	929	4666	7454	5259
2030	2969	2566	10995	1218	5782	9070	6489
2040	3705	3056	14185	1546	7115	10799	7767

Ovarian Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	1338	1368	4453	495	2951	4037	4279
2030	1800	1626	5916	627	4012	4676	4984
2040	2264	1918	7451	749	5178	5289	5645

Liver Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	2404	2193	12661	1552	7397	10414	7083
2030	3560	2678	17635	2157	10795	12287	8538
2040	4908	3280	23372	2824	15354	13848	9979

Pancreatic Cancer Number of Deaths Projection

Type	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
2020	2322	4858	12761	1685	4816	13718	10391
2030	3404	5949	18035	2314	6980	16193	12426
2040	4631	7300	24315	3008	9801	18527	14398

Appendix Table 14: Percentage Increase in Cases Between 2018 and 2040, by Cancer Type: Colombia and Selected Comparator Countries (46)

	Colombia	Argentina	Brazil	Chile	Mexico	France	UK
Prostate	160.20%	71.00%	147.30%	154.20%	147.00%	74.10%	75.90%
Breast	78.30%	47.50%	72.60%	66.90%	86.60%	33.90%	35.70%
Stomach	109.60%	55.50%	97.60%	103.20%	111.70%	44.00%	51.20%
Lung	118.40%	54.60%	100.00%	92.90%	124.40%	28.60%	44.90%
Colon	117.70%	57.40%	105.50%	101.80%	111.40%	50.10%	54.90%
Cervix Uteri	75.90%	35.20%	57.90%	60.80%	83.60%	20.40%	23.40%
Leukemia	69.00%	45.70%	79.20%	75.10%	59.20%	49.80%	53.00%
Ovary	80.80%	45.20%	78.30%	59.40%	87.30%	34.70%	35.90%
Liver	121.50%	55.20%	98.10%	95.00%	123.60%	37.60%	46.00%
Pancreas	116.20%	55.90%	105.10%	90.50%	119.00%	39.40%	43.40%

15. Appendix G: Projected Incidence of Childhood Cancers and Estimates of 5-Year Net Survival for Selected Childhood Cancers

After disaggregating by cancer group, Leukemia, Lymphoma and Central Nervous System (CNS) Neoplasms, and related cancers are the most common childhood cancer groups in Colombia at a projected incidence of 777, 309, and 253 cases respectively. Together, these 3 cancer groups account for 73% of all childhood cancer cases. Appendix Table 15 outlines the each of the 10 childhood cancer groups in Colombia by incidence, with Table 16 defining which specific cancer types comprise each cancer group

Appendix Table 15: Projected Number of Cases of Childhood Cancer in 2030, by Cancer Group (Source: Harvard Dataverse (103))

Cancer Group	Projected Number of Cases in 2030
Leukemia	777
Lymphoma & Related	253
CNS Neoplasms	309
Neuroblastoma	66
Retinoblastoma	61
Renal Tumors	91
Hepatic Tumors	30
Bone Tumors	10
Soft Tissue Sarcoma	133
Germ Cell Tumors	76
Carcinoma & Melanoma	78
Other & Unspecified	2,863

Appendix Table 16: Cancer Group Definitions

Cancer Group	Cancer Type
Leukemia	a. Lymphoid
Leukemia	b. Acute myeloid
Leukemia	c. CMD
Leukemia	d. MDS & other
Leukemia	e. Unspecified
Lymphoma & Related	a. Hodgkin
Lymphoma & Related	b. Non-Hodgkin except BL
Lymphoma & Related	c. Burkitt (BL)
Lymphoma & Related	d. Lymphoreticular
Lymphoma & Related	e. Unspecified
CNS Neoplasms	a. Ependymoma
CNS Neoplasms	b. Astrocytoma
CNS Neoplasms	c. CNS embryonal
CNS Neoplasms	d. Other gliomas
CNS Neoplasms	e. Other specified
CNS Neoplasms	f. Unspecified CNS
Neuroblastoma	a. (Ganglio)neuroblastoma
Neuroblastoma	b. Peripheral nervous
Retinoblastoma	Retinoblastoma
Renal Tumors	a. Nephroblastoma
Renal Tumors	b. Renal carcinoma
Renal Tumors	c. Unspecified
Hepatic Tumors	a. Hepatoblastoma
Hepatic Tumors	b. Hepatic carcinoma
Hepatic Tumors	c. Unspecified
Bone Tumors	a. Osteosarcoma
Bone Tumors	b. Chondrosarcoma
Bone Tumors	c. Ewing & related
Bone Tumors	d. Other specified

Cancer Group	Cancer Type
Bone Tumors	e. Unspecified
Soft Tissue Sarcoma	a. Rhabdomyosarcoma
Soft Tissue Sarcoma	b. Fibrosarcoma
Soft Tissue Sarcoma	c. Kaposi sarcoma
Soft Tissue Sarcoma	d. Other specified
Soft Tissue Sarcoma	e. Unspecified
Germ Cell Tumors	a. CNS germ cell
Germ Cell Tumors	b. Other extragonadal
Germ Cell Tumors	c. Gonadal germ cell
Germ Cell Tumors	d. Gonadal carcinoma
Germ Cell Tumors	e. Unspecified gonadal
Carcinoma & Melanoma	a. Adrenocortical
Carcinoma & Melanoma	b. Thyroid
Carcinoma & Melanoma	c. Nasopharyngeal
Carcinoma & Melanoma	d. Melanoma
Carcinoma & Melanoma	e. Skin carcinoma
Carcinoma & Melanoma	f. Other & unspecified
Other & Unspecified	a. Other specified
Other & Unspecified	b. Other unspecified

Further disaggregating the cancer groups into cancer types, the three most common types of childhood cancer regardless of group are lymphoid leukemia (592 projected cases in 2030), acute myeloid leukemia (114), and astrocytoma (104.2). Other cancers with over 75 projected cases in 2030 are non-Hodgkin lymphoma, Hodgkin lymphoma, CNS embryonal tumors, nephroblastoma, and ganglioneuroblastoma. The top 10 childhood cancer types account for 66.2% of all childhood cancer in Colombia, indicating a relatively fragmented concentration of incidence among cancer types (63).

In addition to incidence and diagnosis at a country-level, the study also estimated 5-year survival from 2015-2019 as a percentage of diagnosed patients for each cancer type. The lowest survival estimate for a top 10 childhood cancer type was CNS embryonal cancer, with a survival of 41.5%. In contrast, Hodgkin lymphoma has the highest 5-year survival of 79.6% of diagnosed cases. Lymphoid leukemia, as the most common type of cancer, has an estimated survival of 74.5% of cases in Colombia (63).

