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 Chile: Challenges & opportunities

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

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GLOSSARY

ASR – Age-Standardized Rate
AUGE – Acceso Universal a Garantias Explicitas or Universal Acess to Explicit Guarantees
CENABAST – The Central Supply Clearinghouse
CVD – Cardiovascular Disease
CNS – Central Nervous System
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.
COVID-19 – Coronavirus disease 2019
FONASA – National Health Fund (Public Health Insurance)
GDP – Gross Domestic Product
GES – Garantia Explicita en Salud or Explicit Health Guarantees
GLOBOCAN – Global Cancer Observatory
HPV – Human Papilloma Virus
LAC – Latin America and the Caribbean
IARC – International Agency for Research on Cancer
ICCI-LA – Integrated Cancer Control Initiative in Latin America
Intl$ – International dollars
ISAPREs – Health Insurance Institutions (Private Health Insurance)
MINSALUD – Ministry of Health of Chile
NCD – Non-Communicable Disease
OOP – Out-of-Pocket
PAHO – Pan-American Health Organization
PHC – Primary Healthcare
PM2.5 – Particulate Matter 2.5 micrometers and smaller
PPP – Purchasing Power Parity
SARS-CoV-2 – The virus responsible for causing COVID-19
SNSS – National Health Services System
SS – Health Services
UHC – Universal Health Coverage
WHO – World Health Organization

1. Executive Summary

Objectives

The aim of the Integrated Cancer Control Initiative in Latin America (ICCI-LA) study is to help improve Chile's response to the rising burden of cancer, as part of its Constitutional commitment to health as a human right and as part of the international push for universal health coverage. The objectives of this report are to discuss the overall context of the Chilean health system related to cancer, present major health system challenges identified by stakeholders, and explore policy options suggested by the leading experts involved in the ICCI-LA study to address these challenges.

Methods

The methods of inquiry used by the research team include a review of published literature and datasets on the Chilean health system and cancer burden, an online survey conducted among subject-matter experts to ascertain primary challenges and opportunities within the Chilean health system around cancer, and four virtual stakeholder workshops 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), Chile had an age-standardized rate (ASR) of 195.5 new cases of cancer per 100,000 people in 2018. The estimated cancer incidence in Chile lies between those for Mexico and Colombia and higher-incidence Latin American country clusters of Argentina and Brazil, which have ASRs closer to 200 cases per 100,000 people.

The cancer incidence is estimated to continue rising in Chile, with 74,973 new cases of cancer projected for 2030 and 94,807 new cases projected for 2040. These figures represent a 38.3% increase in cancer cases between 2020 and 2030, and an 74.9% increase between 2020 and 2040.

Similarly, cancer mortality levels have also been rising in Chile. The country has the second highest ASR of mortality for cancer among selected Latin American countries at 95.7 deaths per 100,000 (lower than Argentina, but higher than Mexico, Colombia, or Brazil), but projected to have 55,698 total deaths from cancer in 2040, an additional 25,384 deaths from what Chile experienced in 2020, a 83.7% increase from that estimated from 2020.

Chile's National Cancer Control Plan has set 15 objectives to promote primary prevention through control of cancer risks, improve early detection, improve quality of cancer care and recovery of cancer patients and survivors, and among others, strengthen national information systems.

The primary challenges, as identified through a survey of responses from 94 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 involved inefficiency in healthcare alongside poor allocation of resources, which can hinder quality of care. Other issues included: fragmentation of the health system, poor financial organization, poor coordination and collaboration among different administrations and health sectors, and a lack of focus on prevention and primary care.

Policy options to address the identified challenges were also categorized by the four health system areas. Suggestions for Resource Management included enacting public policies for cancer care to ensure collaboration between agencies, restructuring existing resource allocation systems to enable continuity in cancer care, enacting policies that prioritize cancer prevention, and conducting cost-effeciveness assessments to restructure existing resources and healthcare budgets. Suggestions for Organization and Governance included enacting new reforms to update current cancer laws, improving collaboration and cooperation among different actors within government entities and between stakeholders, creating an independent institution to monitor and manage cancer care in the country, expanding regional capacity, and implementing policies to engage stakeholders and the public. Financing policy proposals included implementing policies to increase the national budget allocated for cancer, increasing funding to establish an independent agency that can research and inform policy, implementing policies that concern the long-term impacts of supporting comprehensive cancer management, and addressing equity issues between public and private sectors. Lastly, suggestions for service delivery included implementing reforms to existing cancer laws to improve quality of care, improving provider training around cancer care, and establishing comprehensive and integrated information services focused on quality assurance.

Recommendations

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

Highest Priority

1. Restructure delivery of cancer services to reduce fragmentation and ensure provision of consistently high quality and equitable cancer services.
2. Improve accessibility to cancer care throughout Chile by increasing regional capacity.
3. Expand the use of economic analysis to improve the efficiency of resource allocation for cancer care and control.

Higher Priority

4. Improve regulations to strengthen mechanisms for inspection, surveillance and control of national and regional health budgets.
5. Establish a national population based registry.
6. Establish an Independent Cancer Agency responsible for developing cancer policies, training, conducting evaluations, and implementing the National Cancer Plan.

Medium Priority

7. Strengthen actions that prioritize prevention interventions for cancer.
8. Implement policies to gradually increase the national budget allocated for cancer.
9. Strengthen Primary Care in Chile and its role in cancer care and control.

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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 Latin American countries included in the ICCI-LA study, namely Argentina, Brazil, Chile and Colombia, as well as Mexico, the second most populous Latin American country (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. Chile is the third country of focus for the ICCI-LA study.

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

This study used a mixed methods approach. The methods of inquiry included: a literature review of published data, an online survey conducted among topic experts in Chile, and a series of moderated virtual stakeholder workshops that included leading health system and cancer experts from Chile.

The framework for health systems analysis used in the literature review builds on earlier approaches (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 the analysis.

This report is organized into 3 major sections. The first section presents an analysis of the health system context in Chile related to cancer, including the changes in demographic, epidemiological, political, and legal/regulatory environment which influence the trajectory of the health system. The second section is a health system analysis that explores challenges for the health system related to cancer and presents suggested policy options from stakeholders for how to address these challenges. The third section is focused on a set of recommendations and proposed next steps to improve the response of the Chilean health system to the rising burden of cancer.

3. Methods

In order to achieve a detailed understanding of the context, health system, and the challenges and opportunities related to management of cancer in Chile, the methodological approach (details provided in Appendix B) enabled the use of three major sources of information:

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

The Harvard researchera worked with collaborators in Chile to establish a core team to undertake the study. The data were collected and analyzed between July and December 2020. During the data collection and analysis process, there was constant guidance and feedback from the different working groups involved in the four stakeholder workshops.

4. Analyzing the Cancer Context in Chile

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

4.1. Demographic and Epidemiological Transition

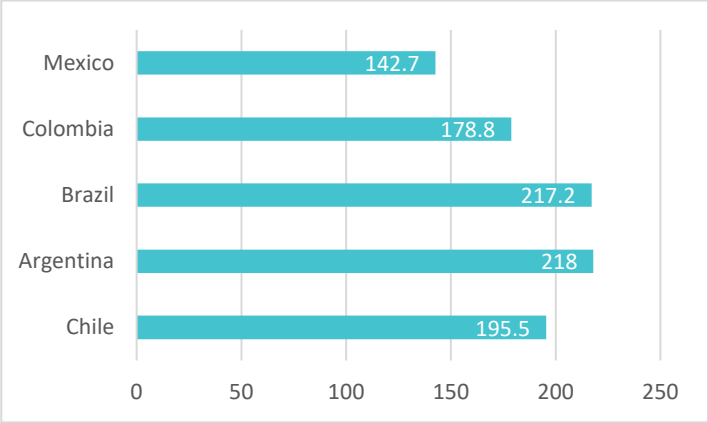
In the GLOBOCAN analysis of Chile's cancer burden, incidence is defined as the number of new cases occurring in a specified period and geographic area (9). It is important to note that incidence is calculated only among individuals who are at risk for a specific outcome. Crude incidence figures, while useful in some regard, portray an incomplete contextualization. These figures do not account for the substantial differences in population sizes and age structures between countries or regions. Consequentially, age-standardized rates (ASR) per 100,000 people are used to approximate the average risk of developing an outcome in a way that allows comparisons between regions with different population sizes and age structures.

4.1.1. Cancer Incidence

In 2018, the age standardized incidence rate of cancer in Chile was 195.5 per 100,000 people, compared with 218 per 100,000 in Argentina, and 217 in Brazil. In contrast, Colombia (178.8) and Mexico (142.7) had noticeably lower incidence rates. Figure 1 presents a comparison of the age standardized incidence rates for cancer.

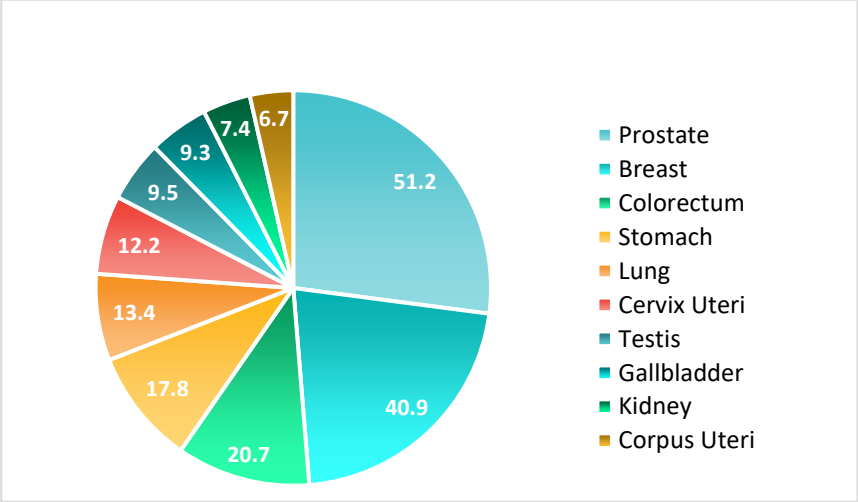
Figure 1: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in 2018, All Cancer Types (Source: IARC Cancer Today).

Figure 1: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in 2018, All Cancer Types (Source: IARC Cancer Today)



Chile's age standardised incidence for prostate cancer (51.2 new cases per 100,000) and breast cancer (40.9) are at least double that for other cancers with rates higher than 10 new cases per 100,000 people, such as colorectal cancer (20.7 per 100,000), stomach cancer (17.8), lung cancer (13.4), and cervical uterine cancer (12.2). Figure 2 displays Chile's 10 most common cancer types by incidence rate.

Figure 2: Estimated Age Standardized Incidence Rate of Cancer per 100,000 People in Chile in 2018, All Cancer Types (Source: IARC Cancer Today).



Chile's high incidence rate of prostate and breast cancers is also a feature of large Latin American countries. Chile has the second highest incidence rate of prostate cancer among selected Latin American countries behind Brazil's rate of 74 new cases per 100,000 people. Chile's figure at 51.2 new cases per 100,000 is closer to the estimates for Colombia (49.8 new cases per 100,000), Argentina (42.4), and Mexico (41.6).

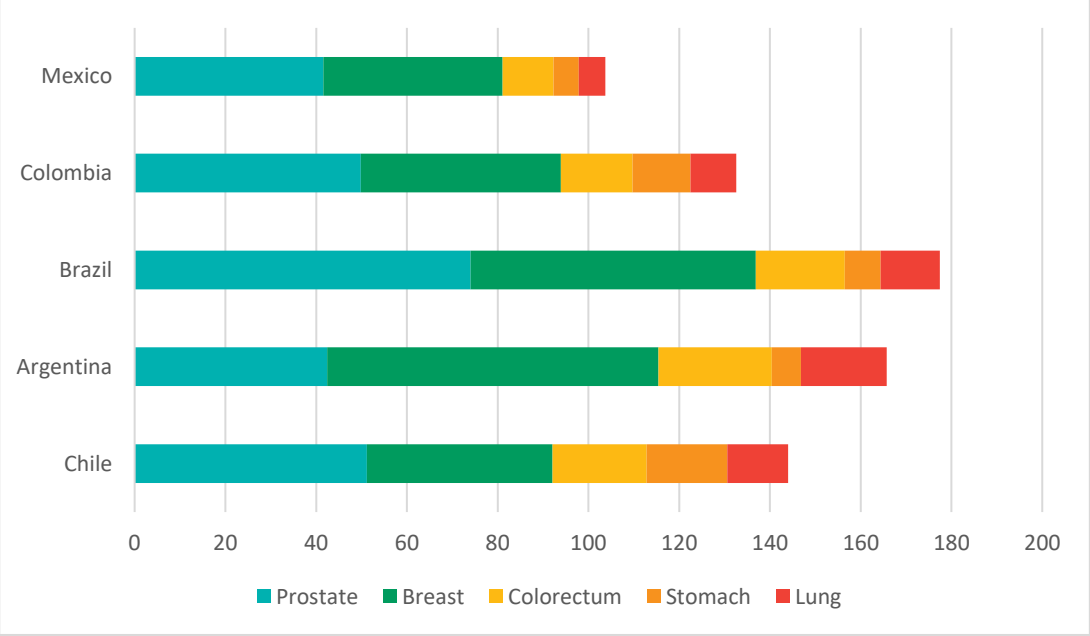
Chile has several unique features in relation to cancer with high rates of stomach, testicular, and gallbladder cancers. For example, Chile has the highest rate of stomach cancer among the large Latin American countries with 17.8 new cases per 100,000 in 2018—greater than that in Colombia (12.8 new cases per 100,000), over double that in Brazil (7.9), nearly triple that in Argentina (6.4), and over triple that in Mexico (5.6). Differences in the incidence rates for gallbladder cancer are even more noticeable. Chile's estimated 9.3 new cases per 100,000 is three to four times higher than the rates reported in Argentina (2.6 new cases per 100,000), Brazil (1.7), Colombia (2.9), and Mexico (2.2). Figure 3 details this comparison for

the top 10 cancers by ASR of incidence in Chile, Argentina, Brazil, Colombia and Mexico and Figure 4 for the top 5 cancers.

Figure 3: Estimated Age Standardised Incidence Rate of Cancer per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today).

	Chile	Argentina	Brazil	Colombia	Mexico
Prostate	51.2	42.4	74	49.8	41.6
Breast	40.9	73	62.9	44.1	39.5
Colorectum	20.7	25	19.6	15.8	11.2
Stomach	17.8	6.4	7.9	12.8	5.6
Lung	13.4	18.9	13	10.1	5.8
Cervix Uteri	12.2	16.7	12.2	12.7	11
Testis	9.5	7.3	3.4	4.7	6.5
Gallbladder	9.3	2.6	1.7	2.9	2.2
Kidney	7.4	8.7	4.3	3.3	3.5
Corpus Uteri	6.7	7.6	6.7	5.2	10.6
Total Incidence Rates of Cancer	**195.5**	**218**	**217.2**	**178.8**	**142.7**

Figure 4: Estimated Age Standardized Incidence Rate for Cancer per 100,000 People in 2018, by Cancer Type (Source: IARC Cancer Today).



The ranking of commonest cancers by age standardised incience rates differs between the five large Latin American countries. Figure 5 outlines the top five cancers by age standardized incidence rates for each of the selected Latin American comparison countries. There are distinct similarities: prostate, breast, and colorectal cancers are the top three most common cancer types. Lung cancer and cervical uterine cancer also rank in the top five for Argentina, Brazil. Stomach cancer is disproportionately high in Colombia and Chile, while lung cancer is not in the top five for Colombia and Mexico.

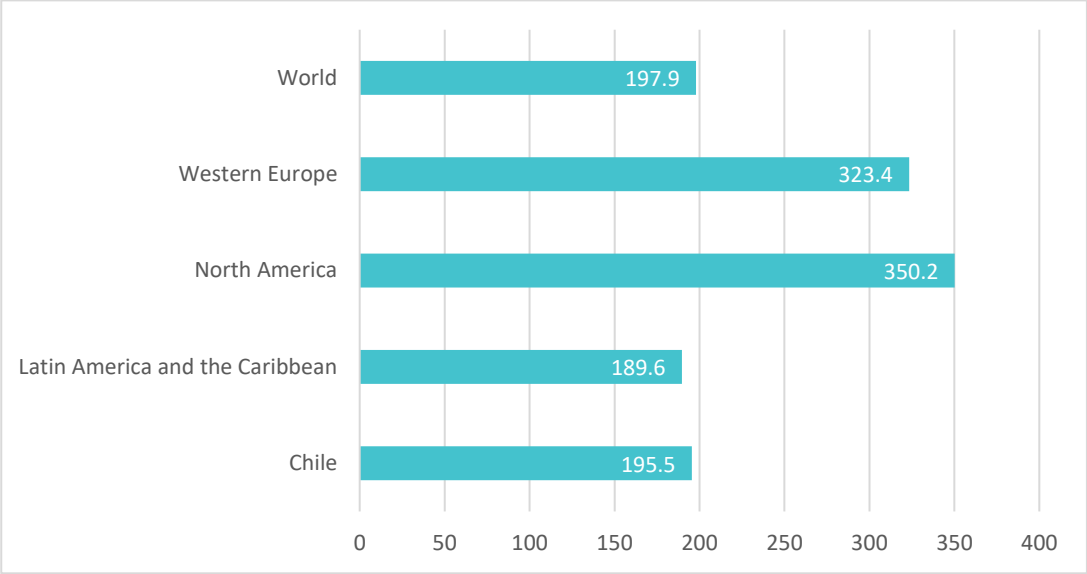
Figure 5: The top five cancers ranked by Age Standardized Incidence Rates per 100,000 people in Chile and selected countries in Latin America (Source: IARC Cancer Today).

Rank	Chile	Argentina	Brazil	Colombia	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	Lung	Cervix Uteri	Cervix Uteri	Cervix Uteri	Corpus Uteri

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

When compared with average levels of ASR of cancer incidence for all cancers in world regions, Chile (195.5 new cases per 100,000) has a comparable rate to those observed in the Latin American and Caribbean region (189.6 per 100,000) and globally (197.9). This rates are well-below the estimates for North America (350.2) and Western Europe (323.4), however.

Figure 6: Estimated Age Standardized Incidence Rate for Cancer for All Cancers per 100,000 People in 2018 (Source: IARC Cancer Today).



For the commonest cancers the ASR of incidence in Chile most closely resembles that in the Latin American and Caribbean region in relation to most common cancer types, but major differences exist with other regions. For example, at 17.8 new cases of stomach cancer per 100,000 people, the ASR of incidence for stomach cancer in Chile is much higher than the average ASR incidence level of 11.1 new cases per 100,000 globally, and over double that for ASR incidence levels in Latin America and the Caribbean (8.7 new cases per 100,000), North America (4.1), and Western Europe (5.8). As with the comparisons with Argentina, Brazil, Colombia, and Mexico, Chile is an outlier in relation to the ASR of incidence for gallbladder cancer. Chile's ASR of incidence of 9.3 new cases per 100,000 in 2018 is at least 3 times higher than the estimates for Latin American and Caribbean (2.5 new cases per 100,000), North America (1.8), Western Europe (1.7), and the World (2.3). Conversely, lung cancer represents a much larger share of the cancer incidence in North America (34.5 new cases per 100,000) and Western Europe (33.9) than that estimated for Chile (13.4), Latin America and the Caribbean (11.8), and the World (22.5).

Figures 7 and 8 provide a breakdown of ASR of incidence rates for the most common types of cancer in Chile, world regions and and globally. Figure 9 compares the ASR of incidence for the 5 most common cancer types across different world regions.

Figure 7: Estimated Number of New Cases of Cancer per 100,000 (Age Standardized) by Cancer Type in Chile and world regions (Source: IARC Cancer Today).

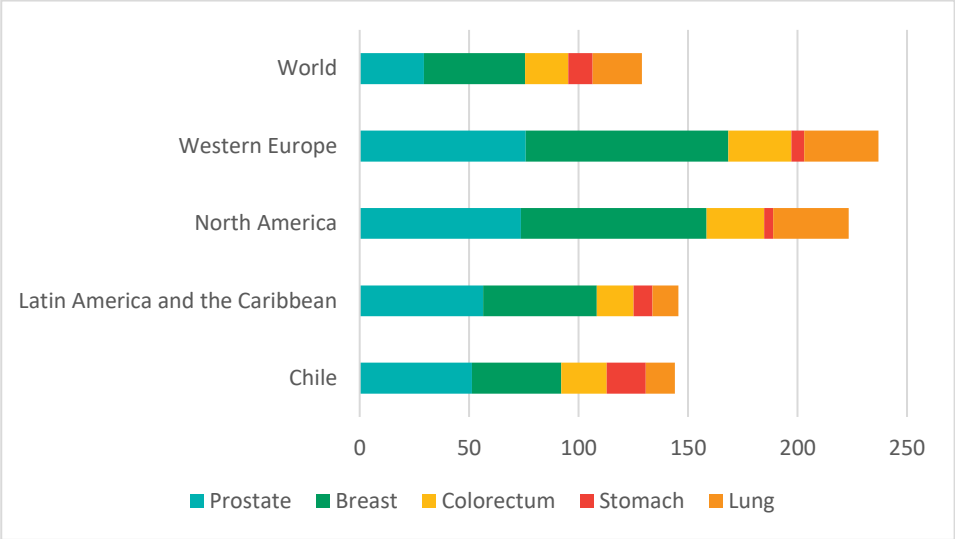


Figure 8: Estimated Number of New Cases of Cancer per 100,000 (Age Standardized) by Cancer Type in Chile and world regions (Source: IARC Cancer Today).