Appendix Table 17: Estimated 5-Year Survival for the Top 10 Childhood Cancer Types by Incidence in Colombia (Source: Harvard Dataverse (63,103))

Cancer Group	Cancer Type	Projected Incidence in 2030	5 Year Survival (% of diagnosed cases)
Leukemia	Lymphoid	592	74.5%
Leukemia	Acute Myeloid	114	58.4%
CNS Neoplasms	Astrocytoma	104	49.9%
Lymphoma & Related	Non-Hodgkin except Burkitt	88	74.3%
Lymphoma & Related	Hodgkin	86	79.6%
CNS Neoplasms	CNS Embryonal	81	41.5%
Renal Tumors	Nephroblastoma	81	71.3%
Neuroblastoma	Ganglioneuroblastoma	62	64.7%
Retinoblastoma	Retinoblastoma	62	71.1%
Bone Tumors	Osteosarcoma	60	55.0%

16. Appendix H: Analysis of Colombian Health System and its Performance Generally and in Relation to Cancer

16.1. Health System Goals

16.1.1. Population Health

In 2020 the Colombian population reached 50.9 million inhabitants. Life expectancy at birth is approximately 78.2 years for women, and 71.0 years for men. Population growth will be accompanied by an aging population and an increase in life expectancy (33). The percentage of the population aged 65 and over will increase by 33% in 2020 compared to 2000 and by 2050 by 119% to comprise 8% of the population in 2020 to 17.5% in 2050 (100).

Colombia has what is known as a triple burden of disease, comprised of communicable, non-communicable diseases, and violence. However, in recent years, violence has seen its levels decrease in the general population. Like other Latin American countries, reducing the maternal mortality ratio is a significant health priority. Colombia has created several initiatives related specifically to NCDs since 2013 and is one of the first countries to do so. Almost 75% of all deaths in Colombia are caused by NCDs, with cancer (20%) and heart disease (30%) as the main causes (101).

Appendix Table 18: Population by region – Colombia 2018 (33).

Region	Population				
	Total	Male (%)	Female (%)	Urban (%)	Rural (%)
Caribbean	10,023,072	49.94	50.06	73.56	26.44
Central	11,663,270	49.21	50.79	73.96	26.04
Bogota Cundinamarca	10,128,968	48.67	51.33	91.38	8.62
Eastern	6,187,858	49.82	50.18	70.55	29.45
Pacific	7.983.357	49.30	50.70	68.66	31.34
Amazon-Orinoquía	595,298	51.09	48.91	46.18	53.82

For the five-year period of 2010-2015, Bogotá had the greatest life expectancy in men at 78.01 years and represents the highest in the country. The departments Atlántico and Santander follow, at 75.49 and 75.33 years respectively (47).

Cancer

In 2014, approximately 17,000 men and 18,400 women died from cancer. The International Agency for Research on Cancer estimated that new cancer cases under age 65 in Colombia will grow by 31% by 2035 (9), with around 36,769 in 2012 to over 53,444 cases by 2035. These rates show Colombia as a country with an intermediate incidence of cancer within the world panorama.

The departments that showed the highest adjusted incidence rates for all cancers (except non-melanoma skin) among men were Quindío (195.5), Risaralda (182.4), Valle del Cauca (179.6) and Antioquia (173.1). In women, they were Quindío (193.3), Caldas (170.4), Risaralda (168.6), and Meta (167.9). Among men, the main locations were prostate, stomach, lung, colon, and non-Hodgkin lymphomas. In women, the main sites were breast, cervix, colon, stomach, and thyroid (49).

In the pediatric population, there is an average estimated 764 new cancer cases in boys and 558 in girls, per year. The type of cancer with the highest specific incidence rate was leukemia (4.8 per 100 000 population in boys and 4.1 in girls), followed by non-Hodgkin lymphomas (2.2 in boys and 0.6 in girls). The departments with the highest cancer incidence rates among children were identified as Atlántico (17.9 per 100 000 population), Quindío (16.4), Risaralda (16.3) and Casanare (14.7). Among girls, the departments with the highest cancer incidence rates were Meta (14.9), Huila (13.6), Quindío (11.4) and Atlántico (11.3) (50,51).

Risk factors

Obesity: The departments with the highest obesity levels (between 18 and 64 years) are San Andrés, Guaviare, Caquetá, Tolima Guainía, Chocó, Casanare, and Arauca, surpassing 20% of the people surveyed (52).

Malnutrition: In the departments of Vaupés, Amazonas, La Guajira, Guainía, and Cauca, chronic malnutrition exceeds 20% of the children included in the survey and is significantly higher than the national average. San Andrés y Providencia is the only territorial entity whose percentage of chronic malnutrition is statistically significant (71% lower than the national) (52).

Anemia: Looking at each department independently, anemia occurs more frequently in the departments of Amazonas, Meta, Nariño, La Guajira, Córdoba, Cundinamarca, and Chocó, where more than 35% of children between 1 and 4 years have anemia. Anemia is 49% and 45% more frequent in the departments of Amazonas and Meta than the national indicator; additionally, the percentage of anemia is significantly lower in the departments of Sucre and Santander, 46% and 50% respectively (52).

Smoking: The current prevalence of cigarette consumption in Colombian adults between 18 and 69 years of age is 12.8%, higher in men than in women. The regions with the highest tobacco consumption are Antioquia (17.2%), Bogota (15.9%), and Chocó (15.9%), although these rates have been decreasing over the years (52).

Alcohol: consumption in Colombia does not exceed that of Europe or countries such as Canada and the United States. However, in South America, it is one of the nations with the highest consumption rates at 6.3 liters of alcohol per person per year. In fact, in the region, it is only surpassed by Venezuela (8.9 liters per year), and Brazil (6.9 liters) (52).

Among the regions, Antioquia and the coastal regions drink the most, with 8.6 liters of alcohol per capita per year. They are followed by the eastern departments with 6.5 liters per person per year and Bogotá with 5.5 liters. The region that consumes the least is the Andean region (excluding Bogotá and Antioquia), with 4 liters per person per year.

Social Determinants of Health

Poverty: Multidimensional poverty assesses the basic needs of citizens, according to educational conditions, labor, youth and childhood indicators, health, housing, and public services. In 2018, multidimensional poverty rates in Colombia reached 19.6% of the population. Guainía (65.0%), Vaupés (59.4%), Vichada (55.0%), La Guajira (51.4%), and Chocó (45.1%) are the regions with the populations that have the greatest obstacles to access basic needs and quality of life elements (53). When reviewing the population's economic levels, the poorest regions of the country are Chocó, where 61.1% of the population is classified as poor, followed by La Guajira (53.7%); Cauca (50.5%); Magdalena (46.6%) and Córdoba (44.2%) (53).

Education: According to the results of the National Survey on Quality of Life (2011), the proportion of illiteracy in people over 15 years of age has decreased in Colombia by 0.5%, from 6.3% to 5.8% (54).

Housing conditions: According to the 2005 census, 10.4% of the population lived in inadequate housing. The percentage of the population living in such conditions is higher in Vichada, La Guajira, and Córdoba, with 47.74%, 46.26, and 41.56%, respectively. The departments with the lowest percentage of people living in inadequate housing are Bogotá, Caldas, San Andrés, and Quíndio, where the rate does not exceed 1.5% (17).

Housing with access to services: According to the 2005 census, 7.4% of the population lived in a house with inadequate services. The percentage living with these conditions varies among the departments, being higher in Chocó, Vichada, and Guainía with 71.13%, 39.14%, and 35.34%, respectively (17). The departments with the lowest percentage of people who do not have access to adequate services are Bogotá, Quindío, and Caldas, where the percentage does not exceed 1.5% (17).

Health System Coverage: 92.02% of the Colombian population is affiliated with an insurance scheme in the health system. 48.34% belong to the subsidized regime, 42.84% to the contributory regime, and 0.83% belong to a special regime, and the remaining 7.98% of the population is not affiliated with a scheme (55).

16.1.2. Financial Protection

Since health reform efforts in 1993 instituted social health insurance, Colombia has slowly improved financial protection for citizens. The coverage expansion to a contributory subsidized system now covers 88% of the population, a markedly impressive increase from the previous 16%. Despite these advancements, uninsured Colombians, who are also disproportionately poorer, still experience high out-of-pocket (OOP) expenditures for cancer-related services (83).

Around 6-8% of Colombians are uninsured, which has decreased by 12% from 2010 to 2015 (57). 76% of those in rural communities have subsidized insurance compared to only 34% in urban areas. More of the urban population has contributory insurance (55%) than the rural population (16%) (57). Those in rural populations were more likely than those in urban areas to cite economic reasons that prevented them from going to the doctor when they needed to (16% vs. 3%).

Appendix Table 19: Health spending in Selected Latin American Countries, 2016 (Source: Past, present, and future of global health financing: a review of development assistance, government, out-of-pocket, and other private spending on health for 195 countries, 1995-2050 (102)).

Country	Health spending per capita, 2016 (US$)	Annualized rate of change in health spending per capita, 1995–2016 (US$)	Health spending as a proportion of GDP, 2016	Government health spending as a percentage of total health spending, 2016	Out-of-pocket spending as a proportion of total health spending, 2016
Colombia	358	0.81%	3.9%	65.1%	20.6%
Argentina	1071	0.68%	7.9%	76.1%	14.8%
Mexico	505	2.64%	4.2%	52.5%	40.0%
Brazil	1114	3.35%	8.0%	33.3%	43.9%
Chile	1244	4.55%	6.8%	58.5%	34.7%
Peru	337	3.59%	4.5%	62.7%	29.1%

16.1.3. User Satisfaction

User satisfaction with the Colombian health system is not well-described. Even for Colombian patients who have health coverage, issues with quality of care affect patients' desire to access health services. One study pointed out that the measures used to evaluate patient satisfaction in Colombia are not up to WHO standards (58). Results from the Colombia Demographic and Health Survey from 2015 found that many patients' perceptions of low-quality care and long wait times affected their decisions to get preventive cancer screenings (57).

According to the national survey of evaluation of health services (EPS), of the year 2017, the global satisfaction for health services was 72.6% in the total of users. Users in the subsidized regime are more satisfied than those in the contributory scheme. The beneficiaries of the contributory scheme were more demanding (66.1%) than the second group (77.1%) (59).

Users' satisfaction is lower, particularly for the services for emergencies and unscheduled appointments. Likewise, the analysis showed that agile and straightforward procedures and the waiting time for attention are essential weaknesses. A total of 79.6% of users express that they would recommend their EPS. However, a higher adherence rate is observed in the subsidized regime, reaching 85.2% (59).

On average, waiting times for general medicine increased from 6.5 to 8.8 days in 2017. The gap by regime widened to 5 days, being more significant in the contributory scheme. The highest increase in waiting times was in specialized medicine, general medicine, general surgery, promotion, and prevention programs.

In 2017, the ease of access for users decreased by 5%. It was found that the least opportunity in care is in specialized care and administrative procedures. This suggests a lack of resolution capacity and/or difficulties in the contracts with the Healthcare Providers Institutions (IPS). Regarding administrative procedures, the highest average waiting time is in the following procedures: EPS change, reimbursements, and access to surgeries. It was observed that some administrative processes are complicated for the user and lead them to prefer not to do them (59). Finally, administrative and organizational difficulties and barriers persist, leading to delays in obtaining care, impairs the user experience, and their perception of the service.

16.2. Health System Objectives

16.2.1. Equity

Judicialization of healthcare, which is widespread in civil law Latin American countries like Colombia, has a large impact on equity (60). Judicialization in the health contexts refers to individuals or groups litigating for legally guaranteed access to medical care or pharmaceuticals. In Colombia, much of the health-related litigation is around pharmaceuticals i and in 2008, almost a quarter of Colombia's public pharmaceutical expenditure ($156 million) was used to pay insurance companies after litigants brought to court a demand for access to a handful of costly medical drugs. This "pharmaceuticalization of health rights litigation" extends into cancer care as well. Large pharmaceutical companies in Colombia provide monetary support to patient advocacy organizations who litigate for cancer patients. This judicialization "fosters inequity in the allocation of limited health resources," (60). Case by case litigation around health rights does not the address root causes of inequity, such as social determinants of health and issues on the government and health systems levels (61). Those who benefit from judicialization in Colombia are most often those who

are have the resources to litigate for their own interests, including those who are middle and upper class who want access to more costly treatments which are not publicly offered services (60).

Research has demonstrated that social determinants of health are major drivers of inequity in Colombia around cancer. Inequities in cervical cancer mortality have been traced back to inequities in women's lack of access to cancer screening and treatment (64). Studies also show that education level was connected with mortality rates, with Colombian women who had lower education levels having higher cancer mortality (64). Further, studies show Colombia's geographical inequities in cervical cancer mortality, with the Eastern regions having lower mortality rates than others (66).