	Chile	Latin America and the Caribbean	North America	Western Europe	World
Prostate	51.2	56.4	73.7	75.8	29.3
Breast	40.9	51.9	84.8	92.6	46.3
Colorectum	20.7	16.8	26.2	28.8	19.7
Stomach	17.8	8.7	4.1	5.8	11.1
Lung	13.4	11.8	34.5	33.9	22.5
Cervix Uteri	12.2	14.6	6.4	6.8	13.1
Testis	9.5	4.4	5.1	9.7	1.7
Gallbladder	9.3	2.5	1.8	1.7	2.3
Kidney	7.4	4.4	10.9	9.7	4.5
Corpus Uteri	6.7	7.7	20.5	12.3	8.4
Total Age Standardized Incidence Rates of Cancer	**195.5**	**189.6**	**350.2**	**323.4**	**197.9**

Figure 9: The top five cancers ranked by Age Standardized Incidence Rates per 100,000 Population in Chile and world regions (Source: IARC Cancer Today).

Rank	Chile	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	Lung	Lung	Corpus Uteri	Melanoma of skin	Cervix Uteri

4.1.3. Cancer Mortality

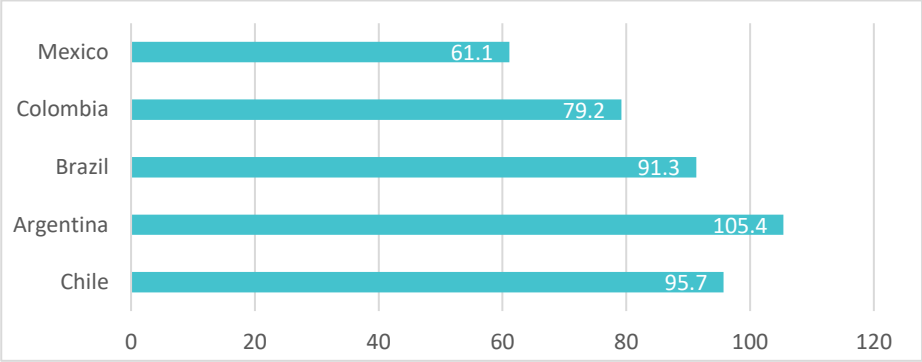
While many of the cancers with the highest incidence rates are similarly ranked by mortality rate, these lists are not exactly the same. Figure 10 provides a comparison of the top 10 cancers ranked by ASR of incidence and and by mortality rates in Chile.

Figure 10: Most Common Cancers in Chile by Age Standardized Incidence and Mortality Rates per 100,000 population (Source: IARC Cancer Today).

Age Standardized Incidence Rate			Age Standardized Mortality Rate	
Prostate	51.2		Prostate	15.8
Breast	40.9		Lung	12.3
Colorectum	20.7		Stomach	11.5
Stomach	17.8		Breast	11.1
Lung	13.4		Colorectum	10.2
Cervix Uteri	12.2		Gallbladder	5.4
Testis	9.5		Pancreas	5.4
Gallbladder	9.3		Cervix Uteri	5
Kidney	7.4		Liver	4.9
Corpus Uteri	6.7		Leukemia	3.5
Total	195.5		Total	95.7

The age-standardized mortality rate in Chile was 95.7 deaths per 100,000 people in 2018, was the second-highest among the selected Latin American countries. The cancer mortality rate in Chile is similar to that observed in Argentina (105.4 deaths per 100,000) and Brazil (91.3) but lower than that in Colombia (79.2) and Mexico (61.1).

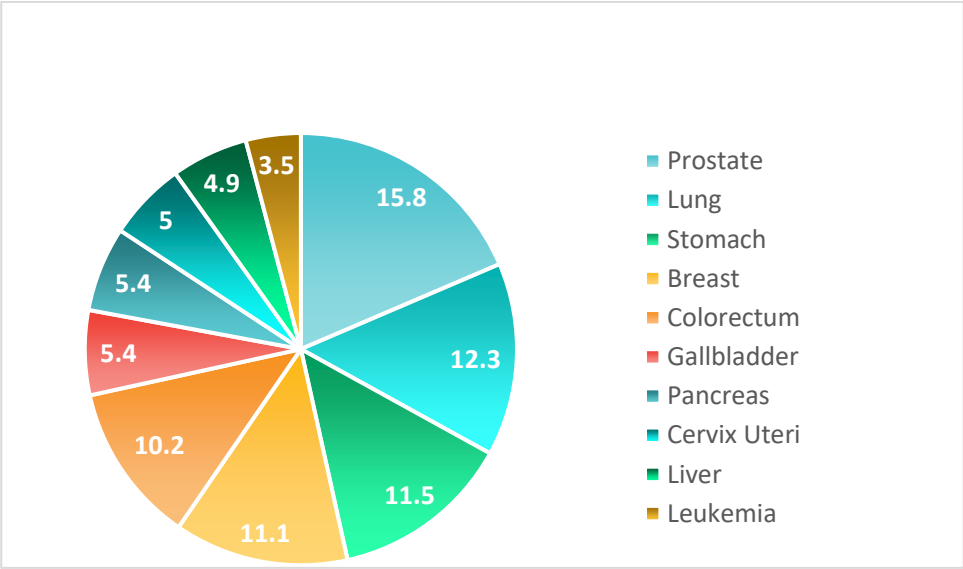
Figure 11: Estimated Age Standardized Mortality Rate for Cancer per 100,000 People in 2018 in Chile and selected Latin American Countries (Source: IARC Cancer Today).



While prostate and breast cancer make up nearly half of the new cancer cases in Chile, these two cancer types make up only 28.1% of the total mortality rate. Breast cancer, while the second highest in terms of the incidence rate, is ranked the fourth highest in terms of the mortality rate. In order of magnitude, the top 5 cancers by ASR of mortality in Chile are prostate cancer (15.8 deaths per 100,000), lung cancer (12.3), stomach cancer (11.5), breast cancer (11.1), and colorectal cancer (10.2). Together, these 5 cancers make up 63% of mortality from Cancer in Chile. No other cancer type has an ASR of mortality higher than 5.5 per 100,000, a level that is nearly half the age standardized mortality rate for colorectal cancer, the fifth-ranked cancer type.

Figure 12 presents estimated mortality rates per 100,000 population for the top 10 cancers in Chile. The mortality from the top 10 cancers in Chile constitute 88.9% of the total.

Figure 12: Estimated Mortality Rate for Cancer per 100,000 People in Chile in 2018 (Source: IARC Cancer Today).



Comparing the estimated age standardized cancer mortality rates in Chile with those for other countries in Latin America and the Caribbean, Chile has the highest mortality rates for prostate, stomach, and gallbladder cancers. Additionally, Chile has the second highest mortality rates for lung, colorectal, pancreatic, and liver cancers. By contrast, Chile has relatively low mortality rates for breast and cervical cancers. Figure 13 provides Age Standardized Mortality Rates for Cancer per 100,000 population for prostate, lung, stomach, breast and colorectal cancers for Chile and selected countries in Latin America. Figure 14 shows the Age Standardized Mortality Rates for Cancer per 100,000 population for the top 10 cancer types.

Figure 13: Age Standardized Mortality Rate for Cancer per 100,000 population for prostate, lung, stomach, breast and colorectal cancers in 2018 (Source: IARC Cancer Today).

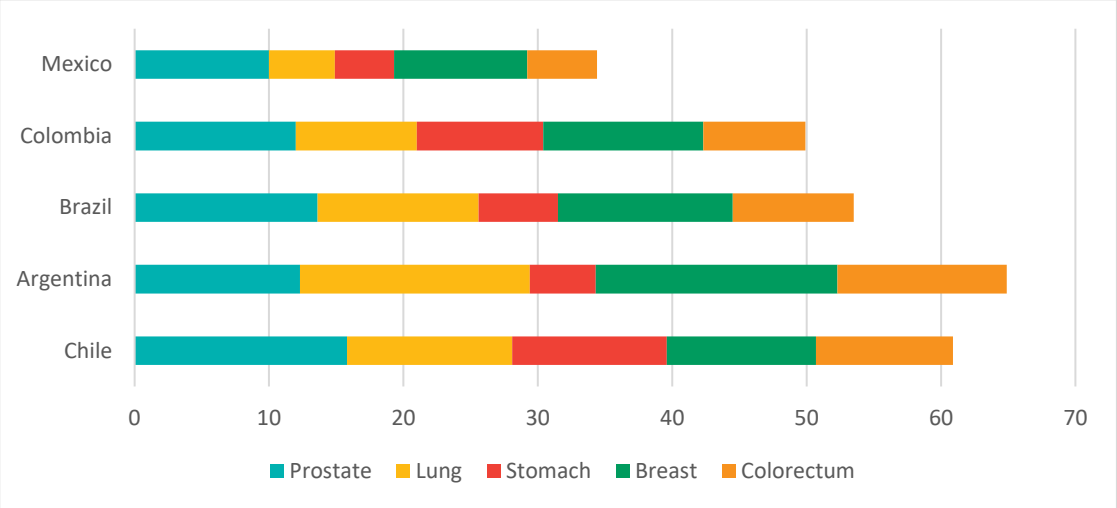


Figure 14: Age Standardized Mortality Rates per 100,000 Population for the top 10 Cancers in selected Latin American Countries in 2018 (Source: IARC Cancer Today).

	Chile	Argentina	Brazil	Colombia	Mexico
Prostate	15.8	12.3	13.6	12	10
Lung	12.3	17.1	12	9	4.9
Stomach	11.5	4.9	5.9	9.4	4.4
Breast	11.1	18	13	11.9	9.9
Colorectum	10.2	12.6	9	7.6	5.2
Gallbladder	5.4	2	1.4	1.9	1.4
Pancreas	5.4	6.9	4.4	3.7	3.3

Cervix Uteri	5	7.7	5.8	5.7	5.8
Liver	4.9	3.2	4.4	3.8	5.1
Leukemia	3.5	3.5	3.2	4.1	3.4
Total	95.7	105.4	91.3	79.2	61.1

Comparison of the 5 top cancers by age standardised mortality rate in Chile with Argentina, Brazil, Colombia and Mexico reveals similarities and differences (Figure 15). For example, in each of the selected Latin American countries prostate, breast and colorectal cancers are in the top 5 cancer types by mortality, and lung cancer is in the top 5 in 4 countries except Mexico. By contrast, cancer of cervix is in the top 5 cancer types by age standardised mortality in Argentina and Mexico and liver cancer appears in the top 5 cancer types in Mexico alone.

Figure 15: Top Five Cancer Types Ranked by Age Standardized Mortality Rates per 100,000 Population in Argentina, Brazil, Chile, Colombia and Mexico (Source: IARC Cancer Today).

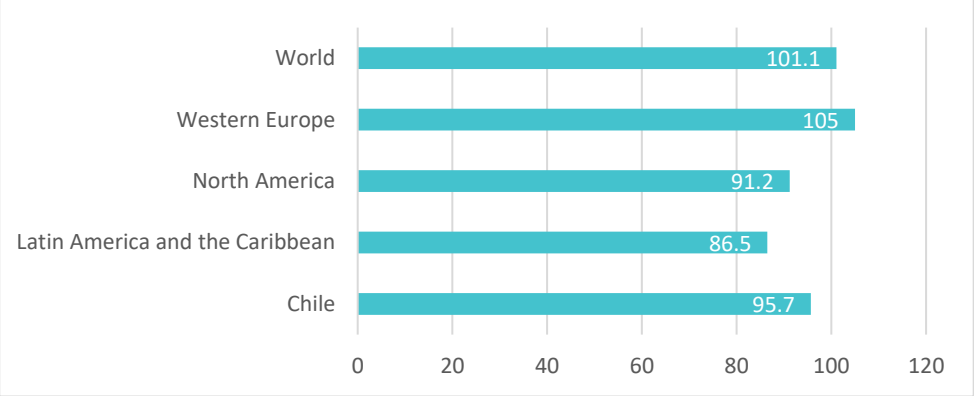
Rank	Chile	Argentina	Brazil	Colombia	Mexico
1	Prostate	Breast	Prostate	Prostate	Prostate
2	Lung	Lung	Breast	Breast	Breast
3	Stomach	Colorectum	Lung	Stomach	Cervix Uteri
4	Breast	Prostate	Colorectum	Lung	Colorectum
5	Colorectum	Cervix Uteri	Stomach	Colorectum	Liver

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

At 95.7 cancer deaths per 100,000 population, Chile has a higher mortality rate than the average levels of age standardized mortality observed in North America (91.2 deaths per 100,000) and Latin America and Caribbean (86.5), yet a lower rate than the average levels observed in Western Europe (105) and the World (101.1). (Figure 16)

It is important to note that while North America and Western Europe have much higher age standardized incidence rates for cancer than Chile, the mortality rate in North America is lower than that in Chile (Figure 16).

Figure 16: Estimated Age Standardized Mortality Rate for Cancer per 100,000 Population in Chile and selected world regions (Source: IARC Cancer Today).



The age standardized mortality rates for cancer vary in different regions of the world (Figures 17 and 18). For example, North America and Western Europe have much higher mortality rates of lung cancer, nearly double Chile's rate, and slightly higher mortality rate for breast cancer. Conversely, Chile has a much higher mortality rate for stomach cancer at 11.5 deaths per 100,000, a figure several times greater than that observed in North America (1.8 deaths per 100,000) and Western Europe (3.4). Similarly, the mortality rate for gallbladder cancer is unusually high in Chile, with 5.4 deaths per 100,000 population—a level that is much higher than that observed in Latin America and the Caribbean (1.8 per 100,000 population), North America (0.56), Western Europe (1.1), and the World (1.1) (Figure 18).

Figure 17: Estimated Age Standardized Mortality Rate for Cancer per 100,000 Population by Cancer Type (Source: IARC Cancer Today).

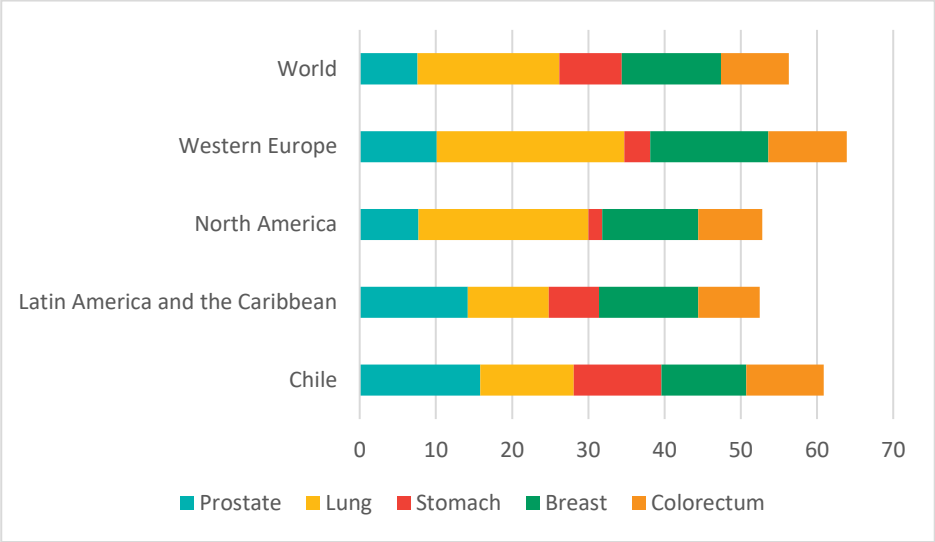


Figure 18: Estimated Age Standardized Mortality Rate for Cancer per 100,000 Population by Cancer Type (Source: IARC Cancer Today).

	Chile	Latin America and the Caribbean	North America	Western Europe	World
Prostate	15.8	14.2	7.7	10.1	7.6
Lung	12.3	10.6	22.3	24.6	18.6
Stomach	11.5	6.6	1.8	3.4	8.2
Breast	11.1	13	12.6	15.5	13
Colorectum	10.2	8.1	8.4	10.3	8.9
Gallbladder	5.4	1.8	0.56	1.1	1.7
Pancreas	5.4	4.2	6.5	7.6	4.4
Cervix Uteri	5	7.1	1.9	2.1	6.9
Liver	4.9	4.7	4.8	4.5	8.5
Leukemia	3.5	3.6	3.4	3.6	3.5

Comparison of the 5 top cancers by age standardised mortality rate in Chile with selected world regions reveals similarities and differences (Figure 19). For example, in Chile and each of the selected world regions countries prostate, breast, lung and colorectal cancers are in the top 5 cancer types by age standardized mortality. By contrast, cancer of cervix is in the top 5 cancer types by age standardised mortality in Latin America and stomach cancer appears in the top 5 cancer types in Chile and global top 5. Liver cancer, which is in the top 5 cancer types by mortality but not in Chile and the selected world regions (Figure 19).

Figure 19: Top 5 Cancer Types in Chile and Selected World Regions Ranked by Age Standardized Mortality Rates per 100,000 Population (Source: IARC Cancer Today).

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

4.1.5. 5 – Year Net Survival for the Most Common Types of Cancer in Chile

Though cancer incidence and mortality rates are certainly very useful metrics to consider when examining a country's cancer burden, mortality levels are influenced by incidence levels. Typically, as incidence rate declines so does mortality rate. Hence, an alternative metric should be considered to better reflect health system performance in relation management of cancer across the care continuum. 5-year net survival for cancer patients provides insight into the effectiveness, equity, efficiency and responsiveness of care individuals receive for cancer.

We used the 5-year net survival from the CONCORD-3 study as a measure of health system performance in managing cancer. CONCORD-3 provides 5-year net survival from 2000 to 2014 for most cancers by world region and country. To model estimates in Chile, CONCORD-3 study used data from 4 population based registries which collectively cover around 13.8% of the total population in Chile. While the coverage figure for population based cancer registries is very low in Chile, and well-below countries like the US which cover 85.6% of the total population, it is higher than that achieved in Argentina (9.2%), Brazil (7.7%), and Colombia (9%). The population coverage achieved by Chile represents a substantial improvement from the previous iteration of the study, CONCORD-2, where just 5.5% of the population was covered by population based cancer registries.

Figure 20 below uses CONCORD-3 data to compare survival for Chile's 5 cancers with the highest mortality rates in 2018, namely prostate, lung, stomach, breast, 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 of gastrointestinal cancers with colon cancer being the most common cancer type in this group. Hence, Figure 20 presents data for colon cancer and not the aggregation of colon, bowel, and rectal cancers.

Another point to note is that the asterisks in Figure 20 denote data points that are considered less reliable than others 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.

Figure 20: 5-Year Net Survival for Adults, Percentage of All Diagnosed Cancer Cases in Chle, Argentina, Brazil and Colombia (Source: CONCORD-3 Study).

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

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

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

Breast				
	Chile	Argentina	Brazil	Colombia
2000-2004	74.60%	82.30%	68.7%*	72.30%
2005-2009	73.50%	82%	76.9%*	79.10%
2010-2014	75.5%*	84.40%	75.2%*	72.1%*

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

The cancers with the highest 5-year net survival from 2010 to 2014 in Chile were prostate and breast cancers, with 85% and 75.5% of patients surviving after 5 years respectively. In contrast, lung cancer (4.6% survival) and stomach cancer (16.7%) have the lowest 5-year survival.

Chile generally performs worse than its large Latin American peers in terms of 5-year net survival, with the most glaring example being lung cancer's survival of 4.6% about half of the survival level achieved in Argentina (13.1%), Brazil (8.5%), and Colombia (8.7%). To further contextualize Chile's performance, Figure 21 shows the country with the highest survival and that for Chile for the top 5 cancers in Chile with the highest mortality rate.

Figure 21: Countries with the Highest 5-Year Survival for Cancer in 2000 to 2014 (Source: CONCORD-3 Study).

5-Year Survival from Cancer in 2010-2014			
Type of Cancer	Country with the Highest Level of 5-Year Survival	5-Year Survival (%)	5-Year Survival in Chile (%)
Prostate	Puerto Rico	98.4%	82%*
Lung	Japan	32.9%	4.6%*
Stomach	South Korea	68.9%	16.7%
Breast	USA	90.2%	75.5%*
Colon	South Korea	71.8%	43.9%*

4.1.6. Childhood Cancer in Chile

The study, Sustainable Care for Children with Cancer: a Lancet Oncology Commission, published by The Lancet Oncology in 2020 estimated 5-year net cancer survival for children in Latin America and the rest of the world. The study estimated a wide variation in survival for all childhood cancer types, ranging from 8.1% in Eastern Africa to 83.0% in North America, with an overall global average of 37.4% (10).

In September 2018, the WHO Global Initiative for Childhood Cancer, has set a target of 60% 5-year survival by 2030 for childhood cancers, but, Ward et al. argue, this target is unlikely to be achieved at the current levels of coverage and scale-up, particularly for cancer types like retinoblastoma, Burkitt's lymphoma and

nephroblastoma for which current survival levels are about 25% (10). In South America, the overall average 5-year for childhood cancer survival is 60.2%, but for many cancers survival levels are well below the WHO's target of 60%, including acute myeloid leukemia (57.1%), astrocytomas (49.3%), CNS embryonal tumors (41.0%), and osteosarcomas (53.5%)(10) (Table 1).