The effects on equity of increases in nationwide health coverage and expansion of social insurance in Colombia are unclear. Research shows that while some improvements have been made to improve access to health services on the whole, inequities in access to preventive services still persist for the poorest populations (56). Some suggest that since the largest expansion of health coverage was done only recently (2003-2008) that the health system has yet to see full the effects of the expansion on access, OOP expenditures, service quality, and health outcomes (56). However, research so far points toward how coverage expansion without similar growth in health sector capacity and continued monitoring and evaluation will not allow equity to be realized (56). Indeed, some have pointed toward health provider shortages and lack of facility diagnosis and treatment capacity as major barriers to equitable cancer care in Colombia (67). Researchers have suggested that the creation of the social health insurance scheme has actually worsened some existing inequities because the scheme did not also address capacity and resource barriers in rural areas. One example is the geographical disparity in access to cancer care where patients in rural communities, are still under-resourced, must travel to urban areas for proper cancer diagnostic and treatment services (68).

While the Colombia Cancer Control Plan (98) notes equity as a goal and acknowledges social determinants of health, it suggests simply having health insurance coverage is a solution, independent of the type of coverage. However, multiple studies have demonstrated that insurance status and type are connected to cancer outcomes (69). Compared to women with cervical cancer who had either subsidized health insurance or no insurance at all had greater years of life lost than women who had insurance under HMOs (70). However, women who had no health insurance or those with subsidized insurance lost fewer years of life compared to those under HMOs, possibly due to a "lack of extended public health programs that guarantee proper access to early detection and treatment of breast cancer in Colombia" (70).

16.2.2. Efficiency

The General System of Social Security in Health ("Sistema General de Seguridad Social en Salud", SGSSS) in Colombia is made up of public and private entities that favor the provision and assurance of health services by the Ministry of Social Protection. These participants have the function of financing, administration, regulation, and provision of services.

According to García et al., the SGSSS consists of two insurance schemes: the contributory regime is financed by contributions from employees and employers and the subsidized system funded by the State with resources from general taxes. This regime covers the most vulnerable part of the population with less economic capacity (71).

Both public and private providers manage the system, and all members have access to a government-defined benefit plan periodically. The system also reimburses medicines and technologies that are not included in the program (73). The SGSSS is based on the universal insurance of around 47 million inhabitants through quotas of a special fund that contains the resources and services offered by the EPS. Thus, the SGSSS is a system that relies on equity and solidarity policies, the purpose of which is that all people have access to health services without distinction of any kind and in which differences in income are compensated by transfers previously established (72).

16.2.3. Effectiveness

The Quality Information System of the health system in Colombia has been implemented starting from 2004. However, the distribution of the Health System (17 EPS of the contributory, more than 40 EPS of the subsidized and more than 8,000 public and private IPS) does not favor the control of information, and EPS do not have incentives for obtaining positive health results (59).

The health system generates a double reporting of the information, and even so, the type of services that the same patient receives (continuity) is not known within the system. Therefore, it is difficult to evaluate health care services. Physicians do not participate in the evaluation process. They have confrontations with EPS, due to regulations, the payment system, control in the diagnosis and treatment of the patient. The monitoring system in Colombia is not unified. Medical records are not automated in most IPSs; therefore, when a patient is cared for in one city and moves to another, he must start the process again (71).

Concerning the quality information system, there is no emphasis on health impact or risk reduction. The EPS do not have the necessary resources to do so, have limited themselves to evaluating whether it complies or does not comply, and do not carry out a critical analysis of the results. There are no corrective measures based on the results found, and not all sectors are reflected in them. In the last government, the implementation of the public health model based on determinants and intersectoral action has been pointed out as a challenge. There is a need to build business models to generate well-being, pointing out that vertical integration should be analyzed from the users and not from the agents' perspective (59).

Likewise, there is the need to achieve efficient delivery models concerning the primary level of care, considering the obsolescence of the infrastructure. Despite the significant advances in the matter obtained during the last five years, there is a need to consolidate the development of information systems. The last challenge of the health system is related to its being different from the current benefit model: consolidate a model where a balance is achieved in the individual care and provision against the social objectives of public health; the impact on the determinants must lead to that balance.

16.2.4. Responsiveness

The existing social response to cancer can be grouped into three main areas: political, community, and related to health services.

Political scope

The government has focused efforts on strengthening mechanisms aimed at expanding and maintaining coverage of population affiliation. This strategy is fundamental to provide financial protection and enable access to health services for the entire population. Actions have been taken by the health sector to promote the comprehensive and effective protection of families in the Social Protection system, such as the implementation of the Quality of Provision of Health Services program, whose primary purpose is to allow the population has access to all professional-level care services equitably, with quality and adequate user care.

Community-level

There is a social response from various civil, cultural, academic, social organizations, and institutions that support cancer patients; the offer of these last services is mainly in the big cities. Organizations and foundations working for cancer control play an essential role in defending, promoting, and disseminating the fundamental rights and freedoms of patients with cancer. The National Cancer Institute has an inventory of organizations that is regularly updated (48).

Scope of health services

Regarding early detection, activities have been mainly focused on two types of cancer: Breast and cervix, especially early detection and treatment. The low survival of children with acute leukemia was addressed by a study that examined a surveillance strategy (VIGICANCER) for children with suspected or diagnosed disease to accelerate the definitive diagnosis and confirmed cases to expedite treatment (74).

The number of existing oncology services implies that a large part of them are dedicated only to a therapeutic modality that hinders the need for comprehensive care required by the cancer patient, requiring the integration of different therapeutic modalities and the interaction of treating specialists.

In 2012, the Ministry of Health and Social Protection established comprehensive care guidelines for cervical, breast, prostate, colon, and rectal cancer in adults (75).

In 2011, the Mandatory Health Plan (POS) incorporated a significant number of technologies for cancer control, such as the HPV test and visual inspection techniques for screening and early detection of cervical cancer, as well as different procedures such as laparoscopy, the inclusion of HER2+ detection, removal of the sentinel lymph node for the diagnosis of breast cancer, and ostomy kits for patients with colon and rectal cancer (76).

16.3. Health system functions

16.3.1. Governance and Organization

The SGSSS was created in 1993 through constitutional reforms, or “Law 100,” and is managed by private and public Health Promotion Entities (“Entidades Promotoras de Salud”, EPS). Individuals are required

enroll in either a contributory plan, which covers most employed or retired individuals, or subsidized plan, which covers individuals unable to afford care (MinSalud SGSSS) (77).

In Colombia, SGSS is overseen by the Ministry of Health and Social Protection, which acts as the entity for control, direction, and coordination of all the system members. The Health Promotion Agencies (EPS), which are in charge of the affiliation of the population and the collection of contributions, and the IPS provide the service for users. The territorial entities and the Superintendency of Health are also part of the SGSS (77).

The affiliation to the SGSS must be made under one of two regimes: contributory or subsidized, depending on the insured's economic capacity. In the contributory scheme, there are those inhabitants who have an employment contract and have sufficient financial solvency, be they civil servants, pensioners, or independent workers. For its part, the country's poor and vulnerable population is affiliated with the subsidized regime. These are those classified in levels I and II of the System for Selecting Beneficiaries of Social Programs (SISBEN) (77, 78).

16.3.2. Health Financing

Financing is centralized in the Administrator of Resources of the General System of Social Security in Health (ADRES) created in 2016, in replacement of the previous Security and Guarantee Fund (FOSYGA). The main functions of ADRES are (79):

- Manage the resources of the SGSSS and the Salvage and Guarantees Fund for the Health Sector (FONSAET).
- Make recognition and payment of the Capitation Payment Unit (UPC) of compulsory health insurance.
- Make payments, make direct transfers to health technology providers and providers, and transfer to agents in the system that optimize the flow of resources.
- Advance verifications that promote efficiency in resource management.
- Develop mechanisms for the financial strengthening of entities.
- Manage the information on their operations.
- Identify and record separately the corresponding values received from each of the territorial entities for health insurance.

This organization manages several subaccounts, responsible for distributing the funds for the entire health system (80):

- Catastrophic Events and Traffic Accidents (ECAT) subaccount: This subaccount corrects the cost of care for victims of traffic accidents through mandatory insurance for traffic accidents (SOAT), and victims of catastrophic and terrorist events. The SOAT covers the comprehensive care of hospitalization, the supply of medications, payment of procedures, diagnostic services, and rehabilitation that the patient requires. Its financial source comes mainly from Transfers made by insurance companies authorized to issue the SOAT.

- Compensation subaccount: It collects the value of the compensation in the contributory regime, understanding as compensation the discount of the contributions received by the EPS and other entities obliged to compensate derived from the health and pension discounts made to employees and employers. The compensation subaccount finances the contributory system through the payment of UPC. That is, the Regulatory Health Commission (CRES) fixes a rate for the UPC, which is recognized by an affiliated user. Thus, ADRES turns to each EPS the UPC value proportional to the number of affiliates regardless of whether they use the services or not.
- Law 100 (1993), established the obligation for those affiliated to the Social Security System, a contribution of 12.5% of the base contribution salary, which could not be less than the minimum wage. For dependents, two-thirds are paid by the employer and one third by the worker. This means that the employer pays 8.5% and the employee 4%. Independent contributors are responsible for all contributions (81).
- Solidarity subaccount: It collects the resources contributed by all the actors in the system destined to the subsidized regime (a part <1.5% of the EPS contribution> is provided by all the people affiliated to the contributory scheme) (81). The resources of the subaccount are intended to allow the affiliation of the poor and vulnerable population to this regime through a demand subsidy consisting of the payment of the premium or UPC to the EPS of the subsidized Regime. The more resources this account obtains, the coverage and universality will be increased, making it possible to affiliate the largest poor and vulnerable population in the subsidized regime. Its sources of financing come from (81,82):

  – Up to 1.5% of the Contribution Regime and special and exception regimes
  – Contributions from the National Budget.
  – The amount of the Family Compensation Funds - CCF
  – Financial returns generated in favor of the Solidarity Sub-account from the health entities' contributions.
  – Financial Returns generated by the investment portfolio of the Sub-account.
  – The Social Tax on Arms

- Promotion subaccount: Finances education, information, health promotion, and disease prevention activities found in the Basic Care Plan - PAB. Its sources of financing come from:

  – A percentage of the contribution, currently assumed by the Ministry of Health and Social Protection
  – Resources assigned for actions to promote and prevent health.
  – Financial returns from the investment portfolio of the subaccount.
  – The ammunition and explosives tax

Likewise, the population is mainly attached to two regimes: contributory and subsidized regimes.

Contributory regime: Financed by the contribution of employees and independent workers. It entitles the beneficiaries to an elemental benefit plan or POS, which can expand its coverage through the purchase of a complementary plan (72).

Subsidized regime: Entitled to a limited benefit plan and obtains its financing from the federal, state, and municipal governments, and a cross-subsidy from the contributory regime. The subsidized scheme collects resources from transfers for social investment to the municipalities (current income of the Nation), from

transfers for social investment to the departments (fiscal located), from the effort of the territorial entities, from resources of the compensation funds family and arms tax (72).

There is the third fund of special and exceptional regimes, defined by Law 100 of 1993: social security regime for the military and police forces, for those affiliated to the National Fund for Social Benefits for teachers, for public servants of Ecopetrol as well as the civil servants of public universities.

16.3.3. Resource Management

The administration of SGSS relies on the insurance entities "Empresas Promotoras de Salud" (EPS) for both the contributory and subsidized schemes. The State has delegated the functions of affiliation and collection of contributions to the EPS. It is the responsibility of the EPS to contract the provider sector to guarantee access to health promotion, disease prevention, care at all levels, and rehabilitation activities.

The regulatory function of the health system falls on the State, through the CRES, the National Superintendency of Health and the Ministry of Health (83). The CRES has among its functions that of defining the POS and its list of medicines, as well as the UPC of each regime.

Insurance entities

- Entidades Promotoras de Salud (EPS): their function is to organize and guarantee the provision of health services found in the POS (Plan Obligatorio en Salud) and are responsible for managing risks derived from general illness or non-occupational. The EPS contracts the health services provider with the IPS (hospitals, clinics, laboratories, etc.). The Health Superintendency defines which private organizations qualify as EPS based on infrastructure, budget, number of affiliations, functionality, and coverage. The EPS must guarantee the POS to their affiliates. To fulfill this obligation, they must form a service network with their health institutions or by contracting services with other health providers or IPS (59).
- Occupational risk managers (ARL): They are responsible for covering events arising from occupational or work risks, and every employer must affiliate their employees to an ARL. The total value of the contribution corresponds to the employer. This affiliation covers all health expenses caused by accidents or occupational diseases and the payment of days of disability. The care of accidents or illnesses will be carried out by the EPS to which it is affiliated, who will charge the expenses incurred to the ARL (84).