Table 1: Estimated 5-Year Net Survival for the Top 10 Childhood Cancer Types in Chile by Incidence (Source: Harvard Dataverse (11))

Cancer Group	Cancer Type	5-Year Survival			
		Argentina	Brazil	Chile	Colombia
Leukemia	Lymphoid	75.6%	69.4%	74.5%	74.5%
Leukemia	Acute Myeloid	63.0%	54.8%	57.1%	58.4%
CNS Neoplasms	Astrocytoma	70.7%	37.8%	49.3%	49.9%
Lymphoma & Related	Non-Hodgkin except Burkitt	80.4%	69.8%	72.0%	74.3%
Lymphoma & Related	Hodgkin	89.0%	71.4%	76.7%	79.6%
Renal Tumors	Nephroblastoma	81.6%	61.2%	69.3%	71.3%
CNS Neoplasms	CNS Embryonal	56.9%	28.8%	41.0%	41.5%
Neuroblastoma	Ganglioneuroblastoma	73.9%	56.0%	63.0%	64.7%
Retinoblastoma	Retinoblastoma	83.8%	60.8%	72.3%	71.1%
Bone Tumors	Osteosarcoma	62.2%	49.9%	53.5%	55.0%

Analysis of the projected incidence levels for childhood cancers in Latin American countries and estimates of what proportion of these are likely to be diagnosed suggest that on average 68.8% of the cases in Chile are likely to be diagnosed, compared with 68.9% in Argentina, 70.3% in Brazil, and 70.9% in Colombia (11) (Table 2). The proportion of childhood cancers that are likely to be diagnosed in Latin American countries is well the levels likely to be achieved in Western Europe (97.2%) and North America (97.3%) (11).

Table 2: Projected Number of New Cases of Childhood Cancer in 2030 and estimates of proportions that will be diagnosed (Source: Harvard Dataverse (11))

Country	Projected incidence of childhood cancer in	Estimated number of childhood cancer cases	Proportion likely to be diagnosed

	2030 (95% Confidence Interval)	diagnosed (95% Confidence Interval)	
Argentina	2089 (1578-2760)	1439 (1160-1729)	68.9%
Brazil	7934 (5588-10472)	5579 (4361-6826)	70.3%
Chile	648 (452-863)	446 (337-551)	68.9%
Colombia	2004 (1369-2690)	1421 (1102-1753)	70.9%

A particular challenge related to childhood cancers is the number of hematopoietic stem cell transplants (HSCTs) performed in Chile. In 2015 there were 31 transplants in children aged <16 years in the public system which caters for 80% of the children and adolescents in Chile (11 per million children aged <16 years). By 2020, this number had risen to 45 (15 per million children aged <16 years). By contrast, in the ISAPRE system, where the remaining 20% of children and adolescents receive their services, there were 36 transplants in 2015 and 37 in 2020 (26 and 28 per million children aged <16 years respectively). Both sectors have achieved good results in terms of survival but the the current inequities in the transplant levels in FONASA and ISAPRE systems need to be addressed with an increased number of HSCT in the FONASA sector to meet the need which fall short each year. Indeed, the HSCT rate in Chile is well below that in countries such as the US. In 2019 the AHSCT rates in FONASA and ISAPRE were 16 and 27 per million children aged <16 years respectively, compared to 31 in the US. This means an estimated 30 children on waiting list who do not have the opportunity to receive a HSCT die each year while waiting for the procedure.

The situation for HCST is similar for adults, where the number of transplants performed in the FONASA system has risen from 44 in 2015 to 125 in 2019, but still fall short of the need (Personal Communication, Dr Bruno Nervi).

4.2. Political, Legal and Regulatory Environment

Chile has introduced several major policies and laws to expand coverage and access to cancer screening, treatment, care and control (Table 3). The first major nationwide policy aimed at bringing cancer to the forefront of the Chilean health system began in the late 1980s with the establishment of the national cervical cancer screening program. This policy was followed in 1988 by the National Program of Cancer Drugs for Adult (PANDA) and National Program of Cancer Drugs for Children (PINDA).

In 1995, the National Breast Cancer Program and the National Plan for Pain Relief and Palliative Care were introduced. These were followed by a major health policy in 2005, GES (Garantías Explícitas en Salud—Explicit Guarantees in Health) that aimed to enhance access to services and financial protection for a set of conditions, including many cancers.

In 2015, the Ricarte Soto Law, named posthumously after the Chilean journalist Luis Ricarte Soto Gallegos who fought for policies to address the high cost of medicines and medical treatments, established a "Financial Protection System for High Cost Diagnoses and Treatments", including some cancers and rare diseases, in both the public and private health sectors in Chile.

In 2018, the first National Cancer Plan 2018-2028 was developed by MINSAL in collaborartion with the civil cancer community (Scientific Societies, Universities, Patient Associations, Foundations).

In October 2020, Chile became one of the few countries in the world to enact a National Cancer Law (Table 3) after 18 months discussion in the Chilean Congress. The Law is currently being implemented and is further discussed in this report.

Table 3: Timeline of Key Cancer Policies in Chile (12,14,16)

Timeline of Key Cancer Policies in Chile	
1987:	Cervical cancer screening program established
1988:	National Program of Cancer Drugs for Adult (PANDA) and National Program of Cancer Drugs for Children (PINDA) implemented
1995:	National Breast Cancer Program
1995:	National Pain Relief and Palliative Care Program introduced
2005:	Universal Access with Explicit Guarantees in Health (GES) introduced to "improve access, quality, financial protection and timeliness of health care for priority diseases including cancer." Over the years, pediatric, breast, cervical, prostate, gastric, acute and chronic leukemia, lymphoma, and primary tumors of the CNS became among the targeted cancer subtypes.
2014:	Article 66a, amendment to Labor Code: female workers over 40 years and male workers over 50 are allowed half a working day to receive preventative medicine exams such as mammograms, prostate exams, and Pap smears

2015:	Ricarte Soto Law passed, expanding financial access and coverage to cancer treatments related to gastrointestinal stromal tumors (GIST), myelofibrosis, and pancreatic neuroendocrine tumors.
2018:	First National Cancer Plan 2012-18 established
2020:	National Cancer Law passed and finally approved by the Congress and the President

Developed in 2005, the policy on Explicit Guarantees in Health (Garantia Explicita en Salud or Explicit Health Guarantees (GES), also known as Acceso Universal a Garantias Explicitas or Universal Acess to Explicit Guarantees (AUGE) has been established to increase healthcare access, quality, timeliness, and financial protection for 80 health conditions (13). Coverage is ensured by financing either through FONASA (Fondo Nacional de Salud) public insurance offered by the state (covering around 80% of the population) or ISAPRES (Instituciones de Salud Previsional), the private insurance system (covering around 18% of the population) (13). The GES program also provides for dedicated timelines in which patients are guaranteed to receive care, whether they are enrolled with FONASA or ISAPRES system. For example, for gastric cancer, there is a guarantee of a diagnostic confirmation within 30 days of seeing a specialist, with a maximum 30 day wait to see that specialist (13). Nevertheless, there are major disparities among the benefits packages offered by the FONASA-public versus ISAPRE-private insurance sytems as well as in access to cancer care and health outcomes.

The Financial Protection System for High Cost Diagnostics and Treatments, or the Ricarte Soto Law, allows for financing for diagnostic and treatment coverage for diseases deemed to be high cost. High cost treatments for gastrointestinal stromal tumors and myelofibrosis are covered by the Law. These treatments include imatinib or sunitinib for the former, and ruxolitinib for the latter. Treatment is covered in cases where the cancer is not resectable or has already metastasized (16).

4.2.1. Chile's National Cancer Control Plan

In April 2018, then Minister of Health Dr. Emilio Santelices did something unprecedented in the country, calling on civil society to collaborate in the development of the first National Cancer Plan for a period of 10 years. To develop the National Cancer Plan, an "Advisory Council on Cancer Matters" was formed, which had the participation of representatives from scientific societies, universities and foundations, who worked together with representatives of all the Departments of the Ministry of Health to provide inputs for the elaboration of this national health strategy. In this way, 5 strategic lines were defined to be addressed in the Action Plan. Strategic Line 1: Promotion, education and primary prevention. Strategic Line 2: Provision of healthcare services. Strategic Line 3: Strengthening of the oncology network. Strategic Line 4: Strengthening of registration, investigation and surveillance systems. Strategic Line 5: Stewardship, regulation and oversight.

The National Cancer Plan was not formally developed until December 2018, announced by President Piñera administration at a time when cancer represented the second leading cause of death in Chile but was projected to become the first soon after (15). The National Cancer Control Plan aims to increase overall five-year cancer survival to 60% by 2028. In 2018, overall survival for cancer was 40% in Chile (15). In the Plan, the government set 15 objectives, shown in Table 4, to be attained by 2028.

Table 4: Chile's National Cancer Plan Objectives (15)

Fifteen Objectives of the Chilean National Cancer Plan	
1.	To generate greater awareness regarding the importance of cancer and civil society's role in its prevention and treatment.
2.	To strengthen healthy lifestyles and encourage self-care through health education, the promotion of protective factors and awareness of risk prevention factors associated with cancer through innovative intra- and inter-sector strategies.
3.	Encourage the generation of environments that allow the population to enjoy better health, providing them with information regarding protection factors and avoiding their exposure to environmental elements that have been identified as risk factors for cancer.
4.	To improve immunization coverage as part of the strategies used to prevent cancer, particularly vaccination against the human papilloma virus.
5.	To improve screening coverage and the timeliness and quality of confirmation of diagnoses and coordination with the pertinent referral center. Special attention will be paid to Papanicolaou, mammography and digestive cancer.
6.	To guarantee comprehensive, timely and quality treatment based on the best available scientific data.
7.	To guarantee timely access and comprehensive palliative care care to people and their support network, in accordance with Law No. 19,966, which establishes a Regime of Explicit Health Guarantees..
8.	To provide support to patients and their families throughout the cycle of their disease and initiatives that integrate the environment of the patient to their treatment and monitoring of the disease.
9.	To improve the management of the network, particularly the fulfillment of those conditions covered by explicit health guarantees (garantías explícitas en salud, GES) in cancer without leaving aside the conditions that are not currently covered by said guarantees.
10.	To strengthen the creation of necessary human resources and future planning in this area in order to create the qualified interdisciplinary team required for the National Oncology Network. The government plans to train nearly 130 oncology specialists by 2022.
11.	To strengthen the National Oncology Network, specifically infrastructure and equipment, in order to guarantee access to quality and timely care to all cancer patients living in Chile with comprehensive care provided to the majority of people in their region of residence. The government plans to invest 20 billion Chilean pesos per year in oncology equipment and infrastructure through 2028.

12.	To strengthen record keeping, information systems for the registration, information and epidemiological surveillance of cancer in order to facilitate the generation of, quality of and access to information in order to support public health decision-making processes. The government proposes launching a National Cancer Register in 2020.
13.	To promote research in various disciplines related to the healthcare field, particularly in areas related to cancer in order to ensure that research is an input that allows the impact of cancer on the population to be reduced.
14.	Urge for consistent, permanent and incremental financing, according to the needs detected for the progression and development of the National Cancer Plan.
15.	To strengthen stewardship, regulation and oversight, ensuring the quality of the clinical processes established for the diagnosis and treatment of people with cancer and the oversight of all technical aspects and the functioning of equipment in order to ensure that users receive quality care. The government proposes the updating and creation of treatment guides and protocols for 20 highest impact types of cancer.

The 15 objectives outline a set of actions that target cancer in multiple ways. The objectives mention use of education as a tool to prevent cancer, such as use of the Human Papilloma Virus (HPV) vaccine to prevent cervical cancer (15). Additionally, the government places the onus to create the necessary changes on itself by building on its current infrastructure and expanding access to vaccines, screening, treatment (including palliative care), and oncology specialists while also expanding its surveillance capabilities and record-keeping (15). The National Cancer Law also emphasizes research as a core element of its tenets, aiming to provide quality diagnostic care and treatment protocols for patients who contract cancer (15).

5. Health System Analysis

The purpose of this section is to present areas for improvement for the Chilean health system in relation to cancer. To do so, we present analysis from two sources: (i) a qualitative online survey conducted with stakeholders, and (ii) analysis of discussions and feedback received during four virtual workshops with key stakeholders in Chile.

Both the survey and the workshops asked stakeholders to identify the major challenges related to cancer for Chile, and to suggest policy options to effectively address the challenges identified.

This section will first report the challenges identified in both the survey and the workshops, and then present the policy options that were suggested to enable the Chilean health system to overcome these challenges in order to address the rising cancer burden in ways that are more effective, efficent, equitable and responsive.

5.1. Health System Challenges related to Cancer

A total of 94 stakeholders responded to the online survey. Survey respondents were from various backgrounds, including the private sector, public sector or government, academia, healthcare provider or other healthcare employee, civil society, and other not specified.

The priorities were identified in relation to health systems functions of Organization and Governance, Financing, Resource Management and health system outputs, namely Service Delivery for both public health and individual health services and ranked accoring to the frequency of responses received.

The repondents identified challenges for each health system function and health system outputs. These chalenges were analysed and organized thematically into eight groups and ranked accoring to the frequency of responses received.

Organization and Governance was identified as the top priority that needed adressing followed by Financing, Resource Management and Service Delivery.

Table 5 prodes a sythesis of the top eight challenges identified by the survey respondents for each of the four categories.

Table 5: Challenges for the Chilean health system in relation to cancer organized by category and priority rank identified in the stakeholder survey

Rank within Category	Top Priority Category	Second Priority Category	Third Priority Category*	Fourth Priority Category*
	Organization and Governance	*Financing*	*Resource Management*	*Service Delivery*
1	Poor planning and coordination of policies	Lack of resources	Poor financial organization and management	Lack of accessibility and insufficient coverage

2	Lack of comprehensive care	Poor budget coordination and management	Ineffective resource allocation	Poor coordination and inefficiency
3	Challenges associated with decentralization	Lack of accessibility	Poor financial coordination and planning	Lack of focus on preventive and comprehensive care
4	Lack of accessibility	Low investment and/or prioritization in cancer prevention	Fragmentation of the health system	Low-quality of provided services
5	Lack of regulation and/or poor enforcement of regulation	Fragmentation and poor financial organization	Structural inefficiencies	Lack of resources
6	Lack of stakeholder participation	Need for regulation, surveillance, and monitoring	Lack of accessibility	Fragmentation of the health system
7	Lack of independent cancer/medical institution	High costs	Lack of evidence to inform delivery	Lack of regulation and oversight
8	Lack of surveillance, monitoring, and evaluation	Lack of transparency and quality control	Lack of transparency	High costs for health services

*** The categories were ranked and scored by 94 stakeholders, resulting in the categories tallying 286, 250, 202, and 202, respectively, resulting in a two-way tie for fourth priority category.**

These challenges identified in the online survey by the repondents are similar to the ones that emerged from the discussions at the virtual stakeholder workshops (Table 6). The roundtable format of stakeholder workshops allowed the participants to discuss in more detail the specific details of each challenge identified. The participants of the stakeholder workshops were able to identify specific root causes as well as some of the consequences of the challenges identified. These are presented in Table 6.

The most commonly identified challenges identified both in the survey and at the workshop were poor coordination and collaboration, structural inefficiencies, improper and inefficient use of available resources, insuficient emphasis on prevention activities, ineffective enforcement of regulations and policies, fragmentation of financing and health system in general, lack of accessibility in relation to cancer services and lack of comprehensive cancer services and care, and inequities in relation to access to care between public and private sectors.

Table 6. Challenges for the Chilean health system in relation to cancer organized by health system area, as identified at the roundtable meetings of stakeholders

Opportunity Area	Challenge Identified	Specific Reasons and Root Causes for the Challenge identified
Organization and Governance	*Poor coordination and collaboration*	• Lack of coordination within National Cancer Plan limit effectiveness of screening services • Siloed approaches to cancer care hinders framing of cancer as a public health priority • Governance of cancer is highly centralized in the Ministry of Health in Santiago, making it difficult for the regions to self-manage local challenges • Lack of coordination structures inhibit participation of multiple across different sectors in cancer prevention, control and care • Frequent turnover of administrations prevent effective coordination and planning • System appears to be reacting to problems "whack-a-mole" style instead of taking systems-wide approaches • Inadequate data of variable quality from cancer registries • There is no office in the Ministry of Health responsible for generating information to develop policies and care guideines.
	Inefficiency and poor allocation of resources	• The system is prioritizing certain cancers over others by not including all cancers in GES (Some cancers are not yet included in GES, such as pancreatic, biliary cancer, sarcoma and melanoma. Consequently, there is no converage for the treatment, and there is no obligation in the time of diagnosis or initiation of treatment for these conditions) • Disproportionate amount of funds are being directed towards cancers of low-incidence and high-cost drugs • Not enough resources are allocated to improve cancer diagnosis • Lack of investment in cancer specialists • Too many resources for cancer are centralized in Santiago
	Poor communication	• Lack of effective relationships between administrators, doctors, and hospitals is stifling communication and coordination • Lack of communication is leading to treatment delays
	Fragmentation of the health system	• Many (ineffective or contradictory) independent strategies hinder the development of a unified strategy for cancer control • Private sector hospitals are increasing cost of continuing care across the whole health system • GES is complicating and compounding problems between public and private sector
Financial	*Poor financial organization and mechanisms*	• Hospitals have inefficient capacity for forecasting and budgeting • Inadequate financing of the public sector and for cancer

	Lack of focus on prevention	• Early diagnosis and screening are not prioritized in the strategic discussions related to financing cancer care and control • Undue emphasis on high-cost drugs and not on early diagnosis • There is a large gap in diagnostic testing, which inhibits doctors from making better decisions for treatment strategies • Available screening services are not utilized at high enough rates
	Fragmentation of the health system	• Cancers that are not covered by GES force people to seek private care and pay out of pocket for the services and treatment received
Resource Management	*Poor coordination, collaboration, and planning*	• Technologies that can improve efficiency are not being deployed due to lack of resources • Lack of a unified national strategy is creating unnecessary competition between sectors • Health entities are entrenched with little incentive to collaborate • Hospitals have to make own purchases, creating huge inefficiencies across the whole health system
	Issues of equity and access	• Insufficient access to screening services • Large disparities in services and health outcomes across regions • Resources allocated to regions are not in line with need • Few incentives to attract doctors and specialists to rural areas • Inequity is a systemic issue that limits and hinders innovation
	Insufficient and inadequate resource allocation	• Insufficient resources to train more nurses especially nurse practitioners • Solutions to addresss gaps in human resources identified by MINSAL are not being deployed
	Fragmentation of the health system	• There is a lack of an integrated response between different specialties and sectors • Reform plans are too siloed • Functional deficits are not properly understood and there is lack of sufficient will to address them • Data colected in different sectors are not shared
Service Delivery	*Inefficiencies due to poor management, planning, and coordination*	• Fragmented strategies between the two health subsecretaries; one designs regulations and the other implements, but none address cancer control as a unified strategy – Cancer falls under regulation instead of service delivery • Overly bureaucratic system complicates simple tasks • Long wait times between an appointment and screening • Insurers are not acting with efficiency in mind, they may keep someone on the waitlist before sending them over to the private sector for care • Directors of hospitals or health centers have difficulty in estimating resource needs for managing cancer each year

	Lack of focus on prevention and primary care	• Separation of primary and secondary care; primary care is dependent on municipalities and receive insufficient training or resources to adequately deal with cancer • Lack of capacity at primary care centers to diagnose and manage cancer and to provide palliative care
	Issues of inequity between different regions	• Major disparities in access to healthcare services and health outcomes by region and socio-economic group • Country is organized by regional zones, and regions need to have unique strategies with resources and capacity to address needs but cancer is manged centrally

5.2. Suggested Policy Options to Address the Challenges identified

In the online survey, respondents provided policy options to address the health system challenges they identified in each of the four health system areas. The proposed policy options are summarized in Table 7 and presented in the order in which the respondents ranked them in importance for addressing the respective challenges identified for each health system area: (1) Organization and Governance, (2) Financing, (3) Resource Management, and (4). Service Delivery

Table 7: Policy opportunities for the Chilean health system in relation to cancer identified in the survey, organized by health system area.