Instituciones Proveedoras de Salud (IPS)

The IPS are hospitals, clinics, laboratories, doctor's offices, etc. that give the health service. They can be public or private. For purposes of classification in levels of complexity and care, they are characterized according to the type of services they enable and accredit, that is, their installed capacity, technology, and personnel, and according to the procedures and interventions they are capable of carrying out (85).

The system has not been without its own problems. The government has failed to make timely payments to EPS for compensation and recovery of non-POS events, while the EPS has done the same with the providers through deliberate non-payment and gloss of accounts. Both public and private providers have tried to survive through the overbilling of procedures and attention. Another apparent difficulty of the system is the heavy bureaucratic burden of the EPS, which duplicates efforts in each of them, especially in terms of procedures, documentation, and advertising (85).

16.4. Health System Outputs

16.4.1. Service Delivery

Plan Obligatorio en Salud (POS)

It is the set of services for health care to which members have the right to belong to the Social Security System. It covers a specific list of activities, procedures, interventions, and medications to prevent, cure, and alleviate diseases for the user and their family group. Likewise, it contemplates the recognition of economic benefits for contributing members of the contributory system in the event of maternity leave and disability due to general illness (86).

General coverage

- Disease prevention programs.
- Emergency care of any order, that is, needs that require immediate attention.
- General and specialized medical consultation in any of the areas of medicine.
- Dental consultation and treatments (excluding orthodontics, periodontics, and dental prosthetics).
- Laboratory tests and X-rays.
- Hospitalization and surgery and surgical and non-surgical procedures
- Medical consultation in psychology, optometry, and therapies.
- Essential drugs in their generic name.
- Comprehensive care during maternity, delivery, and the newborn.
- Care with high-cost treatments for catastrophic diseases, which are those that represent a high technical complexity in their management, high cost, low occurrence, and low cost-effectiveness in their treatment.
    - Treatment with radiotherapy and chemotherapy for cancer.
    - Dialysis for chronic kidney failure, kidney, heart, bone marrow transplant, liver transplant, and corneal transplant.
    - Treatment for HIV-AIDS and its complications.
    - Surgical medical treatment for major trauma.
    - Joint replacements.
    - Surgical treatment for diseases of the heart and central nervous system.
    - Therapy in an intensive care unit.
    - Surgical treatment for conditions of genetic or congenital origin.

POS for Cancer patients

The resolution 5521 of 2013 contemplates: chemo and radiotherapy treatments, paraclinical examinations, diagnostic images, and medications.

- For patients diagnosed with colon and rectal cancer, the Ostomy kit is included within the POS.
- From the prenatal stage to 18 years, patients with cancer have the right to coverage of all the technologies contained in the POS (86).

Several studies demonstrated that access and use of services such as cytology and diagnosis and treatment of women with cervical cancer change according to the type of affiliation to SGSSS, income, and educational level. These differences are also evident in access to preventive activities such as screening

mammography and cytology, which are generally higher for high-income socioeconomic groups. Knowledge about risk factors and cancer symptoms is much lower among the less favored groups (66).

Education level

The absolute differences in age-adjusted death rates from cancer at the educational level were more significant in women. Mortality from cervical cancer showed a more noticeable decrease in women with low educational levels (65).

Inequities by area of rural/urban residence and type of municipality

The Pasto registry showed an association between the socioeconomic and residence variables with the malignant tumors. For example, colon and rectal cancer incidence are substantially higher in urban areas (2.7 per 100,000 in rural areas compared to 8.2 in urban areas). Stomach and cervix cancer showed a decrease of -2.3% and -0.2% per year, respectively, in the urban area, while in the rural area, on the contrary, they increased by + 1.7% and +3.6%. Prostate and breast cancers showed an increase of +6.3% and +3.4% in the urban area and a decrease in the rural area of -5.2% and - 2% (87). A study carried out by the INS on mortality from cervical and prostate cancer by municipality, shows that the mortality rates for these cancers are higher in departments with higher socioeconomic inequality. For cervical cancer, the highest rates were reported in poorer municipalities, and the lowest rates were reported in the wealthiest municipalities (66).

17. Appendix I: Stakeholder Meeting Agendas

From mid-August to Mid-September 2020, the ICCI-LA modified their stakeholder meetings to take place virtually, rather than in-person attendance. Four separate stakeholder meetings were held, each with a particular Cancer policy topic: Organizational (August 12, 2020), Financial (August 19, 2020), Resource Management (September 3, 2020), and Service Delivery (September 15, 2020).

The workshops were held over Zoom teleconferences, allowing questions to be poised by moderators, and responded to by stakeholders who work in and around Colombia's health system. The first half of each stakeholder meeting sought to identify the main challenges of the country with regards to cancer, taking into account the particular context of the country. Stakeholders were also prompted to respond to issues currently facing Colombia's health system with regards to cancer due to the ongoing COVID-19 pandemic.

In second half of the workshops, participants were encouraged to propose potential solutions to the challenges that were previously identified. The four workshops helped to raise important discussions about the state of cancer in Colombia. Hopefully, it will lead to a better understanding of the problem and lead to the improvement of cancer outcomes. The participants to the workshops are included below.

17.1. Workshop 1: Organization and Governance

August 12, 2020, 3-5pm, via ZOOM

Moderator:	Prof. Rifat Atun (with translation, if necessary, by members of the Local Committee)
# of Participants:	15-20 people
Duration:	2 – 2.5 hours
Format:	Interactive Discussion via Zoom; "raise hand" before speaking
Logistical Support:	INC Colombia and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Raúl Murillo**
	• A brief overview about the role of the local committee • Explanation about how to participate during Zoom discussion – "raise your hand" virtually through Zoom, say you name and institution before your comments • Everything will be discussed in Spanish, apart from the comments made by Dr. Rifat Atun, which will be translated • Introduce Dr. Rifat Atun

3:00 - 3:10:	**Welcome – Dr. Raúl Murillo**
3:10 - 3:15:	**Presentation of ICCI-LA – Prof. Rifat Atun**
	• Overview of the objectives of ICCI-LA • Why Colombia? • Objective of this workshop and other planned workshops • Participants are invited to participate in a future workshop to review the report that comes from these workshops
3:15 - 4:15:	**Group Discussion: Challenges**
	Questions: (20 mins per question) 1. What are the principle challenges facing the Colombian health system in relation to its organization and its governance capabilities in general, and in relation to the following topics? – Responsibility – Transparency – Ensuring decisions are made in an inclusive way – Planning, and – Coordination of the health system 2. What are the principle challenges facing the Colombian health system in relation to its organization and governance capacities specifically in its management and control of cancer, and in relation to the following topics? – Responsibility – Transparency – Ensuring decisions are made in an inclusive way – Planning, and – Coordination of the health system 3. What has been the impact of COVID-19 with relation to the organization and governance of Colombia's health system in general; and specifically in regards to its response to cancer care and control?
4:15 – 5:15:	**Group Discussion: Proposed Solutions**
	Questions (15 mins per question) 1. What are the three priorities to improve the organization and governance of the Colombian health system in general, and in relation to the following topics? – Responsibility – Transparency – Ensuring decisions are made in an inclusive way – Planning, and – Coordination of the health system 2. What are the three priorities to improve the organization and governance of the Colombian health system with regard to cancer control and cancer care, and in relation to the following topics? – Responsibility – Transparency – Ensuring decisions are made in an inclusive way

3:00 - 3:10:	**Welcome – Dr. Raúl Murillo**
	– Planning, and – Coordination of the health system 3. What should be changed to improve the organization and governance of these priorities? **4.** How should the organization and governance of Colombia's health system be improved to more effectively respond to COVID-19 in general and how should it improve specifically in relation to the cancer care and cancer control?
5:15:	**Closing remarks and next steps – Prof. Rifat Atun**

17.2. Workshop 2: Financing

August 19, 2020, 3-5pm, via ZOOM

Moderator:	Prof. Rifat Atun (with translation, if necessary, by members of the Local Committee)
# of Participants:	15-20 people
Duration:	2 – 2.5 hours
Format:	Interactive Discussion via Zoom; "raise hand" before speaking
Logistical Support:	INC Colombia and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Carlos Castro**
	• A brief overview about the role of the local committee • Explanation about how to participate during Zoom discussion – "raise your hand" virtually through Zoom, say you name and institution before your comments • Everything will be discussed in Spanish, apart from the comments made by Dr. Rifat Atun, which will be translated • Introduce Dr. Rifat Atun
3:10 - 3:15:	**Presentation of ICCI-LA – Prof. Rifat Atun**
	• Overview of the objectives of ICCI-LA • Why Colombia? • Objective of this workshop and other planned workshops • Participants are invited to participate in a future workshop to review the report that comes from these workshops
3:15 – 4:15:	**Group Discussion: Challenges**

3:00 - 3:10:	**Welcome – Dr. Carlos Castro**
	Questions: (30 mins per question) 1. In your experience and perspective, what do you consider the main challenges for Colombia's health system in terms of financing? 2. In your experience and perspective, what do you consider the main challenges for Colombia's health system financing relating to: – cancer control (prevention, early detection, screening) – patient care (diagnostics, treatment, rehabilitation and palliative care)
4:15 – 5:15:	**Group Discussion: Proposed Solutions**
	Questions: (30 mins per question) 1. In your experience, what do you think should be the priorities and actions to take in order to improve the financing of the health system, with regards to cancer control? 2. How has the response to COVID-19 affected the health system's financing mechanisms, and how could we do more to improve the efficiency of the system for patients with cancer?
5:15:	**Closing remarks and next steps – Prof. Rifat Atun**

17.3. Workshop 3: Resource Management

September 3, 2020, 3-5pm, via ZOOM

Moderator:	Prof. Rifat Atun (with translation, if necessary, by members of the Local Committee)
# of Participants:	15-20 people
Duration:	2 – 2.5 hours
Format:	Interactive Discussion via Zoom; "raise hand" before speaking
Logistical Support:	INC Colombia and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Carolina Weisner Ceballos**
	• A brief overview about the role of the local committee • Explanation about how to participate during Zoom discussion – "raise your hand" virtually through Zoom, say you name and institution before your comments • Everything will be discussed in Spanish, apart from the comments made by Dr. Rifat Atun, which will be translated • Introduce Dr. Rifat Atun
3:10 - 3:15:	**Presentation of ICCI-LA – Prof. Rifat Atun**

3:00 - 3:10:	**Welcome – Dr. Carolina Weisner Ceballos**
	• Overview of the objectives of ICCI-LA • Why Colombia? • Objective of this workshop and other planned workshops • Participants are invited to participate in a future workshop to review the report that comes from these workshops
3:15 – 4:15:	**Group Discussion: Challenges**
	Questions: (30 mins per question) 1. In your experience and perspective, what do you consider the main challenges for Colombia's health system in general in terms of resource management (human resources, technology, and information)? Consider your answers in terms of: – Efficiency – Equity 2. In your experience and perspective, what do you consider the main challenges for Colombia's health system for cancer control in terms of resource management (human resources, technology, and information)? Consider your answers in terms of: – Efficiency – Equity
4:15 – 5:15:	**Group Discussion: Proposed Solutions**
	Questions: (30 mins per question) 1. In your experience and perspective, what are some potential solutions for the challenges previously identified for Colombia's health system for cancer control in terms of resource management (human resources, technology, and information)? 2. How has resource management of Colombia's health system been affected by the COVID-19 pandemic, and how can the system become more efficient in the treatment and control of cancer?
5:15:	**Closing remarks and next steps – Prof. Rifat Atun**

17.4. Workshop 4: Service delivery

September 3, 2020, 3-5pm, via ZOOM

Moderator:	Prof. Rifat Atun (with translation, if necessary, by members of the Local Committee)
# of Participants:	15-20 people
Duration:	2 – 2.5 hours
Format:	Interactive Discussion via Zoom; "raise hand" before speaking
Logistical Support:	INC Colombia and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Jairo Aguilera López**
	• A brief overview about the role of the local committee • Explanation about how to participate during Zoom discussion – "raise your hand" virtually through Zoom, say you name and institution before your comments • Everything will be discussed in Spanish, apart from the comments made by Dr. Rifat Atun, which will be translated • Introduce Dr. Rifat Atun
3:10 - 3:15:	**Presentation of ICCI-LA – Prof. Rifat Atun**
	• Overview of the objectives of ICCI-LA • Why Colombia? • Objective of this workshop and other planned workshops • Participants are invited to participate in a future workshop to review the report that comes from these workshops
3:15 – 4:15:	**Group Discussion: Challenges**
	Questions: (20 mins per question) 1. In your experience and perspective, what do you consider the main challenges for Colombia's health system in general in terms of service delivery? Consider your answers in terms of: – Equity – Effectiveness – Efficiency – Response capacity 2. In your experience and perspective, what do you consider the main challenges for Colombia's health system for cancer control in terms of service delivery? Consider your answers in terms of: – Equity – Effectiveness – Efficiency – Response capacity 3. How has COVID-19 affected the service delivery mechanisms for Colombia's health system for patients with cancer?
4:15 – 5:15:	**Group Discussion: Proposed Solutions**
	Questions: (20 mins per question) 1. What are two priorities to improve health services in the Colombian health system? 2. In your experience and perspective, what are some potential solutions for the challenges previously identified for Colombia's health system for cancer control in terms of service delivery? 3. What innovations (for example: telemedicine) can be institutionalized in order to create a more sustainable model for cancer control and attention, based on the experiences of the COVID-19 pandemic?
5:15:	**Closing remarks and next steps – Prof. Rifat Atun**