Policy Option	Specific Policy Actions
Top Priority Policy Area: Organization and Governance	
1. Develop policies and actions to effectively implement National Cancer Law	• Create a department within MINSAL dedicated to cancer • Introduce new guidelines and directives to improve prevention, detection, comprehensive care, case management and treatment and quality across the care continuum in public and private sectors • Develop additional policies to regulate the main risk factors for cancer: tobacco, alcohol, sugary beverages, and environmental contaminants • Introduce legislation that requires the national cancer control plan to be updated every five years • Create a national population based cancer registry
2. Improve collaboration and cooperation among different actors within government entities and between stakeholders	• Improve coordination between public and private entities, and civil society organizations, to implement the National Cancer Law • Use 'Big Data' and data science to better analyse, track, plan, and implement cancer prevention and care • Require a unified electronic health records systems for the health sector • Create regional cancer committees and/or a cancer advisory council that sets guidelines for achieving cancer goals

3. Create an independent institution to monitor and manage cancer care in the country	• Establish and fund an autonomous governmental institution to develop strategies to implement the National Cancer Plan, coordinate between public and private sectors, monitor its implementaion and evaluate impact • Ensure continuation of overarching strategies, regardless of political administration
4. Expand regional capacity	• Through open and transparent means, allow MINSAL to decentralize management of cancer to regions with authority to develop local initiatives to address different types of cancer that are more common in certain geographical areas, paying attention to environmental factors that influence cancer outcomes • Improve specialized infrastructure to address cancer inequities in different regions • Strengthen epidemiological surveillance and ensure resources are allocated to all regions for all types of cancer pathologies
5. Implement policies to engage stakeholders and involve the public in decision-making around cancer	• Study existing regulations through public, private, and academic joint committees • Develop public policies to incentivize health professionals to attend to patients in different regions • Create policies for cancer in an inclusive way using scientific evidence from other OECD countries
Second Priority Policy Area: Financing	
6. Implement policies to gradually increase the national budget allocated for cancer	• Design and promote a national tax system to increase tax revenues of tobacco, alcohol and harmful industrial parctices to appropriately finance the National Cancer Plan and cancer research • Introduce annual and trimester-based goals that are linked to expanded budgets, ensuring accountability and efficiency • Establish a cancer financing law to guarantee cancer financing • Earmark annual budget for prevention and promotion activites related to cancer • Expanded state funding for cancer with, participation, and support from the private sector
7. Provide funding to establish an independent cancer agency	• Establish an appropriately funded independent cancer agency that can undertake research to inform policy and guidelines for financing research, innovative cancer technologies, medicines, and treatments accessible to all, and to spearhead public-private-partnerships to identify and work with laboratories to improve outcomes • Undertake regular analysis (three yearly) to allocate resources according to prevalence and incidence

8. Implement economic policies that consider the long-term impact of comprehensive cancer starting with prevention and early detection	• Use zero-based budgeting methodology proposed by the Ministry of Finance to develop a budget for the National Cancer Plan in order to effectively achieve incremental and multi-year increases, developing new and improved performance indicators that allow for improved impact evaluation • Develop a nationwide agreed data set to collect information from hospitals and primary care facilities about the types of cancers treated, tumor subtypes, age of diagnosis, and all clinical parameters to guide public policy • Establish policies that improve the training and management of health professionals, specifically for early diagnosis of cancer • Assess the costs of cancer care to ensure alignment in public and private sectors, and regions • Update a national drug law to ensure nationwide availability of all essential medicines
9. Address equity issues between public and private sectors to ensure coverage is available and accessible	• Address the limited availability of specialists and cancer centers by decentralizing resource allocation decisions in MINSAL • Expand GES to cover all types of cancer with appropriate funding • Create referral centers for cancers with high complexity within the public sector ○ Promote and facilitate the specialization and sub-specialization of health professionals within the public sector
Third Priority Policy Area: Resource Management	
10. Enact public policies for cancer care that ensures collaboration and cooperation between agencies and among different regional health authorities	• Build on experience of managing COVID-19 pandemic in Chile to create public-private-partnerships to implement National Cancer Plan • Modify governance structures to have a multisectoral platform to educate and train health profesionals, and support patients • Create a national system using big data and analytics to monitor resources fand their use for cancer control • Create a subdepartment within MINSAL with budget and authority to allocate resources for managing issues related to cancer • Establish a regulatory framework for evidence-based resource management that is flexible enough to adapt to local conditions • Develop an online platform that is fully accessible and integrated for all institutions, allowing simple-to-use authorization system for doctors, insurers, and medication providers involved in cancer care • Develop regional cancer programs to prioritize important cancers and meet specific needs of each region • Establish interdisciplinary and interhospital committees that focus on managing resources for cancer patients to improve cancer care • Strengthen the ETESA agency with involvement from MINSAL and informed by health economics to create alliances with academic research centers to develop strategies for regional contexts • Create an integrated cancer referral network for all cancer patients that is accessible in both public and private sectors

	• Centralize medication purchases through CENABAST to reduce fragmentation and inefficiency
11. Re-structure existing resource allocation systems to enable continuity in cancer care, taking into account differences in regional needs	• Ensure adequate resource allocation to regional governments for them to manage comprehensive cancer budgets, including prevention, promotion, diagnostics, treatment, rehabilitation, palliative care, and research • Develop regulations with incentives to increase availability of doctors, infrastructure, and referral centers in different regions • Develop an investment plan for equipment and infrastructure financed jointly by central and regional governments • Develop guidelines and require their use for resource allocation • Provide additional funding to regional universities to establish local training programs to increase the number of specialists locally
12. Enact policies that prioritize cancer prevention and promotion	• Create sentinel surveillance centers for different cancer types • Introduce nationwide screening programs for breast and prostate cancer that are free and accessible ○ Pursue population-based studies, conduct community-based trials to test the effectiveness and population-based impacts of different cancer control strategies and allocate resources based on results
13. Conduct economic evaluations and use results to efficiently allocate resources and health budgets, taking into account regional needs	• Require external independent evaluations for resource allocation decisions related to the National Cancer Law • Support regional decisions using ETESA • Utilize clinical guidelines, KPI's, and accountability mechanisms to evaluate resource management throughout the public and private sectors • Strengthen the accreditation process for public and private sector providers providing cancer services
Fourth Priority Policy Area: Service Delivery	
14. Effectively use the National Cancer Law to implement policies to improve quality, cancer prevention, diagnosis, and treatment across regions	• Use National Cancer Law to promote effective oversight of MINSAL for both public and private systems • Modify accreditation system within the Superintendencia de Salud to cover specialized cancer care centers • Set FONASA tariffs for cancer services according to guidelines established by MINSAL • Expand GES to cover additional cancer types and cancer care and treatment, as well as diagnostics and therapeutic procedures • Introduce legislation to require the use of standardized guidelines and interventions in the public and private health systems • Strenghen and expand regulations and public policies to address malnutrition, increase physical activity, reduce consumption of tobacco and alcohol, and reduce workplace exposure to contaminants

	• Establish a natonal population based cancer registry • Undertake comprehensive assessment of independent practitioners and private providers providing cancer care • Introduce legislation to incentivize pharmaceutical companies to provide patient support programs and/or collaborate with the State to support training of specialists
15. Ensure integration of the health system to promote collaboration and coordination between different actors within the health system to offer comparable services in both the public and private sectors to close gaps in access and health outcomes between rich and poor	• Clarify and simplify the referral process for cancer; reduce long wait times • Encourage the establishment of public-private-partnerships, involving MINSAL, universities, and independent actors, to effectively manage cancer burden, taking into account complexity of care and competencies • Establish regional cancer centers • Develop policies to encourage decentralization of regional health services • Designate one (or more) regional cancer center leader with additional resources and infrastructure that allows them to organize within their own network at various levels of care within the public and private systems • Improve care coordination and continuity through the expanded use of telemedicine and technologies • Enhance collaboration and integration of scientific societies, doctors, and other professionals to reduce inefficiencies • Expand comprehensive care services in schools and communities • Collaborate with civil society organizations to incorporate cancer patient management in all health centers
16. Improve provider training around cancer care and service delivery with a multisectoral approach	• Require continuous education and profesional training for practitioners • Encourage participatory management to establish more effective paths for communication • Establish a traini9ng program to develop nurse practitioners that can provide cancer care
17. Establish comprehensive and integrated information services and processes focused on quality assurance in cancer prevention, diagnosis, and treatment	• Expand capacity of hospitals and selected health institutions to undertake real-time PCR analysis for studies on tumor mutations • Establish a database of genetic variations of cancer • Allow for the use of new diagnostic biomarkers and personalized treatments, and certify hospitals and cancer centers to provide such services • Implement a unified information system that integrates data for services delivered at different levels across the care continuum (prevention, promotion, treatment, rehabilitation) • Develop referral and counter-referral system between different levels of care: diagnostics, treatment, and follow-up

The moderated roundtable discussions enabled the participants to discuss more deeply specific details of policy options identified in the survey (Table 8).

Table 8. Policy opportunities for the Chilean health system in relation to cancer organized by health system area as identified at the stakeholder meeting.

Opportunity Area	Policy Category	Specific Policy Options
Organization and Governance	*Improve collaboration and cooperation*	• Ensure continuity directors of hospitals regardless of political administration • Ensure open communication between and within different levels of government, particularly between central government with regional areas • Improve stakeholder participation when developing legislation and regulations
	Creation of independent cancer institutions	• Ensure independence and continuity of cancer control beyond political transitions through the creation of an independent cancer agency • Establish a national cancer network, including public and private sectors
	Utilize data to inform policies	• Undertake studies to measure and compare performance of healthcare providers
Financial	*Increase transparency and improve communication & collaboration*	• Require greater transparency and access to information on national policies related to health and cancer and approval of new medicines • Reduce compartmentalization within MINSAL • Utilize MINSAL to improve coverage and coordinate between the public and private sectors
	Establish guidelines and standards	• Empower civil society to investigate claims of violations of standards and guidelines • Ensure evidence and data drive the approval process of pharmaceuticals, whether included in GES or not
	Expand or reform budgeting process	• Reform budgeting process to better estimate resource needs and ensure effective budgeting for cancer • Invest in cost-effective and equitable solutions
Resource Management	*Improve collaboration and coordination*	• Expand the autonomy and capacity of nurses to address human resource gaps regardless of specialty • Create a network of oncologists to fill in service provision gaps and provide guidance to practitioners throughout Chile

	Increase investments and improve resource allocation	• Combine fianncial incentives with non-economic incentives to attarct ad retian health professionals in underserved part of Chile • Incentivize innovation with appropriate funding in services that have been impacted by COVID-19 • Improve availability of diagnostics, human resources, and health centres in different regions throughout Chile before building new hospitals
	Improve efficiency	• Identify areas of wasteful spending • Improve information systems to reduce bottlenecks to care, while maintaining patient-centered focus
Service Delivery	*Improve collaboration and coordination to address regional disparities*	• Expand regional capability outside Santiago by establishing regional cancer centers supported by national and regional authorities • Establish guidelines to address prioritization of needs in line with national objectives for cancer control, with specific consideration given to patients in rural areas
	Expand the number and capacity of nurses and specialists	• Use of task shifting to expand the scope of cancer care provided by nurses and nurse practitioners • Invest in training of specialists and other health professionals involved in cancer care, especially nurse practitioners
	Improve transparency, oversight, and regulations	• Allow doctors to have greater autonomy and decision-making capacity, but with increased oversight and better management • Empower patients by providing them with more information about cancer treatment and care process
	Expand the use of telemedicine and other innovations	• Build on the lessons learned from COVID-19 to expand access to care and to improve care continuity
	Strengthen primary care throughout the health system	• Expand training for primary care with better soft- and people-skills to build better relationships with patients • Strengthen primary care centers to better manage cancer care and control

6. COVID-19 Pandemic and Implications for Cancer in Chile

Like most countries in Latin America, Chile has been hit very hard by the COVID-19 pandemic with severe health and economic consequences. Early in the pandemic, the government acted rapidly to introduce wide

testing and quarantine travelers, neighborhoods, and others at high-risk for infection (17,18). The government also insituted strick lockdowns and measures to track social distancing adherence. As a result, Chile saw some early succcess in limiting the spread of the virus and seemed to emerge as a model in COVID-19 response ahead of many of its peers in Latin America, and relaxation of restrictions began as early as April 2020 (17).

Although the country has been implementing different measures recommended by national and international experts to suppress and mitigate the impact of its spread, without strict measures and in spite of a highly successful vaccination program, COVID-19 infection rate rose very rapidly as the virus spread quickly and mostly unchecked in low-income communities (17,18,19), with Chile recording the highest COVID-19 infection rate per capita in Latin America, and one of the highest in the world (17). By June 2021, there were more than 1,400,000 confirmed COVID-19 cases, more than 5,000 reported new daily cases and approximately 30,000 deaths.

Some have pointed out how social inequalities have been the main contributor to the rising number of infections (17). Early containment and testing efforts were focused on travelers and other higher income groups (17). Many lower income Chileans were essential and frontline workers and thus unable to work from home and more likely to be exposed to the virus (17,18). Additionally, widespread public mistrust in the government contributed to the ineffectiveness of many preventive public health measures including limiting gathering sizes and quarantining (17). This mistrust has been worsened by inaccurate reporting of the real burden of COVID-19 by Chilean health officials and media reports of government officials themselves not adhering to guidelines (17). In June, riots erupted across the country with protestors blaming the government's focusing of preventive measures on the few wealthy elite (18). By July, infections rates began to decrease and the government created a stepwise plan for a gradual reopening of the country (20).

The long term impact of Chile's response to address the intersection of COVID-19 and cancer is yet to be seen. Cancer patients are a high-risk group for severe COVID-19 infection as well as death (21, 22), with 13% of cancer patients dying within a month of being diagnosed with COVID-19 (23). Six months into the pandemic, countries are beginning to understand the effects of COVID-19-related measures, like lockdowns and health system stress, on cancer care. Recent studies in the UK found that COVID-19 caused delays in cancer diagnosis and referral pathways that increased patient years of life lost and mortality due to their cancer (24, 25). The studies also found that social distancing and lockdown affect health-seeking behavior as those with suspected cancer waited until symptoms worsened to seek care (24,25).

The situation is similar in Chile where patients have experienced delays in diagnosis, referral and treatment of cancer cases due to COVID-19 and the restrictions related to physical distancing and movement. The vast majority of cancer patients have not been able to access the health system due to capacity constraints and many have delayed contact with the health system even when they had symptoms because of fear of contracting COVID-19. As a result, in both the public and private health sectors there has been a huge decline in the number of cancer cases diagnosed, chemotherapy treatments given and surgeries performed. The delay in diagnosis has led to late presentation to the health system for cancer diagnosis and care, and excess deaths (ref Ward et al. in press)

To effectively respond to the adverse impact of COVID-19 on cancer, the capacity of Chilean health system should be strengthened to improve preparedness, responsiveness and resilience. Health policy and actions

have to ensure effective control of COVID-19 cases but also the long-term consequences of this pandemic on the management of chronic non-communicable diseases such as cancer.

The increase in cancer diagnoses in the coming months will produce unprecedented stress for the health system in Chile and other countries in Latin America. The government should take action to safely increase capacity for cancer diagnosis and care amidst pandemic measures, combined with public education campaigns detailing how to safely seek care for suspected cancer symptoms and receive treatment. (26).

Reliable data and analysis is needed to understand the true nature and magnitude of the adverse consequences of COVID-19 on the health system, cancer and other conditions. There is to guide policies and actions to develop appropriate level of services and surge capacity to manage COVID-19 and to ensure that the health system is responsive and resilient to the changing epidemiology and demand patterns.

7. Recommendations and Next Steps

In this section, we provide recommendations for major set of actions that could be implemented to more effectively address the rising cancer burden in Chile. These recommendations are organized by their priority for the health system (highest, high, or medium). We identify for each policy recommendation, potential financial cost of implementation (high, medium, or low) and estimate the length of time needed to implement (short, medium, or long term) (Figure 22).

Figure 22: Summary of policy recommendations with priority, cost, and timeline assessment.

Recommendation	Priority	Estimated Cost	Estimated Timeline
Restructure delivery of cancer services to reduce fragmentation and ensure provision of consistently high quality and equitable cancer services.	Highest	Medium Cost	Medium term
Improve accessibility to cancer care throughout Chile by increasing regional capacity and autonomy in management of cancer programs	High	Medium cost	Medium term
Expand the use of economic analysis to improve the efficiency of resource allocation for cancer care and control.	Highest	Medium cost	Medium term
Improve regulations to strengthen mechanisms for inspection, surveillance and control of national and regional health budgets.	High	Higher cost	Shorter term
Establish a national population based registry.	High	Higher cost	Medium term
Establish an Independent Cancer Agency responsible for developing cancer policies, training, conducting evaluations, and implementing the National Cancer Plan.	High	Medium cost	Medium term
Strengthen actions that prioritize prevention interventions for cancer.	Medium	Lower cost	Longer term
Implement policies to gradually increase the national budget allocated for cancer.	Medium	Medium cost	Longer term

Strengthen Primary Care in Chile and its role in cancer care and control.	Medium	Higher cost	Longer term

7.1. Highest Priority

1. **Restructure delivery of cancer services to reduce fragmentation and to ensure provision of consistently high quality and equitable cancer services.** There should be new partnerships and improved coordination between public and private entities, as well as civil society organizations, to effectively implement the National Cancer Plan and to improve cancer care and control.

   – Create an integrated cancer referral network for all cancer patients that is accessible in both public and private sectors eliminating barriers when managing resources for cancer care.
   – Develop regional cancer programs to prioritize important cancers and the specific needs of each type in each region.
   – Create a national system for monitoring the allocation and application of resources for development of comprehensive cancer services for diagnosis, treatment, care and control, including for palliative care

2. **Improve accessibility to cancer care throughout Chile by increasing regional capacity and autonomy of regions in management of cancer programs.** Expand connections with civil society to improve other aspects of patient care, like connecting patients that are outside of city centers to specialty centers in more urban areas

   – Address the limited availability of specialists and cancer centers by decentralizing the allocation of resources within MINSAL. Create incentives to attract healthcare professionals to more rural areas addressing issues of disparities across regions
   – Expand GES to cover all types of cancer pathologies and ensure a minimum annual budget is spent on cancer pathologies. Expand service to include support of not just clinicians, and can include comprehensive services such as diagnostics, treatment, and follow-up.
   – Create referral centers for cancers with high complexity within the public sector.
   – Promote and facilitate the specialization and sub-specialization of practitioners within the public sector
   – Invest in training of nurse practitioners to be involved in cancer care and control
   – Address issues such as transportation, housing, food, care and assistance.
   – Expand the use of telemedicine and other innovations to improve access

3. **Expand the use of economic evaluation to improve resource allocation for cancer care and control.** This analysis should be conducted by an independent agency in order to:

   – Reorganize existing resources and utilize national cancer plan to promote effective governance of MINSAL over both public and private systems
   – Improve data quality and validity by conducting audits of the public system to analyze affected populations and Improving the information systems that manage cancer for continual updates
   – Investigate performance of clinics and hospitals providing cancer care.

7.2. Higher Priority

1. **Improve regulations to strengthen mechanisms for inspection, surveillance and control of national and regional health budgets.** The government should improve monitoring of resource allocation, budget management, and service delivery by:

   – Defining clearly the role of national and regional authorities to oversee health budget management, and spending, and to identify need.
   – Supervise budgeting process to ensure appropriate allocation of budgets
   – Address inefficiencies and suggest policy solutions
   – Invest in cost-effective solutions and identify areas of wasteful spending; enabling the government to use available resources more efficiently and to increase available funding for cancer care and control
   – Develop tools to allow non-public auditors, such as civil society and non-governmental organizations, to inspect and surveil allocation of resources to cancer, providing them a direct line of communication with public health authorities to report insufficient handling of cancer resources.

2. **Establish a national population based registry.** The government should support the development of a national population-based cancer registry by pooling data from the existing registries and new ones that need to be established in regions where registries do not exist. Data from a national registry 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
   – Coordinate with the proposed National Cancer Agency, regional health authorities and academic institutions to ensure data are made available for analysis.
   – Develop and appropriately finance analytic capacity at MINSAL, the proposed National Cancer Agency and the Regional Registries to regularly analyse the data collected
   – Generate evidence to better understand the cancer burden in the country and use this evidence to inform resource allocation and management based on need.

3. **Create an Independent Cancer Agency responsible for developing cancer policies, training, conducting evaluations, and implementing the national cancer plan.** Ensure independence of cancer control work outside of political transitions through the creation of an independent cancer agency, with a role to :

   – Ensure effective implementation of the National Cancer Plan
   – Provide independent guidance on policies needed to address the cancer burden in Chile
   – Commision economic evaluations to ensure policies, programs and interventions funded are cost effective and equitable
   – Develop accountability and enforcement mechanisms for achieving targets in the national cancer plan, including setting goals and measuring compliance with budgetary priorities.

7.3. Medium Priority

1. **Enact policies that prioritize cancer prevention and health promotion.** Cancer policies should focus on strengthening cancer prevention and health promotion, by:

   – Implementing prevention policies
   – Requiring mandatory screenings and guarantee accessibility and Pass legislation to require standardized guidelines and interventions for both public and private systems
   – Investing in research focusing in population-based studies, conducting community-based studies to test the effectiveness and population-based impacts of different cancer prevention and control strategies
   – Increasing public health education and strengthening policies to address malnutrition, increase physical activities, reduce consumption of tobacco and alcohol, and reduce workplace exposure to contaminants.

2. **Implement policies to gradually increase the national budget allocated for cancer.** The government should aim to increase funding in order to make innovative cancer technologies, medicines, and treatments more accessible to patients by:

   – Promoting a national tax system to finance the National Cancer Plan adequately; expand taxes on tobacco, alcohol, sugary beverages and harmful industrial activities
   – Pursuing expanded federal and state funding with regulation, participation, and support from the private sector to increase funding for cancer care and control.
   – Creating a special fund for cancer treatments and ensure a minimum annual budget is approved, with regular evaluations to allocate resources based on burden pf different types of cancer throughout the country.

3. **Strengthen Primary Care in Chile and its role in cancer care and control.** The national government should invest in primary care as a strategy for prevention and early diagnosis of cancer.

   – Provide academic training and continuing education for health providers around cancer care (prevention, diagnosis, and treatment) especially for nurses and nurse practitioners involved in cancer care and control.
   – Involve specialists at earliest stages of cancer detection at primary care, avoiding delay diagnosis and referral to health care centers
   – Create incentives to expand the availability of doctors, health professionals such as nurse practitioners, infrastructure, and referral centers throughout different regions of Chile
   – Provide comprehensive care by expanding and improving training for primary care with soft skills and people skills to build better relationships with patients.

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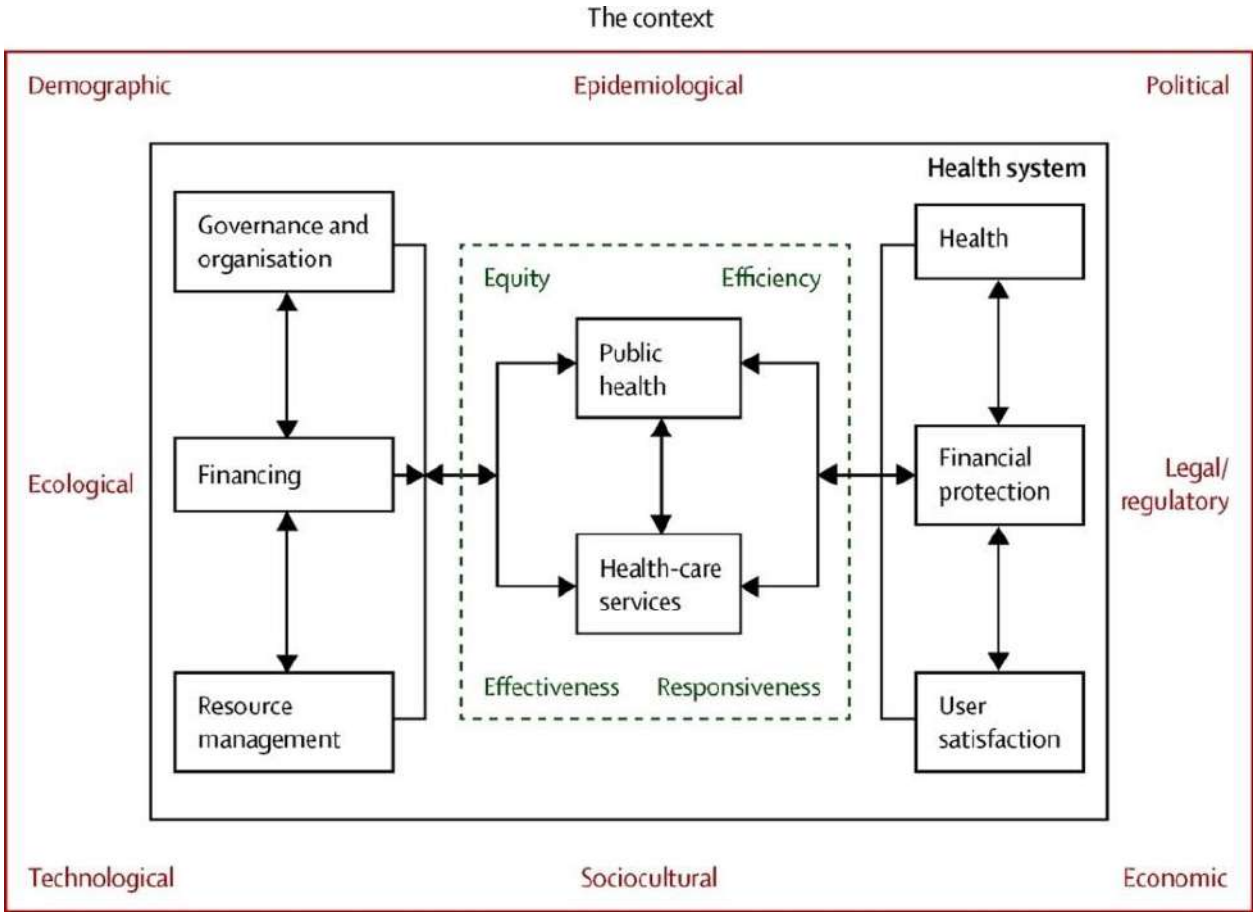
9. Appendix A: Health System Framework

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;

Health System Outputs

1. **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

Chile is one of four countries selected to carry out the study. In order to achieve a complete approach and understanding of the context of the country, its health system and the challenges and opportunities related to the approach of cancer in the country, the methodological approach will take into account five major sources of information:

1. A literature review of published articles, policies, and datasets,
2. A novel online survey conducted among experts, clinicians, policy makers and key informants from civil society,
3. Key informant planning workshops in Antofagasta, Valdivia, and Santiago,
4. Pre-workshop planning meeting in Santiago, and
5. A virtual stakeholder workshop.

The Harvard research team worked with collaborators in Chile to establish a core team to undertake the study. The data was collected and analyzed between the months of August to December 2020. It should be noted that during the data collection and analysis process, there was constant guidance and feedback from the different working groups, including the stakeholder workshop.

10.1. Literature Review

A literature review was conducted by three researchers from Harvard University to quantify the burden of cancer in Chile and compare this burden within other large Latin American countries like Colombia, 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 Chile 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 GLOBOCAN project (9). Supporting data was obtained from the CONCORD 3 study (27), 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:** First, the various factors that contribute to the health and cancer context in Chile will be determined. In order to obtain related information, we will consult published journal studies and reports and analysis of different organizations, such as the Organisation for Economic Co-operation and Development (OECD) (28), the International Monetary Fund (29), the World Bank (30), Inter-American Development Bank (31), the Pan American Health Organization (32), Latin American agencies (33), 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 within which the Chilean health system operates (34).

  Another of the main sources of information will be non-peer reviewed articles published in the last 5 years related to the different aspects of the health system and the problem of cancer in Chile. Most of these articles were published in newspapers with extensive experience of Chile and have international (Economist) (35) and national circulation (El Mercurio and La Tercera) (36,37), as well as local news agencies (Emol) (38).

- **Health System:** Data permitting, we will analyze the performance of the Chilean health system in achieving health system goals (improved level and distribution of health, financial protection and user satisfaction) and objectives (equity, efficiency, effectiveness and responsiveness). We will also analyse the organization, governance, financing and resource management in the Chilean health system and the personal health service and public health service outputs it produces to achieve health system objectives and goals. Data will be gathered from surveys, routine health administration data, and disease registries as well as national and international reports, which evaluate the different aspects of the health system not only at the national level, but also other reports in which the health system in Chile is compared with other Latin American countries.

  Our main source of information will come from the Ministry of Health (minsal.cl), which contains the most updated information and reports on the health outcomes in Chile. This website examines 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 (39). Likewise, we will evaluate the information and reports available in the health statistics and information department, which is responsible for generating the official statistical information for the health sector. Other sources of

information that will be consulted within the national scope are the reports from the different provinces which, as we will see in the final report, are independent entities and function autonomously in most health decision-making in their geographical area.

Finally, information sources from multilateral organizations were used, including reports and data available on the PAHO/WHO website (41), which provide official data for countries, enabling us to examine the health system within the Latin American context, and compare data for Chile with its neighbors.

- **Cancer:** One of our primary sources of information was the National Cancer Plan 2018-2028 (Plan Nactional de Cancer, PNC) that discusses the context of cancer in Chile as well as a plan of action to stem rising incidence and mortality rates (42). The plan of action has five primary components for improvement: education and primary prevention, oncology care networks, access and quality of care, cancer registry systems, and regulation and financing (16). Additionally, the Health National Strategy 2011-2020 (Estrategia Nacional de Salud, Metas) which discusses cancer as part of its strategy to combat Noncommunicable Diseases (NCDs) was used (43). Specifically, the report briefly analyzes cancer trends and context within Chile and outlines strategies for reducing the cancer mortality rate, including improving efficacy of primary prevention, screenings, and quality of care. The report also mentions the importance of palliative care, financial protection for patients, and quality data registries. We obtained information and data from the Cancer Registry and Surveillance System (40) and the Ministry of Health (39) and by the National Cancer Institute of Chile (44). Finally, records and initiatives by private organizations related to the disease were also reviewed (45).

We conducted analysis of the available online data to quantify the burden of cancer in Chile and compare this burden within other large and populous Latin American countries like Argentina, Brazil, Colombia, and Mexico, as well high income countries like France and the United Kingdom that have well established national cancer programs. To analyze cancer incidence and mortality figures in Chile and in selected countries, 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 GLOBOCAN project (9). 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 Chilean cancer registries used in incidence and mortality estimates and projections were the Cancer Registry in the Region of Antofagasta, Arica Cancer Registry, Cancer Registry - Province of Bío Bío, Concepción Cancer Registry, and Region de Los Ríos (Valdivia) Cancer Registry (40). Together, these subnational datasets were used to model a country-specific mortality to incidence ratio, a method which provides more accurate estimates and projections than regional models with population-based registries that lack the same level of granularity (40). Further details about the methodology used in the GLOBOCAN study, its estimates, and projections can be found ain 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 rates (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).

For survival, we used data from the CONCORD-3 study, which tracks global cancer survival data for 18 cancer types in 71 countries based on population-based cancer registries (27). 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 (27).

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 (27).

In total, the population covered by the four participating registries in Chile was 13.8%, a figure consistent with Latin America peers like Argentina (9.2%) and Brazil (7.7%) (27).This figure represents an improvement from the previous iteration of the CONCORD study (CONCORD-2), where only 5.5% of the population was covered by participating cancer registries, yet a far cry from countries like the US (85 .6%) and France (21.7%) (46). Some of Chile'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 (46).

The team's analysis of CONCORD-3 data selected Chile's 5 cancers with the highest mortality rates per 100,000 people in 2018, namely prostate, lung, stomach, breast, and colon cancers. The analysis expanded to compare Chile's 5-year net survival with Latin American counterparts (Argentina, Brazil, Colombia, and Mexico), as well as the countries with the highest reported survival for each of the respective cancers (27).

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 asked participants to identify major challenges for the Chilean 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 also 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 were 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 will include three parts:

1. **Deductive coding**: First, deductive codes were used to organize all open-ended responses by the four opportunity categories for which respondents were 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 label major themes that arise 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 (highest, high, or medium), potential financial cost to implement (highest, high, or medium), and length of time required to implement (short, medium, or long-term).

10.3. Chile Virtual Stakeholder Workshop

ICCI-LA organized four virtual workshops on cancer control policies and to explore actions to address the rising burden of cancer in Chile. These events also helped to elucidate first-hand what the main challenges of the country are in terms of cancer and country context.

The stakeholders were invited to participate in facilitated roundtable discussion focused on four main areas of cancer policy: (1) organizational, (2) financial, (3) resource generation and management, and (4) service delivery. Each roundtable was moderated by a senior policy maker with a good knowledge of the Chilean health system and cancer control, and a good knowledge of the institutions and stakeholders therein. The moderators were also responsible for organizing and inviting a multi-stakeholder group of participants based on background and expertise for each of the roundtables which they facilitated. The workshops were attended by 35 stakeholders from leading public and private organizations involved in cancer control.

The themes emerging from the roundtables were collated and categorized for analysis and comparison with the responses for the survey, and to explore 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 proposed by the workshopattendees were categorised and prioritized in discussion with the participants to develop a set of proposed policies and actions that were 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 Chile

11.1. Demographic and Epidemiological Transition

Chile is democratic republic located on the west of the South American continent, with Argentina bordering to the east, Bolivia in the northeast, Peru in the north, and the Pacific Ocean to the west (48). As of 2016, the country had a population of 17,910,000, with a large majority living in urban areas (upwards of 88% in 2012) (49). The median age of its population is 35.5, with a large majority (68.4%) of its population falling between the ages of 15-54 years, 11.81% of its population 65 years and older, and 19.79% of its population being between 0-14 years (50). Its fertility rate is estimated to be 1.76 children born per woman, below the replacement rate, and a mortality rate of 6.47 per 1,000 (50).

Chile is undergoing a demographic transition that is in its advanced stages. It has both low fertility and mortality rates, with a growing elderly population, which carries implications regarding its healthcare system. It does, however, have a relatively low dependency ratio of 45.9, indicating that it continues to have the ability to reap benefits from through the demographic dividend (48).

Significant investments in "sanitation, nutrition, potable water, and basic education," traced back to the 1920s, account for a large reduction in communicable disease burden in modern-day Chile (48). As of 2002, according to the WHO, noncommunicable disease accounted for 79.4% of total deaths, and more recent figures support a rise in obesity, coronary heart disease, stroke, diabetes, hypertension, and cancers of the stomach, liver, and lung (48). As such, Chile is said to be advancing along the epidemiological transition, reaching a point where advanced economies lie in which chronic, noncommunicable disease burdens a nation to a higher degree than infectious disease.

11.2. Political, Legal, and Regulatory Environment

Chile declared independence from Spain in 1810, and would continue a series of wars against Spain, Peru and Bolivia, and even within its borders at different points in the 1800s (51). Salvador Allende's government was democratically elected in 1970, only to be overthrown in 1973 via a military coup. Augusto Pinochet became dictator of Chile for 17 years until Chile returned to democratic governance in 1990, where the system has remained to the present day (50).

Chile is a presidential republic, with a president as the head of the executive branch and a bicameral National Congress heading the legislative branches of government (50). The judicial branch, at the national level, is separated into two systems: the Chilean Tribunal and the Supreme Court. Reforms in 2005 concrete constitutional review processes from the Supreme Court and gave it to the Tribunal (where it already had the power to perform abstract review), and the former retained the ability to review decisions made by lower courts and appoint some of the Tribunal's members (53). Abstract review grants the tribunal the ability to check legislation before it is enacted and can also tell the National Congress how to change parts of the law in consideration (53).

11.3. Economic Environment

Finance and Cancer Survival

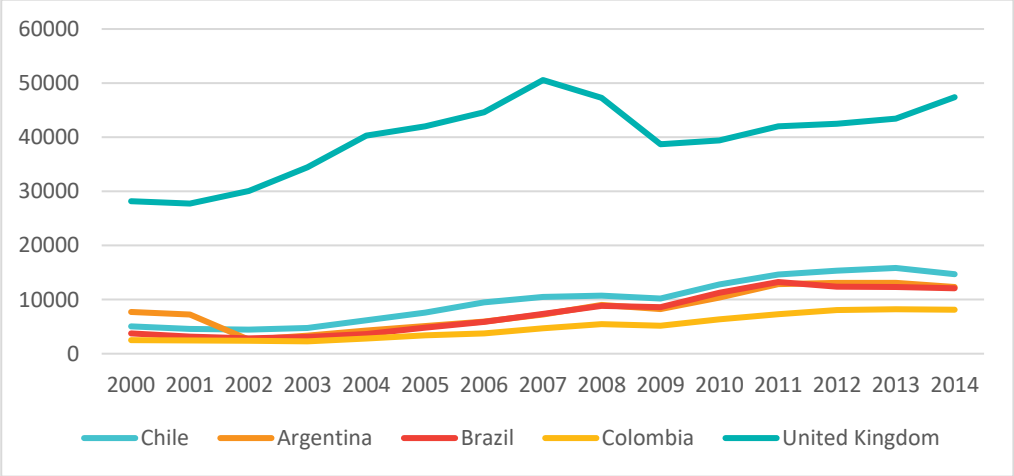
We plotted 5-year survival against Gross Domestic Product (GDP) per capita and health expenditure per capita for Chile and selected comparator countries. GDP per capita is calculated by dividing a country's annual GDP by its midyear population, with the original figure reported in current US Dollars (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, Colombia, and the UK for additional contextualization. Analysis was limited to the period of 2000 to 2014 in order to match the survival estimates from the CONCORD-3 study.

Country-Level Expenditures

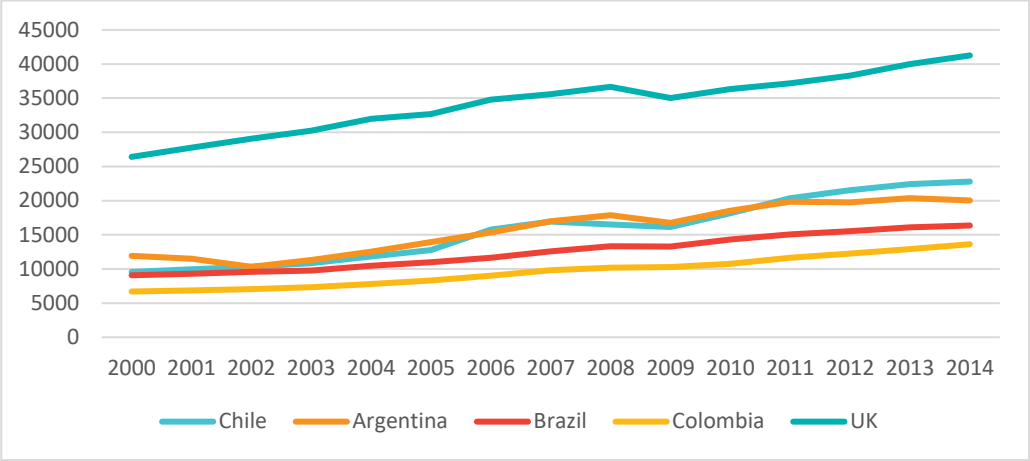
GDP per capita had increased substantially for each country included in the analysis from 2000 to 2014, despite significant periods of slower growth or decline. Of the countries selected, Colombia had the lowest 2014 GDP per capita, PPP, with Intl$1,3618.12, closely followed by Brazil at Intl$1,6358. In a higher cluster were Argentina and Chile, with a GDP per capita, PPP, of Intl$20,008.32 and $22,786.66 each. Finally, the UK had 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 accurate comparison between countries.

Chile's GDP per capita, PPP, increased 138.5% from Intl$9,553.57 in 2000 to Intl$22,786.66 in 2014, the largest increase of any country included in the analysis. For comparison, Argentina increased by 67.9%, Brazil by 80.3%, Colombia by 103.4%, and the UK by 56.2%. Appendix Figures 2 and 3 graph each country's GDP per capita and GDP per capita, PPP from 2000 to 2014.

Appendix Figure 2: GDP Per Capita, Current USD (Source: The World Bank Open Data).



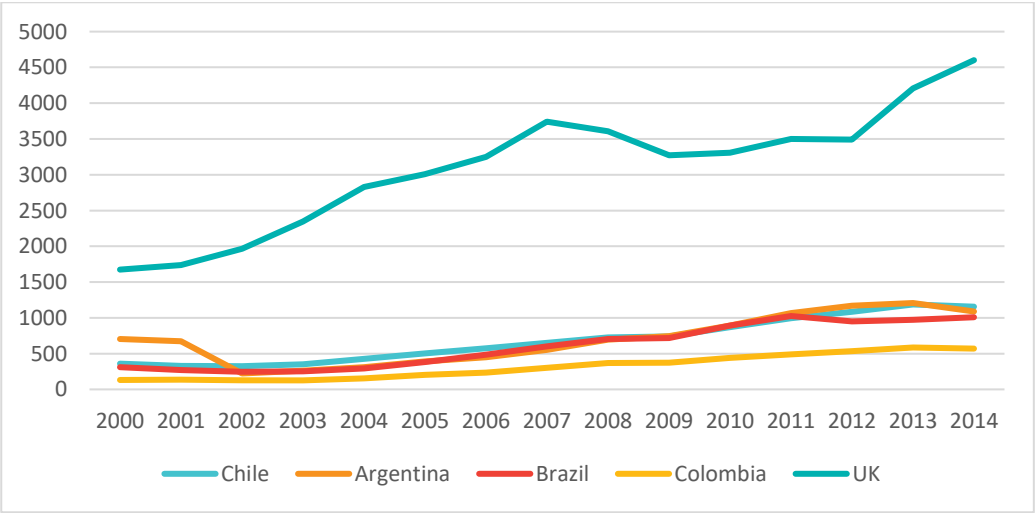
Appendix Figure 3 : GDP Per Capita, PPP, Current International$ (Source: The World Bank Open Data).



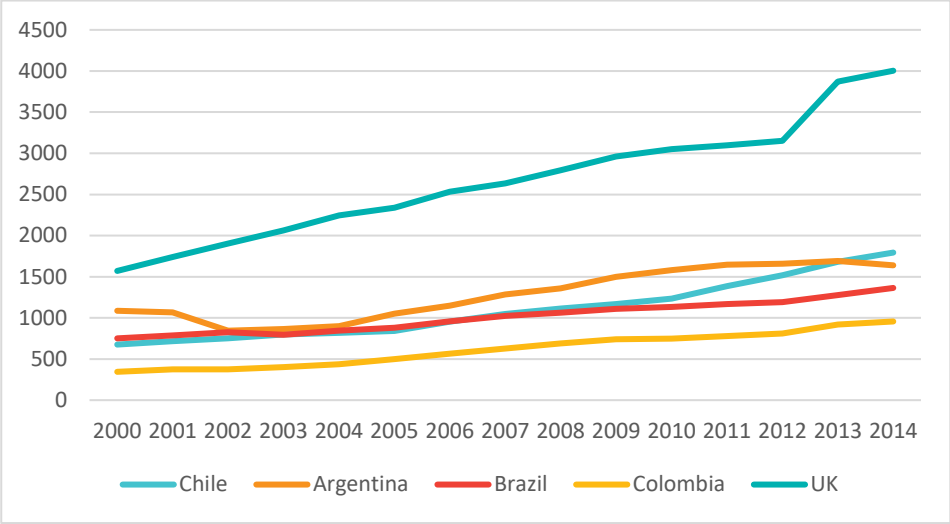
As with GDP per capita, Chile had the highest health expenditure per capita, PPP of any selected Latin American country at Intl$1,793.68 in 2014. This was greater than the health expenditure per capita, PPP in Argentina (Intl$1,640.34), Brazil (Intl$1,363.77), and Colombia (Intl$956.48). The UK represented an outlier in this metric, spending a significantly higher Intl$4,003.54 per person in 2014. Despite spending a larger amount on health expenditure per capita than many of the comparison countries, Chile spent a slightly lower percentage of its GDP per capita, PPP, on health. Chile spent 7.87% of its GDP per capita, PPP on health expenditure per capita, PPP, a ratio below that of the UK (9.7%), Brazil (8.34%), and Argentina (8.2%).

Each country also substantially increased its health expenditure per capita, PPP, over time. Chile's spending grew 165.5% between 2000 and 2014, a figure higher than the increases in Brazil (81.6%), Argentina (51.1%), and the UK (154.89%).