18. Appendix J: Stakeholder Meeting Participants

Participant Names and Affiliations

1. Atun, Rifat - **Harvard University**
2. Rendler-Garcia, Melissa - **Union for International Cancer Control (UICC)**
3. Aguilera López, Jairo - **Instituto Nacional de Cancerología de Colombia**
4. Alarcón, Clara - **Hospital Universitario Hernando Moncaleano Perdomo de Neiva**
5. Arias Ortiz, Nelson Enrique - **Universidad de Caldas - Registro Poblacional de Cáncer de Manizales**
6. Ayala Zuleta, Nubia Marcela - **Hospital Universitario Hernando Moncaleano Perdomo de Neiva**
7. Barbosa, Diva - **Novartis**
8. Bautista, Nubia Esperanza - **Ministerio de Salud y Protección Social de Colombia**
9. Bermeo Muñoz, Johana Sabely - **Secretaria de Salud Publica Departamental - Valle del Cauca**
10. Brome, Mary - **Secretaria de Salud y Protección Social de Antioquia**
11. Caballero Otalora, Adriana Marcela - **Ministerio de Salud y Protección Social de Colombia**
12. Cadena, María - **Hospital Universitario Hernando Moncaleano Perdomo de Neiva**
13. Caicedo, José Joaquín - **Amese - Clínica del Country**
14. Campillo, Gustavo - **Fundación Rasa**
15. Cárdenas, Diana - **Adres**
16. Carreño, Sandra - **Oncolife**
17. Castañeda, Leidy - **Secretaria de Salud - Caldas**
18. Castro, Carlos - **Liga Colombiana contra el Cáncer**
19. Cazap, Eduardo - **SLACOM**
20. Chávarro Barreto, Hernán - **Secretaria de Salud Departamental de Huila**
21. Fuentes, Cristian - **Gobernación de Cundinamarca**
22. Gálvez, Ana Cristina - **Fundación Sanar Niños con Cáncer**
23. García, Jorge - **Fundación Retorno Vital**
24. Garzón, Adriana - **Fundación SIMMON**
25. Giha, Yaneth - **AFIDRO**
26. Gómez, Sandra - **Secretaria Salud de Cundinamarca**

27. Gómez Ribon, Diana María - **Gobernación de Antioquia**
28. Góngora, Olga Lucia - **Compensar EPS**
29. Gonzales, Ana María - **Clínica Somer**
30. Gonzalvez, Guillermo - **OPS/OMS Colombia**
31. Hernández Flórez, Luis Jorge - **Universidad de los Andes**
32. López, Jenny - **Instituto Nacional de Cancerología**
33. López Suarez, Luz Nayibe - **Superintendencia Nacional De Salud**
34. Maldonado, Norman - **PROESA - Centro de Estudios en Protección Social y Economía de la Salud**
35. Maza, German - **Compensar EPS**
36. Méndez, Yolima - **Fundación Colombiana de Leucemia y Linfoma**
37. Mojica Monroy, Martha Janeth - **Ministerio de Salud y Protección Social**
38. Muñoz Chamorro, Nancy - **Hospital Infantil Los Angeles**
39. Muriel, Álvaro - **Bayer**
40. Murillo, Raúl - **Hospital Universitario San Ignacio**
41. Navarro-Vargas, José Ricardo - **Universidad Nacional de Colombia**
42. Ordoñez, Ines - **IETS**
43. Ortiz, María Del Mar - **Secretaría de Salud Departamental - Valle del Cauca**
44. Ospina Serrano, Aylen Vanessa - **Asociación Colombiana De Hematología y Oncología**
45. Palamarchuk, Olena - **Secretaria Distrital de Salud de Bogotá**
46. Paz, Javier - **Grupo MediNuclear**
47. Paz, Silvia - **Instituto Cancerológico de Nariño LTDA**
48. Peñaloza, Rolando - **Pontificia Universidad Javeriana - Instituto de Salud Pública**
49. Pinzón, Jazmín - **IETS**
50. Rendón Castrillón, Diana Cristina - **Clínica Somer**
51. Roldán Sánchez, Omaira Isabel - **Ministerio de Salud y Protección Social de Colombia**
52. Ruiz Villa, María Beatriz - **Instituto Nacional de Cancerología de Sucre**
53. Salazar Arbeláez, Helena - **Superintendencia Nacional de Salud**
54. Sarasty Rodríguez, Doris Lucia - **Hospital Infantil Los Ángeles**
55. Sastoque Meñaca, Emma - **Hospital Universitario Hernando Moncaleano Perdomo de Neiva**
56. Soriano Soto, Maiyuri - **Clínica Somer**

57. Torres, Miyerlandi - **Secretaria de Salud Pública Municipal - Cali**
58. Tovar, Vilma - **Secretaria de Salud Departamental de Huila**
59. Uribe Navarro, José Trinidad - **Instituto Departamental de Salud Norte de Santander**
60. Uribe Parra, Daniel **- Ministerio de Salud y Protección Social de Colombia**
61. Wiesner, Carolina - **Instituto Nacional de Cancerología de Colombia**
62. Zapata Idarraga, Nadia Carolina - **Secretaría de Salud Departamental – Bogotá**
63. Mendales, Jacob - **Harvard University**

ICCI-LA

Iniciativa Integrada para el Control de Cáncer en América Latina

Integrated Cancer Control Initiative in Latin America

The ICCI is made possible through a collaborative agreement between UICC and Novartis. All research activities performed by UICC and research partners are done independently of Novartis or any other pharmaceutical manufacturer.

NOVARTIS