Appendix Figure 4: Health Expenditure per Capita, Current USD (Source: The World Bank Open Data).



Appendix Figure 5: Health Expenditure per Capita, PPP, Current International$ (Source: The World Bank Open Data).



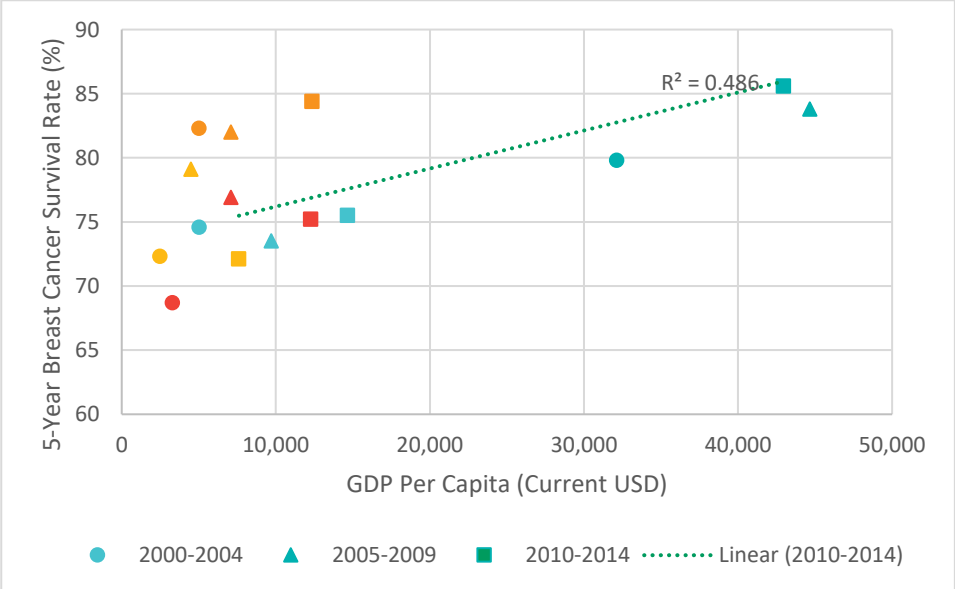
To mirror the CONCORD analysis, each of the financial metrics discussed above were segmented into 5 year averages corresponding to the years for survival estimates: 2000-2004, 2005-2009, and 2010-2014.

The specific cancer types selected for analysis are breast cancer, colon cancer, and lung cancer for which comparable data were available.

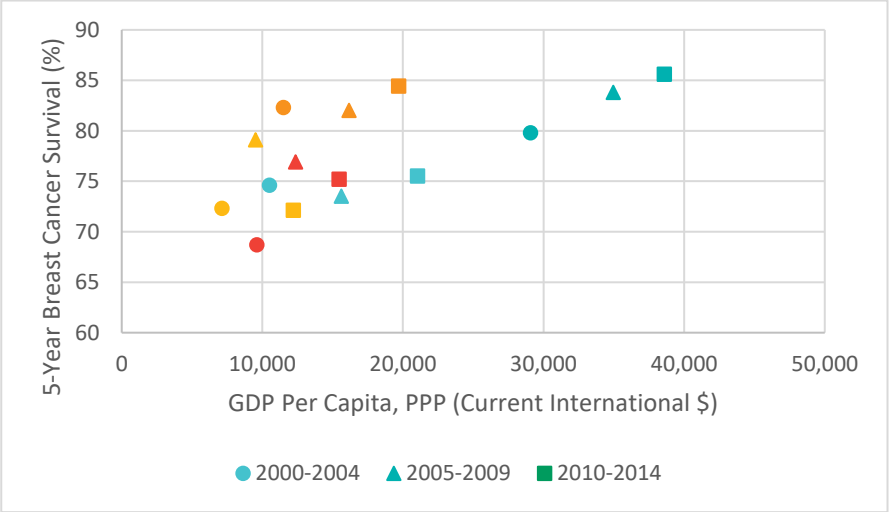
Expenditure and Breast Cancer

For breast cancer, 5-year survival in each of the comparator countries range from 72.1% in Colombia to 85.6% in the UK from 2010 to 2014, with Chile having a survival of 75.5%. By comparison, the highest breast cancer survival in the world from 2010 to 2014 belongs to the US at 90.2% of all diagnosed cases. Plotting survival levels against GDP per capita we find a positive correlation, with the trend clearer in PPP figures. Appendix Figure 6 and 7 show this comparison for GDP per capita and GDP per capita, PPP.

Appendix Figure 6: GDP per Capita vs Breast Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data)

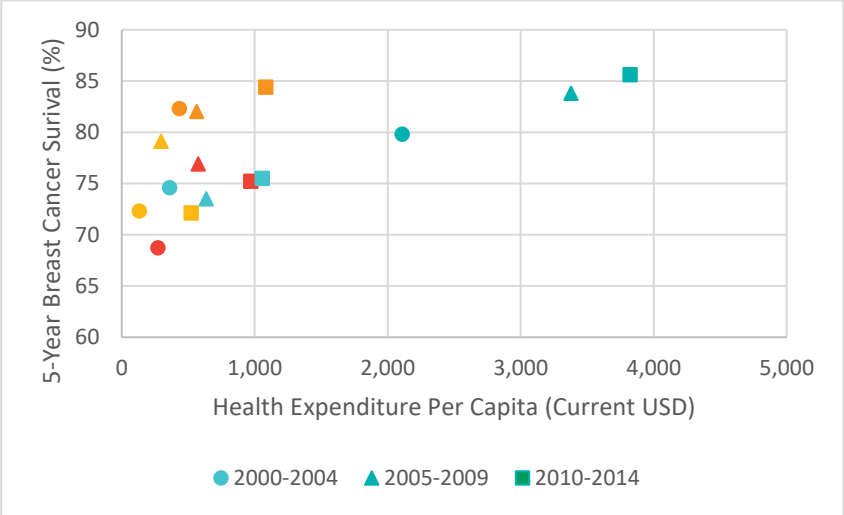


Appendix Figure 7: GDP per Capita, PPP vs Breast Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).

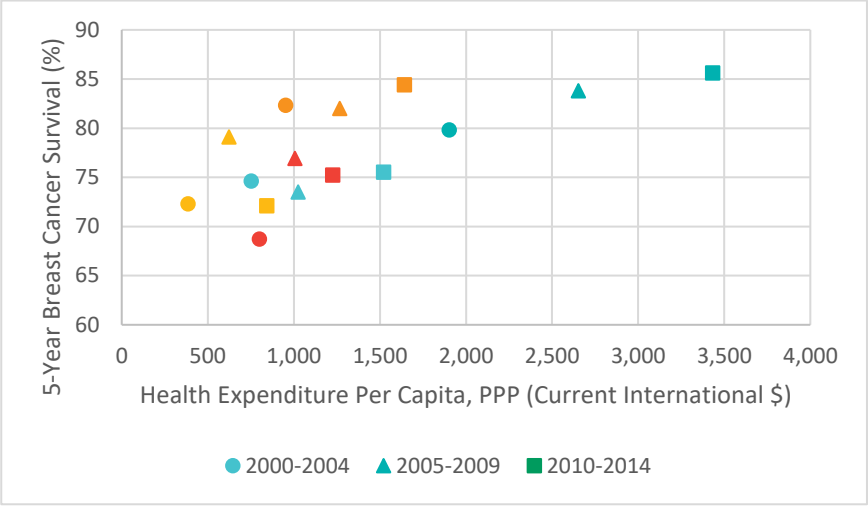


Health expenditure per capita shows a tighter positive correlation between variables, as seen in Appendix Figure 8 and 9.

Appendix Figure 8: Health Expenditure per Capita vs Breast Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 9: Health Expenditure per Capita, PPP vs Breast Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



In general, the correlation is stronger in the PPP metrics which allow for a more accurate comparison between countries than the nominal GDP per capita figures. One way this is evident through the R2 value, which is the percentage of the dependent variable variation, in this case 5-year breast cancer survival, that is explained by a linear model. 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.

Appendix Figure 10 details the inputs used for the respective scatterplot analysis.

Appendix Figure 10: Breast Cancer Expenditure Inputs (Sources: CONCORD-3 Study and The World Bank Open Data).

Breast Cancer 5-Year Survival (% of patients diagnosed)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	74.6	82.3	68.7	72.3	79.8
2005-2009	73.5	82	76.9	79.1	83.8
2010-2014	75.5	84.4	75.2	72.1	85.6

GDP Per Capita (Current US$)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	5012.6	5027.5	3288.8	2484.2	32132.1
2005-2009	9705.2	7104.1	7090.8	4499.1	44639.4
2010-2014	14662.2	12346.5	12263.0	7604.0	42959.9

GDP Per Capita, PPP (Current Internatonal $)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	10502.6	11515.4	9627.7	7140.3	29091.8
2005-2009	15620.8	16169.9	12370.6	9522.5	34939.8
2010-2014	21047.6	19696.1	15471.7	12223.7	38608.8

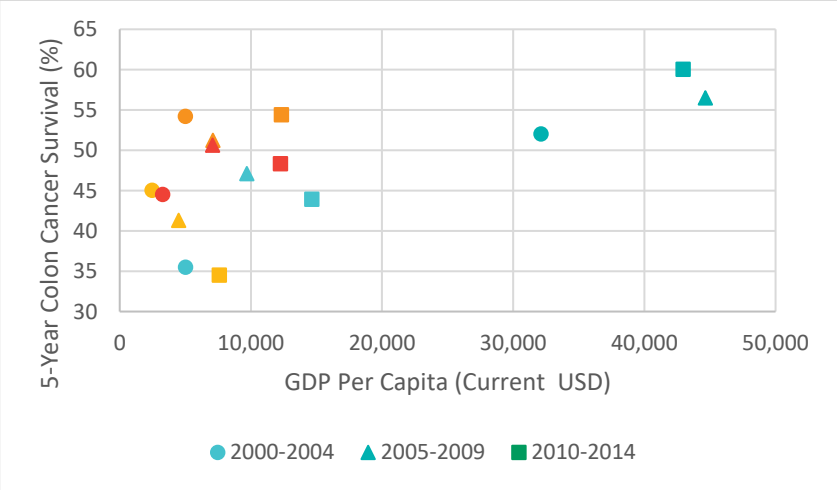
Health Expenditure Per Capita (Current USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	358.3	434.0	274.4	134.8	2110.9
2005-2009	637.9	565.3	577.7	296.5	3376.4
2010-2014	1058.4	1084.8	970.5	524.0	3822.7

Health Expenditure Per Capita (Current USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	358.3	434.0	274.4	134.8	2110.9
2005-2009	637.9	565.3	577.7	296.5	3376.4
2010-2014	1058.4	1084.8	970.5	524.0	3822.7

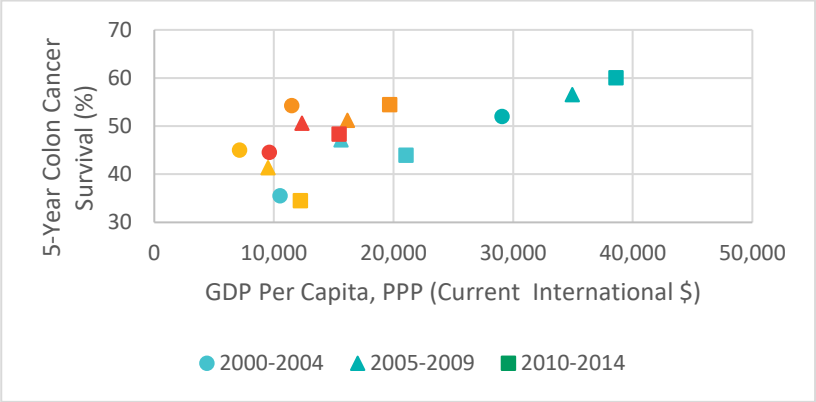
Expenditure and Colon Cancer

Survival for colon cancer are considerably lower than breast cancer, with South Korea having the highest survival in the world in 2010-2014 at 71.8% of all diagnosed patients. Chile, by comparison, had a 43.9% survival in the same time period. This figure is lower than that in Argentina (54.4% survival), Brazil (48.3%), and the UK (60%). Like breast cancer, colon cancer survival is also positively correlated with both GDP per capita and health expenditure per capita.

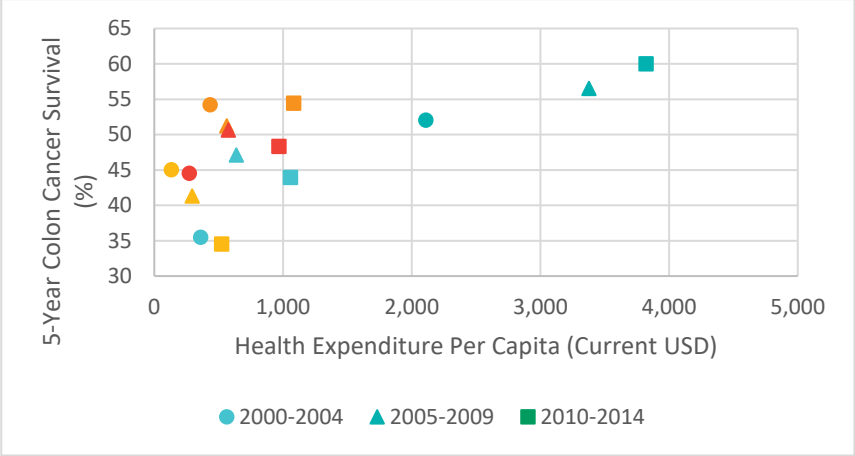
Appendix Figure 11: GDP per Capita vs Colon Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



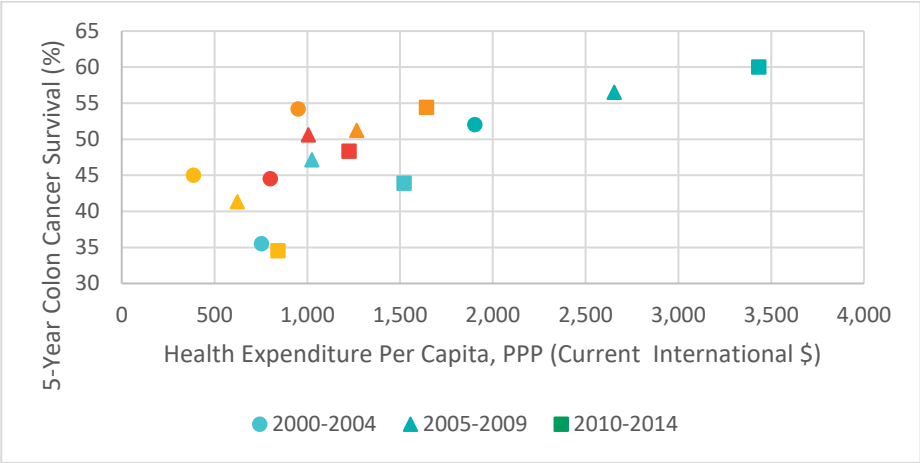
Appendix Figure 12: GDP per Capita, PPP vs Colon Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 13: Health Expenditure per Capita vs Colon Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 14: Health Expenditure per Capita, PPP vs Colon Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 15: Colon Cancer Expenditure Inputs (Sources: CONCORD-3 Study and The World Bank Open Data).

Colon Cancer 5-Year Survival (% of patients diagnosed)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	35.5	54.2	44.5	45	52.0
2005-2009	47.1	51.2	50.6	41.3	56.5
2010-2014	43.9	54.4	48.3	34.5	60.0

GDP Per Capita (Current USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	5012.6	5027.5	3288.8	2484.2	32132.1
2005-2009	9705.2	7104.1	7090.8	4499.1	44639.4
2010-2014	14662.2	12346.5	12263.0	7604.0	42959.9

GDP Per Capita, PPP (Current International $)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	10502.6	11515.4	9627.7	7140.3	29091.8
2005-2009	15620.8	16169.9	12370.6	9522.5	34939.8
2010-2014	21047.6	19696.1	15471.7	12223.7	38608.8

Health Expenditure Per Capita (Current USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	752.1	952.2	800.9	386.6	1903.8
2005-2009	1025.5	1267.9	1006.7	623.8	2652.6
2010-2014	1522.4	1643.1	1226.0	842.9	3434.4

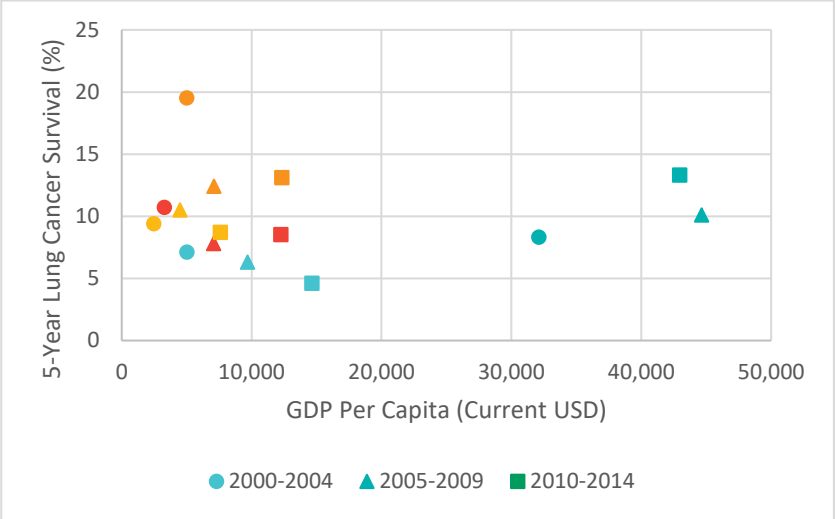
Health Expenditure Per Capita, PPP (Current International $)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	752.1	952.2	800.9	386.6	1903.8
2005-2009	1025.5	1267.9	1006.7	623.8	2652.6
2010-2014	1522.4	1643.1	1226.0	842.9	3434.4

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%).

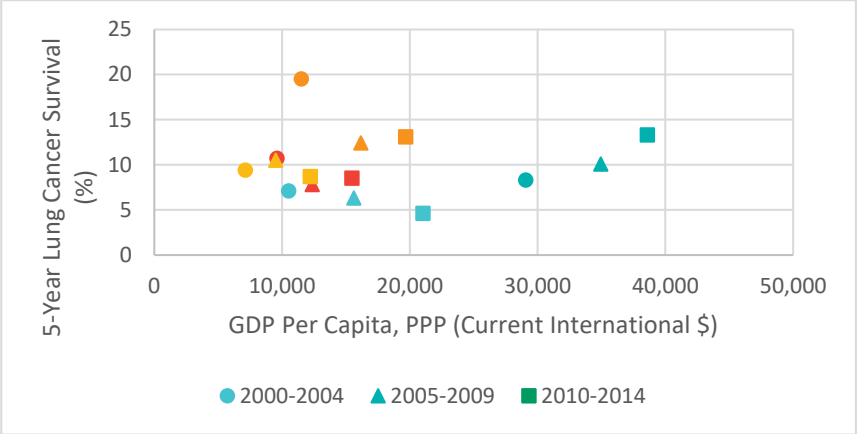
Expenditure and Lung Cancer

Lung cancer survival levels are significantly lower than those of breast cancer and colon cancer, with the highest survival in the world from 2010 to 2014 being 32.9% of diagnosed adults in Japan. Chile's 4.6% survival during 2010 to 2014 is the lowest among comparison countries, with Argentina (13.1%), Brazil (8.5%), Colombia (8.7%), and the UK (13.3%). Plotting these survival estimates against GDP per capita and health expenditure per capita, shows a weaker positive correlation between financial metrics and lung cancer survival. Appendix Figures 16, 17, 18, 19, and 20 display these findings.

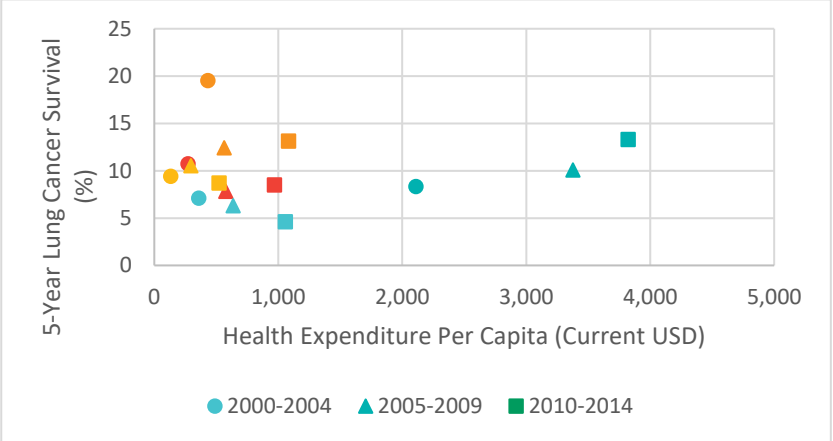
Appendix Figure 16: GDP per Capita vs Lung Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



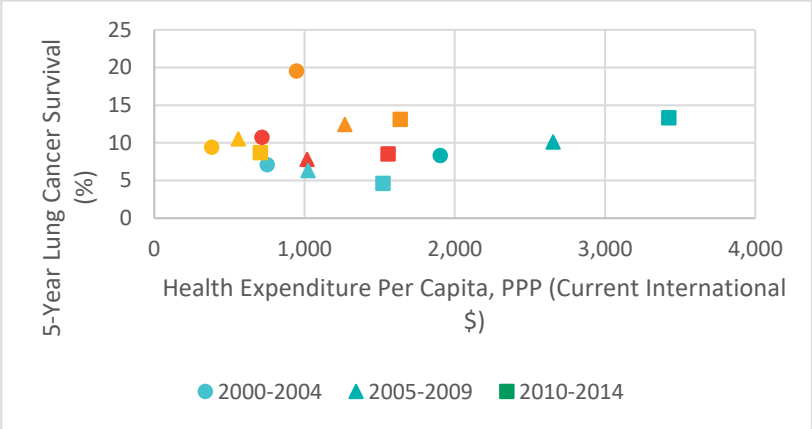
Appendix Figure 17: GDP per Capita, PPP vs Lung Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 18: Health Expenditure per Capita vs Lung Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 19: Health Expenditure per Capita, PPP vs Lung Cancer 5-Year Survival (Sources: CONCORD-3 Study and The World Bank Open Data).



Appendix Figure 20: Lung Cancer Expenditure Inputs (Sources: CONCORD-3 Study and The World Bank Open Data).

Lung Cancer 5-Year Survival (% of patients diagnosed)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	7.1	19.5	10.7	9.4	8.3
2005-2009	6.3	12.4	7.8	10.5	10.1
2010-2014	4.6	13.1	8.5	8.7	13.3

GDP Per Capita (Current USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	5012.6	5027.5	3288.8	2484.2	32132.1
2005-2009	9705.2	7104.1	7090.8	4499.1	44639.4
2010-2014	14662.2	12346.5	12263.0	7604.0	42959.9

GDP Per Capita, PPP (Current International $)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	10502.6	11515.4	9627.7	7140.3	29091.8
2005-2009	15620.8	16169.9	12370.6	9522.5	34939.8
2010-2014	21047.6	19696.1	15471.7	12223.7	38608.8

Health Expenditure Per Capita (USD)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	358.3	434.0	274.4	134.8	2110.9
2005-2009	637.9	565.3	577.7	296.5	3376.4
2010-2014	1058.4	1084.8	970.5	524.0	3822.7

Health Expenditure Per Capita, PPP (Current International $)					
	Chile	Argentina	Brazil	Colombia	UK
2000-2004	750.5	947.6	717.3	383.9	1904.3
2005-2009	1025.4	1269.1	1019.0	560.2	2653.3
2010-2014	1522.8	1638.6	1556.2	707.4	3426.2

Supporting the visual interpretation of weaker correlation is the fact that the R2 values for the 2010 to 2014 trendlines are substantially lower across the board for explaining variation in lung cancer survivability. 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%).

11.4. Socio-cultural Dynamics

The vast majority of Chile identifies as white or non-indigenous as of 2016 (88.9%) (51). The main indigenous population involves the 'Mapuche,' a group of people who inhabit south-central Chile and parts of present-day Patagonia. Nearly all Chileans speak Spanish (99.5%), though the Mapuche language has influenced Spanish enough to make it distinctive in comparison to Spanish from other nations in South America (51). Mapuche struggle against European influence and domination date back to Spanish colonization but have continued to the modern day in the form of armed conflict between Chilean law enforcement and Mapuche nationalists (51).

Owing to perhaps a recent history of authoritarianism and Catholic roots, Chile's politics are conservative and reserved than some of its South American counterparts. Older generations have been more akin to uphold traditional values, particularly in the realm of social issues such as abortion, divorce, and homosexuality (4). Additionally, social class inequalities have remained a problem in Chile, exemplified by the contrast between shanty towns (campamentos) and upper-class districts in the capital city of Santiago (51). These inequalities have a long history, but were exacerbated by the Pinochet regime when unemployment grew, and standards of living worsened for the lower and middle classes while the overall economy grew. There remain contentious debates about the benefits of the Pinochet regime among Chileans, represented in part by the 2006 street riots (both celebratory and mournful) caused by the former dictator's death (51).

11.5. Ecological Changes

Air pollution remains one of the largest environmental concerns in the Republic of Chile. Santiago sees especially noxious air during the winter, owing partly to it being situated in a valley surrounded by coastal and Andean mountain ranges. Because of this landscape, when the nation underwent economic and industrial growth in the 1990s, citizens in Santiago saw air pollution levels that were comparable to Mexico City and Sao Paolo by the 1990s, despite having one-third the population of either of these cities (53). The government began to regulate emissions more actively after the transition to democracy in 1990, resulting in decreased levels of particulate matter 2.5 (measured in µg/m3, abbreviated as PM2.5) (54). However, despite a decrease of almost 50 µg/m3 of PM2.5 between 1989 and 2012, the level remained above the WHO recommendation of 10 µg/m3 (53).

In addition, climate change models have noted increasing temperatures of about +0.15°C per decade in parts of northern and central Chile, starting from the mid-1970s (53). Precipitation records indicate a trend towards dryer weather in south-central Chile as well. If current worldwide emissions continue for the rest of the century, projected climate change indicates modestly warmer coasts (+1°C), with significant warming inland (+4°C) and severe decreases in annual precipitation for south-central Chile (7). Though studies on the effect of climate change on infectious disease transmissibility and rates has not been extensively conducted in the context of Chile, there is a possibility of increased transmission of Chagas disease, dengue, and hantavirus (53).

11.6. Technological Changes

Since the 1980s, Chile's strengthening economy has allowed for the business community to flourish and begin integrating itself with the global economy while cementing its place as a strong innovator among

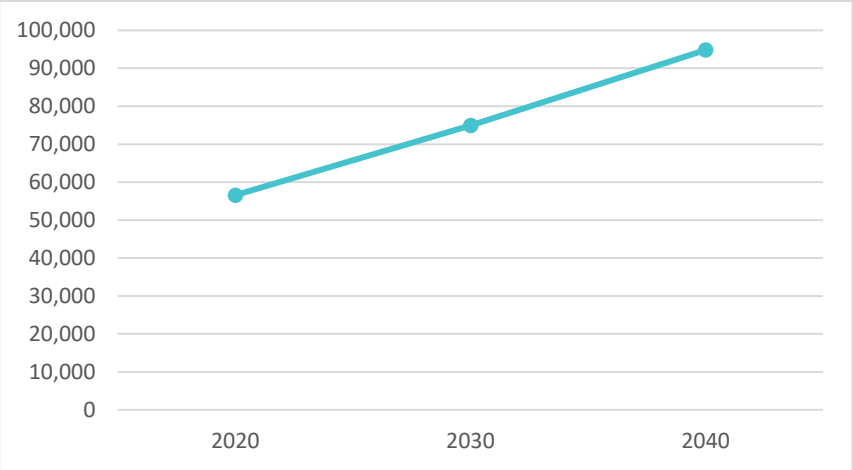
Latin American nations. By the mid-2010s, the country introduced reforms that allowed start-ups to register through a single portal, allow swifter negotiations between creditors and debtors, and introduced "tax incentives for foreign investment in Chilean investment funds" (54). Despite these changes, Chile's science and innovation performances fall below the OECD average, but it is still making significant strides. In universities, for example, the country has financed both innovation workshops and a one month stay chosen for the sale of a new product, and has also bridged the gap between the private sector and the trainees to increase employability (54).

In 2018, President Sebastián Piñera spearheaded the creation of the Ministry of Science, Technology, Knowledge, and Innovation, thus further codifying its commitment to building its capacity for innovation in these fields (55). The ministry will seek to advise the President and will also aim to promote public policy that furthers collaboration between the public and private sector. Through the ministry, the national government also hopes to contribute to scientific understanding while "promoting the perspective and equitable participation of men and women in all areas of science" (55).

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

The total number of new cases of cancer in Chile is projected to rise 77.7% between 2018 and 2040. In 2040, the country is projected to have 94,807 new cases of cancer, representing an additional 41,442 on top of the 2018 estimate. Chile's rate of change is on par with most of its large Latin American peers, with total number of new cancer cases in Brazil projected to increase by 78.4%, Colombia by 86.5%, and Mexico by 88.6%. Argentina is still projected to increase significantly, but at a slower rate of 47.8% between 2018 and 2040.

Appendix Figure 21: Estimated Cancer Cases in Chile 2020-40 (Source: IARC Cancer Tomorrow).

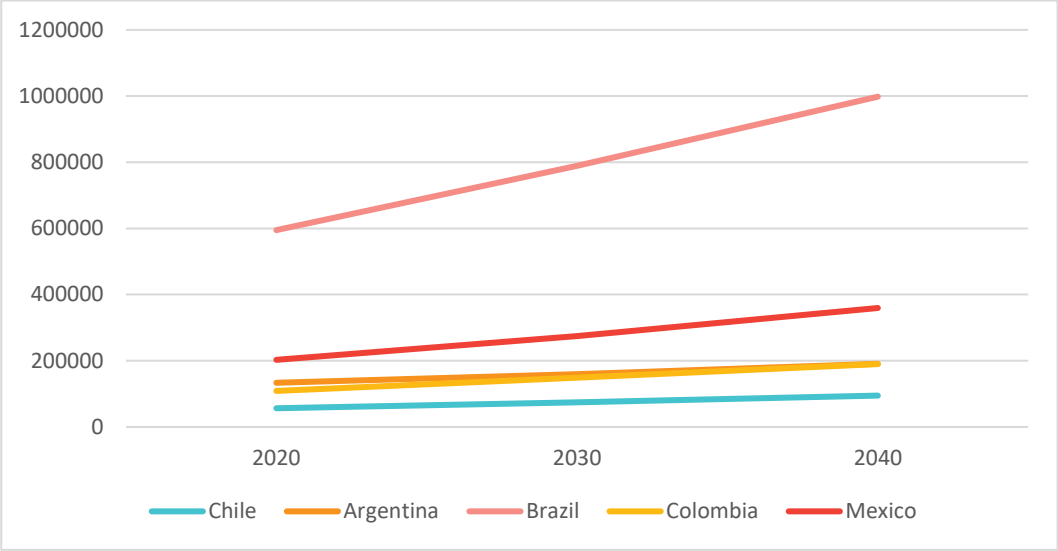


Appendix Figures 22 and 23 show the crude number of incident cancer cases projected over the next 20 years. Though comparisons between countries drawn from crude metrics do not account for different population age structures or sizes, examining the percentage increases within a country can help understanding the projected burden.

Appendix Figure 22: Estimated Cancer Cases in Chile 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).

	Chile	Argentina	Brazil	Colombia	Mexico
2020	56575	133604	594908	108954	202923
2030	74973	159776	789200	148600	274383
2040	94807	190779	998056	189988	359542

Appendix Figure 23: Estimated Cancer Cases in Chile 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).



Incidence Projections in Other Regions

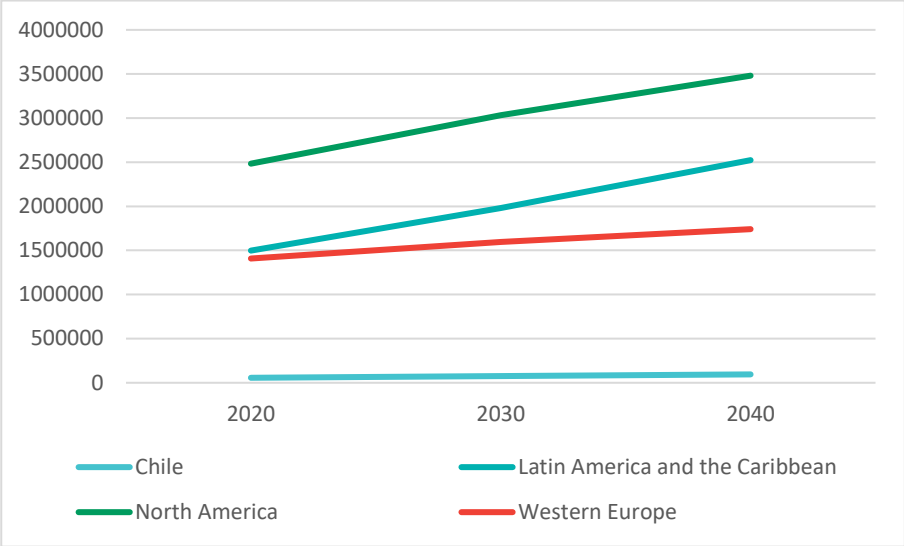
Compared to other regions of the world, Chile's cancer incidence from 2018 to 2040 will increase by about the same percentage as the Latin American and the Caribbean (78.6% increase from 2018 to 2040) estimate, which is much higher than the North American (46.3% increase) and Western European (27%) projections.

Appendix Figure 24: Percentage Increase in Number of Cancer Cases from 2018 to 2040 (Source: IARC Cancer Tomorrow).

	Chile	Latin America and the Caribbean	North America	Western Europe	World
2020	6.0%	6.0%	4.4%	2.8%	5.0%
2030	40.5%	40.1%	27.5%	16.4%	33.4%
2040	77.7%	78.6%	46.3%	27.0%	63.4%

To show the magnitude of the different rates of change, the Latin American and Caribbean region had a comparable number of cancer cases to Western Europe in 2018, with 90,000 total cases separating their estimates. However, because cancer in Chile and Latin America as a whole is projected to rise much faster than estimates in Western Europe, the gap between the two regions in 2040 is projected to become 782,211 cases.

Appendix Figure 25: Estimated Cancer Cases in Chile and World Regions 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).



Appendix Figure 26: Estimated Incidence Cancer Cases in Chile and World Regions 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).

	Chile	Latin America and the Caribbean	North America	Western Europe
2020	56575	1497913	2483719	1408162
2030	74973	1979072	3031766	1594721
2040	94807	2523200	3480754	1740989

Disaggregated Incidence Projections

The number of new cancer cases in Chile is projected to double or nearly double between 2018 and 2040 for prostate cancer (104.4% increase), stomach cancer (92.8%), and lung cancer (89.6%). Other major increases can be seen in colon cancer (85.7% increase), gallbladder cancer (82.6%), and kidney cancer (71.5%). Projected trends in prostate cancer are of particular concern because it is already the cancer with the highest incidence rate in Chile. Such alarming trends are not unique to Chile, with new cases of prostate, stomach, and lung cancer all doubling or nearly doubling in Brazil, Colombia, and Mexico. Chile's rate of increase is overall slightly below that of Brazil, Colombia, and Mexico, with the 10 most common cancers in Chile rising by an average 67.44% between 2018 and 2040, compared to 70.96% in Brazil, 79.59% in Colombia, and 87.92% in Mexico for the same 10 cancer types. Cancer incidence is also projected to increase in Argentina, but at a slower pace. Projected increases in France and the UK are even lower, with the average percentage increase for Chile's 10 cancer with the highest incidence rates being 22.47% and 29.98% respectively.

Appendix Figure 27: Percentage Increase in Cancer Cases in Chile and Selected Countries Between 2018 and 2040, by Cancer Type (Source: IARC Cancer Tomorrow).

	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
Prostate	104.40%	58.50%	99.10%	114.00%	127.00%	25.50%	38.50%
Breast	44.40%	39.70%	55.50%	56.60%	69.80%	12.20%	20.20%
Colon	85.70%	53.10%	89.90%	102.40%	101.30%	36.90%	41.20%
Stomach	92.80%	53.60%	89.50%	100.30%	106.30%	36.70%	46.70%
Lung	89.60%	54.00%	98.30%	113.40%	122.30%	21.90%	41.50%
Cervix Uteri	39.10%	30.20%	43.10%	50.90%	62.00%	7.40%	7.10%
Testis	11.70%	18.20%	1.50%	3.70%	15.20%	1.10%	4.20%
Gallbladder	82.60%	53.20%	98.50%	109.00%	113.30%	38.80%	41.10%
Kidney	71.50%	48.70%	68.50%	71.00%	88.50%	23.70%	33.90%
Corpus Uterine	52.60%	44.90%	65.70%	74.60%	73.50%	20.50%	25.40%

Cancer types in this analysis were chosen and ordered according to age-standardized rate, a different metric than the crude number of new cases. Despite this difference, prostate cancer is still projected to have the highest number of new cases, with 13,443 new cases in 2040. However, the cancer with the second highest projected number of new cases is stomach cancer with 9,950 new cases. This is followed by breast cancer (7,787 new cases in 2040), lung cancer (7,345), and colon cancer (6,827). Appendix Figure 28 further breaks down the projected number of new cases for each of Chile's top 10 cancer by ASR.

Appendix Figure 28: Projected Number of Deaths from Cancer in Selected Countries 2020-40, for the Top 10 Cancer Types with the Highest Mortality Rates in Chile (Source: IARC Cancer Tomorrow).

Prostate Cancer Future Incidence Projection

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

Breast Cancer Future Incidence Projection

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

Colon Cancer Future Incidence Projection

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

Stomach Cancer Future Incidence Projection

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

Lung Cancer Future Incidence Projection

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

Cervical Cancer Future Incidence Projections

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

Testicular Cancer Future Incidence Projections

Type	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
2020	995	1759	3789	1302	4701	3204	2448
2030	1056	1914	3853	1349	5086	3209	2489
2040	1096	2038	3816	1331	5303	3246	2544

Gallbladder Cancer Future Incidence Projections

Type	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
2020	2871	1706	5062	1794	3181	2913	3066
2030	3852	2074	7044	2585	4569	3440	3643

2040	4928	2524	9365	3463	6304	3911	4185

Kidney Cancer Future Incidence Projections

Type	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
2020	2068	5069	11322	1910	4799	16432	14102
2030	2705	6076	14649	2500	6541	18331	16324
2040	3345	7269	18010	3066	8467	19683	18321

Uterine Cancer Future Incidence Projections

Type	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
2020	982	2499	9675	1694	7738	10879	10982
2030	1221	2963	12424	2257	10223	12156	12347
2040	1424	3496	15091	2764	12609	12750	13388

13. Appendix E: GDP 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 and Health Expenditure figures used in the analysis.

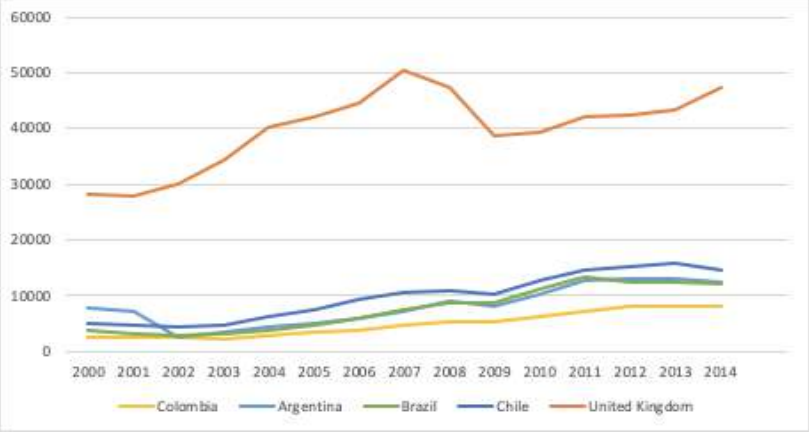
GDP per capita was calculated by dividing a country's annual GDP by its midyear population, with the original figure reported in current US Dollars (USD). Healthcare expenditure pertains to the estimated expenditure on healthcare goods and services consumed each year, also nominally reported in current 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, Colombia, and the UK for additional contextualization of Chile's situation.

Changes in GDP per Capita

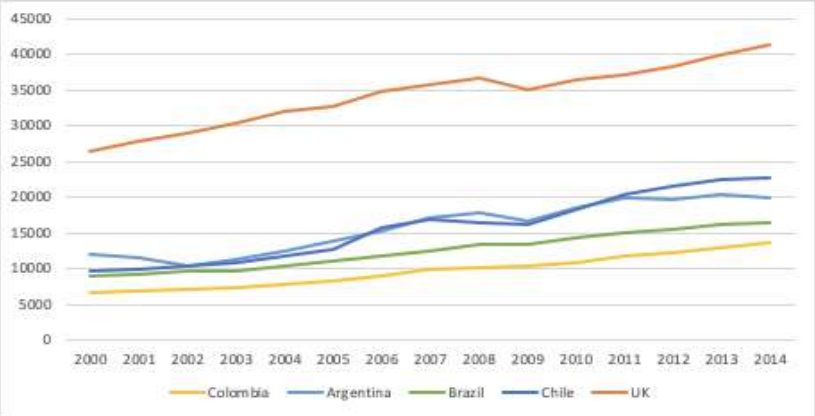
GDP per capita has increased substantially for each country included in the analysis from 2000 to 2014, despite significant periods of slower growth or decline. Of the countries selected, Chile has the second-highest 2014 GDP per capita at Intl$22,786, PPP, with Colombia at the lowest end at Intl$13,618, closely following Brazil at Intl$16,358. Chile and Argentina form a more economically affluent cluster, with Argentina at a GDP per capita, PPP, of Intl$20,008. 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.

Chile's GDP per capita, PPP, has increased 138.5%, from 2000 to 2014. This percentage increase in on the higher end, above Argentina (67.9% increase), Brazil (80.3%), Colombia (103.4%), and the UK (56.2%). Appendix Figures 29 and 30 present each country's nominal GDP per capita and GDP per capita, PPP.

Appendix Figure 29: GDP Per Capita, Current USD for Chile and selected countries (Source: Our World in Data) (80)Appendix Figure 2: GDP Per Capita, Current USD for Colombia and selected countries (99)



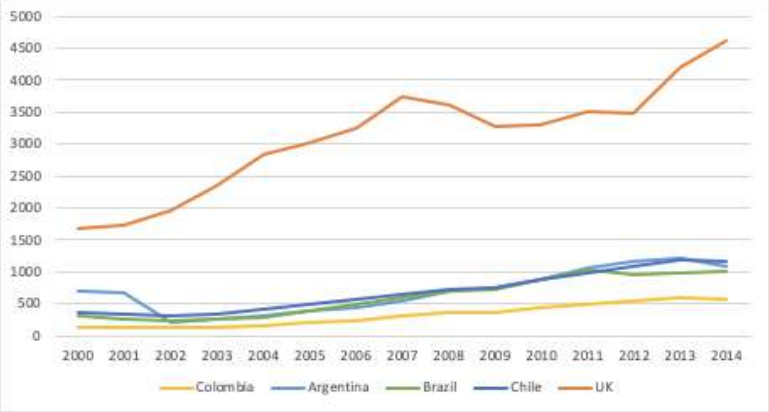
A Appendix Figure 30: GDP Per Capita for Chile and selected countries, PPP, Current International $ (Source: Our World in Data) (80)



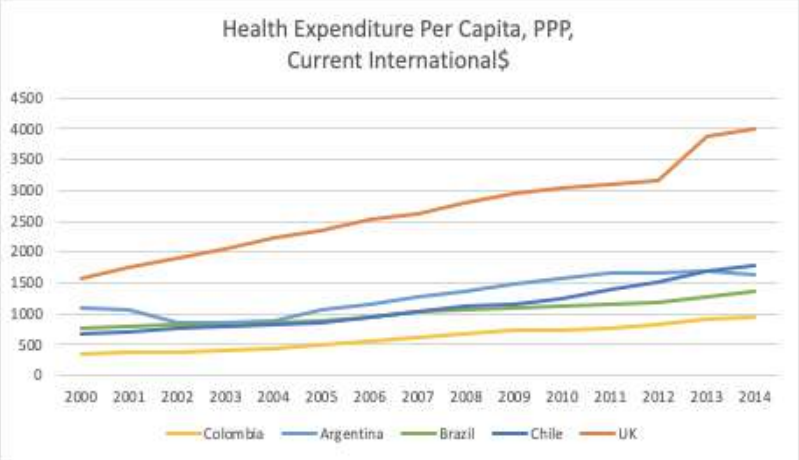
As with GDP per capita, Chile has the highest health expenditure per capita, PPP, of the Latin American countries at Intl$1,793. Other countries in the comparison group, in order, are Colombia (956), Brazil (1,640), Argentina (1,640), and the UK (4,003). Though it is the highest nominal amount of the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

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

Appendix Figure 31: Health Expenditure per Capita, Current USD for Chile and selected countries (Source: Our World in Data) (80)



Appendix Figure 32: Health Expenditure per Capita, PPP, Current International$ for Chile and selected countries (Source: Our World in Data) (80)



To mirror the CONCORD study 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 Table below.

Appendix Table 1: 5-year Averages of GDP Per Capita of Chile and Selected Countries (Source: Our World in Data)

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

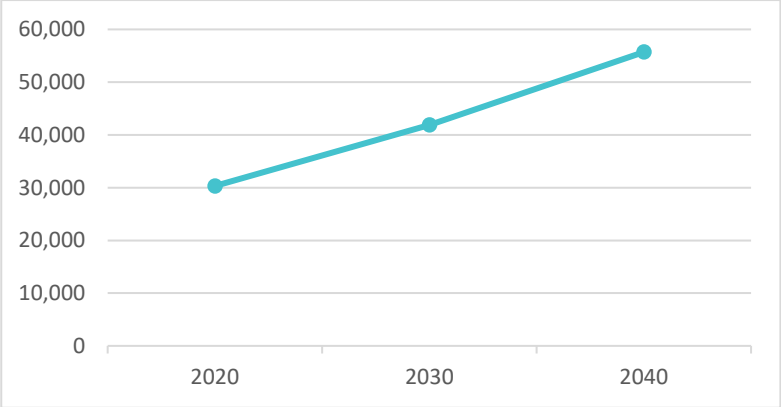
Health Expenditure Per Capita, PPP (Current International $)

	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

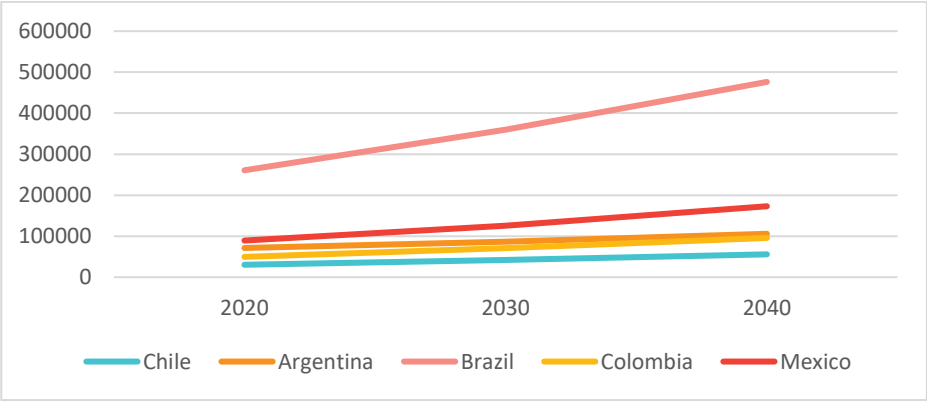
Chile's total number of deaths from cancer is projected to nearly double between 2018 and 2040, increasing 95.8% to 55,698 deaths in 2040. This represents an additional 27,255 deaths on top of the 2018 estimate of 28,443 deaths.

Appendix Figure 33: Projected Cancer Deaths in Chile 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).



The increase in cancer deaths is part of a regional trend, with deaths from cancer projected to double double in Brazil (95.5% increase 2018 to 2040), Colombia (107.8%), and Mexico (107.2%). Argentina is the only country with a substantially lower projected increase at 53.9% from 2018 to 2040. Though percentage increase is not as robust as age-standardized rates, examining them within a country allows for some deduction of which countries will have a burgeoning issue on their hands in the near future.

Appendix Figure 34: Projected Deaths in Chile 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).



Appendix Figure 35: Projected Cancer Deaths in Selected Latin American Countries 2020-40, All Cancer Types (Source: IARC Cancer Tomorrow).

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

Mortality Projections in Other Regions

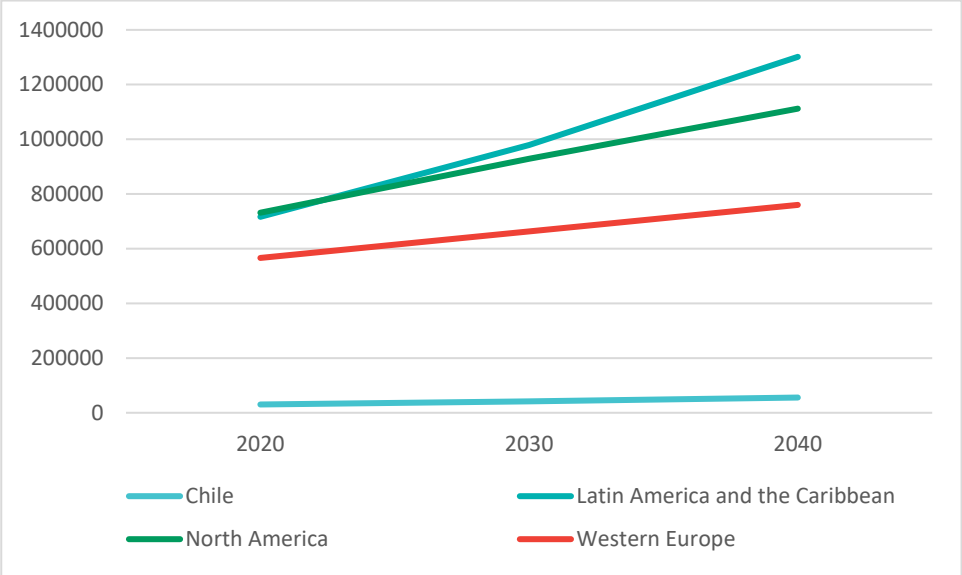
Chile's increase in mortality between 2018 and 2040 is similar to the Latin American and Caribbean regional figure of a 93.4% increase. However, both estimates are well-above the projected increase in North America (59.2% increase), Western Europe (38.6%), and the global estimate (71.5%).

Appendix Figure 36: Percentage Increase in Number of Cancer Deaths from 2018, Chile and selected World Regions (Source: IARC Cancer Tomorrow).

	Chile	Latin America and the Caribbean	North America	Western Europe	World
2020	6.6%	6.5%	4.8%	3.2%	5.2%
2030	47.3%	45.5%	33.0%	20.9%	36.3%
2040	95.8%	93.4%	59.2%	38.6%	71.5%

Appendix Figure 37 shows the projected number of deaths over time for each region, with the rate of increase steeper for Chile and Latin America and the Caribbean. Though North America and Latin America and the Caribbean had a similar number of deaths in 2018, Latin America is expected to pass North America within the next few years and continue distancing itself from North America over time.

Appendix Figure 37: Projected Cancer Deaths 2020-40 in Chile and Selected World Regions, All Cancer Types (Source: IARC Cancer Tomorrow).



Appendix Figure 38: Projected Cancer Deaths 2020-40 in Chile and Selected World Regions, All Cancer Types (Source: IARC Cancer Tomorrow).

	Chile	Latin America and the Caribbean	North America	Western Europe
2020	30314	716476	731531	566094
2030	41884	979129	928636	663088
2040	55698	1301388	1111973	760017

Disaggregated Mortality Projections

Prostate cancer already has the highest mortality rate in Chile, and the number of deaths from prostate cancer is projected to increase 154.2% between 2018 and 2040, the highest percentage increase among common cancer types in Chile by mortality rate. This substantial increase in prostate cancer deaths is not necessarily unique to Chile, with Brazil expected to increase by 147.3%, Colombia by 160.2%, and Mexico by 147%. For comparison, Western European countries are projected to increase by a smaller, but still worrying margin, with France increasing by 74.1% and the UK by 75.9%.

The concerning pattern continues to other cancer types in Chile, where deaths are predicted to double or nearly double for lung cancer (92.9% increase from 2018 to 2040), stomach cancer (103.2%), colon cancer (101.8%), gallbladder cancer (89.2%), pancreatic cancer (90.5%), and liver cancer (95%). Appendix Figure 39 details these percentage increases for the top 10 cancers in Chile by mortality rate. Note that colon, rectal, and bowel cancer are aggregated into colorectal cancer in some reports, while colon cancer, the most common of the three colorectal sub-types, is used in others.

Appendix Figure 39: Percentage Increase in Number of Cancer Deaths Between 2018 and 2040, Chile and Selected Countries by Cancer Type (Source: IARC Cancer Tomorrow).

	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
Prostate	154.20%	71.00%	147.30%	160.20%	147.00%	74.10%	75.90%
Lung	92.90%	54.60%	100.00%	118.40%	124.40%	28.60%	44.90%
Stomach	103.20%	55.50%	97.60%	109.60%	111.70%	44.00%	51.20%
Breast	66.90%	47.50%	72.60%	78.30%	86.60%	33.90%	35.70%
Colon	101.80%	57.40%	105.50%	117.70%	111.40%	50.10%	54.90%
Gallbladder	89.20%	54.10%	104.00%	119.10%	119.30%	50.20%	47.30%
Pancreas	90.50%	55.90%	105.10%	116.20%	119.00%	39.40%	43.40%
Cervix Uteri	60.80%	35.20%	57.90%	75.90%	83.60%	20.40%	23.40%
Liver	95.00%	55.20%	98.10%	121.50%	123.60%	37.60%	46.00%
Leukemia	75.10%	45.70%	79.20%	69.00%	59.20%	49.80%	53.00%

Appendix Figure 40 showing the crude number of projected deaths over time by country and cancer type. In 2040, stomach cancer is projected to kill the most people in Chile with 7,069 deaths. This is closely followed by lung cancer (6,909 deaths) and prostate cancer (5,771 deaths). The cancers included in this section of analysis were chosen and ordered by age-standardized mortality rate calculated among populations susceptible for a condition, and not their crude number of deaths. Therefore, conditions that primarily affect one population segment, like breast cancer in women, may have higher rates but a lower crude number of deaths than other cancers.

Appendix Figure 40: Projected Number of Deaths by Cancer Type in Chile and Selected Countries, for the Top 10 Cancer Types with the Highest Mortality Rates in Chile (Source: IARC Cancer Tomorrow).

Prostate Cancer Number of Deaths Projection

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

Lung Cancer – Number of Deaths Projected

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

Stomach Cancer – Number of Deaths Projected

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

Breast Cancer – Number of Deaths Projected

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

Colon Cancer – Number of Deaths Projected

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

Gallbladder Cancer – Number of Deaths Projected

Type	Chile	Argentina	Brazil	Colombia	Mexico	France	UK
2020	1729	1389	4141	1197	2034	1254	1158
2030	2354	1690	5842	1765	2951	1512	1398
2040	3071	2063	7851	2419	4142	1830	1645

Pancreatic Cancer – Number of Deaths Projected

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

Cervical Cancer – Number of Deaths Projected

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

Liver Cancer – Number of Deaths Projected

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

Leukemia – Number of Deaths Projected

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

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, Central Nervous System (CNS) Neoplasms, and Lymphoma are the most common childhood cancer groups in Chile at a projected incidence of 248, 100, and 80 cases respectively. Appendix Table 2 outlines the each of the 10 childhood cancer groups in Chile by incidence, with Appendix Table 3 defining which specific cancer types comprise each cancer group.

Appendix Table 2: Projected Number of Cases of Childhood Cancer in 2030, by Cancer Group (Source: Harvard Database) (59)

Cancer Group	Projected Number of Cases in 2030
Leukemia	248
Lymphoma & Related	80
CNS Neoplasms	100
Neuroblastoma	25
Retinoblastoma	20
Renal Tumors	29
Hepatic Tumors	10
Bone Tumors	32
Soft Tissue Sarcoma	44
Germ Cell Tumors	25
Carcinoma & Melanoma	24
Other & Unspecified	9

Appendix Table 3. 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

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 (190 projected cases in 2030), acute myeloid leukemia (36), and astrocytoma (32). Other cancers with over 25 projected cases in 2030 are Hodgkin lymphoma, non-Hodgkin lymphoma, CNS embryonal tumors, and nephroblastoma (59).

Appendix Table 4: Estimated 5-Year Survival for the Top 10 Childhood Cancer Types in Chile, by Incidence (Source: Harvard Database) (58,59)

Cancer Group	Cancer Type	Projected Incidence in 2030	5 Year Survival (% of diagnosed cases)
Leukemia	Lymphoid	190	74.5%
Leukemia	Acute Myeloid	36	57.1%
CNS Neoplasms	Astrocytoma	32	49.3%
Lymphoma & Related	Hodgkin	28	76.7%

Lymphoma & Related	Non-Hodgkin except Burkitt	27	72.0%
CNS Neoplasms	CNS Embryonal	26	41.0%
Renal Tumors	Nephroblastoma	26	69.3%
Neuroblastoma	Ganglioneuroblastoma	24	63.0%
Retinoblastoma	Retinoblastoma	20	72.3%
Soft Tissue Sarcoma	Rhabdomyosarcoma	19	57.4%

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

16.1. Health System Goals

16.1.1. Population Health

The National Statistics Institute of Chile estimates that the country had a population of 17.5 million in 2017 (61) (Appendix Table 5). Life expectancy at birth in the period between 2015 and 2020 was approximately 77.3 years for men and 82.1 years for women (62). Additionally, the Institute estimates that the population will reach 21.1 million in 2035 (61). Between 1990 and 2015, the proportion of people 65 years of age and older increased while the proportion for children aged 0-18 decreased, suggesting a demographic transition typical of nations achieving greater levels of income and development.

Chile has double burden of disease related to both non-communicable (NCD) and communicable disease. Among people older than 65, 75% of deaths were attributable to NCDs in 2014, the majority of those being cardiovascular disease, neoplasms, respiratory diseases, and gastrointestinal disorders. Among communicable diseases, HIV incidence continue to increase in the first half of the 2010s among men who have sex with men, though vertical transmission has declined from 1.2% in 1988 -1992 to 0.6% in 2008 - 2012. Tuberculosis also continues to be a concern, particularly among men and in the extreme northern and southern areas of the nation (63).

Appendix Table 5. Population by region – Chile 2017 (61).

Region	Population				
	Total	Male (%)	Female (%)	Urban (%)	Rural (%)
Arica y Parinacota	226,068	49.8	51.1	91.7	8.3
Tarapacá	330,558	50.8	49.2	93.8	6.2
Antofagasta	607,534	51.9	48.1	94.1	5.9
Atacama	286,168	50.5	49.5	91.0	9.0
Coquimbo	757,586	48.7	51.3	81.2	18.8
Valparaíso	1,815,902	48.5	51.5	91.0	9.0
Metropolitana	7,112,808	48.7	51.3	96.3	3.7
O´Higgins	914,555	49.6	50.4	74.4	25.6
Maule	1,044,950	49.0	51.0	73.2	26.8
Ñuble	480,609	48.4	51.6	69.4	30.6

Biobío	1,556,805	48.3	51.7	88.6	11.4
La Araucanía	957,224	48.6	51.4	70.9	29.1
Los Ríos	384,837	49.1	50.9	71.7	28.3
Los Lagos	828,708	49.4	50.6	73.6	26.4
Aysén	103,158	52.0	48.0	79.6	20.4
Magallanes	166,533	51.2	48.8	91.9	8.1

Cancer

In 2020, approximately 15,047 men and 13,537 women died from cancer (64). The International Agency for Research on Cancer estimated that new cancer cases under age 65 in Chile will grow by 8.6% by 2035, with around 20,900 in 2020 to over 22,700 cases by 2035 (65).

Between 2000 and 2010, the regions that showed the highest prevalence of cancer were in the regions of Antofagasta (29.0%), Coquimbo (26.2%), Valparaíso (25.5%) and Región Metropolitana (25,1%) (66). Between 2015 and 2016, in the regions of Arica y Parinacota, Tarapacá, Antofagasta, Maule, Biobío, Los Lagos, and Aysén, the mortality rate per 100,000 of neoplasms exceeded that of cardiovascular disease (67).

The regions that showed the highest adjusted incidence rates of cancer per 100,000 (from 2003-2007) were Antofagasta (266), Los Ríos (263), Magallanes (247), and Maule (236). For women, they were Magallanes (224), Los Rios (206), Antofagasta (194), and Los Lagos (191). Regions with the highest adjusted mortality rates (from 1990-2015, per 100,000) for all cancers (except non-melanoma skin) among men were Antofagasta (223.7), Magallanes (184.7), Aysén (169.2) and Valparaiso (167.8). In women, they were Antofagasta (134.5), Los Ríos (128.2), Magallanes (125.9), and Aysén (123.7). Among men, the top five locations of cancer with the highest mortality rates, in descending order, are stomach, prostate, lung, colon, and liver cancers. Among women, those top five locations are breast, lung, bladder/biliary tract, stomach, and colon cancers (67).

In the pediatric population ages 0-18, there is an average estimated 389 new cancer cases in boys and 292 in girls, as of 2020 (65). The type of cancer with the highest specific incidence rate was leukemia (140 in boys and 115 in girls), followed by testicular cancer in boys (52) and thyroid cancer in girls (25) (64). In 2020, leukemia resulted in the most deaths in boys (41) and girls (27) followed by cancers of the brain and nervous system for both sexes (17 in boys and 15 in girls).

Risk factors

Obesity: Obesity is one of Chile's largest public health threats. In 2016, a large plurality of the Chilean population was clinically qualified as overweight (39.8%) and 34.4% qualified as obese. The National Health Survey shows that there has been no reduction in the prevalence of either overweight or obese individuals since the early 2000s. Childhood obesity is rated at nearly 45%, nearly double the OECD average of nearly 25% (68).

Smoking: Tobacco consumption rates declined in Chile from 45.3% in 2003 to 33.3% in 2016-2017. Currently, 24.5% of adults smoked in 2016, but the smoking rate in Chile remains above the OECD average (18.4%). 28.2% of males were daily smokers in Chile in 2016, compared to 20.9% of females. Young Chileans

form a large proportion of smokers, suggesting potential impacts at the national healthcare level in the near future (68).

Alcohol: Among adults, alcohol consumption is lower than the OECD average, but consumption is rising. Heavy episodic drinking (60 grams or more at least once in the last 30 days) was at 4.9% in 2010. Men are more likely to be heavy episodic drinkers (9.8%) compared to women (0.1%) (68).

Social Determinants of Health

Poverty: PAHO notes that according to the CASEN 2015 survey, the proportion of Chileans living in non-extreme and extreme poverty were 8.1% and 3.5%, respectively. Though the income of the poorest 40% of the population increased by 4.9%, the Gini inequality coefficient remained stable at around 0.55 for the last several decades (63). The multidimensional poverty index, which assesses the basic needs of citizens according to educational conditions, labor, youth and childhood indicators, health, housing, and public services, was rated as 20.4% by the Chilean government in 2015. According to the government's analysis, 5.5% of Chileans experience both income and multidimensional poverty (69).

Education: Chileans enjoy a high level of literacy, with those 15-24 years of age achieving 99% rate as of 2017. People 15 years and older hold a literacy rate of 96.4%, and adults 65 years and older hold a rate of 90.4% as of 2017, an increase from below 80% in 1985 for the latter age group. While the number of out-of-school children has steadily decreased since 2013 to 2018, the number of out-of-school adolescents has increased since 2014's low of 6,457 to 2018's 26,107 (70).

Housing conditions: According to the 2017 census, 1.5% of the country lives in inadequate housing, defined by walls and/or ceilings being made of "precarious" materials like tin, cardboard, plastic, etc. or lacking entirely. Living in a home where the floor is made of earth is also part of this definition. Los Lagos and Los Rios form the greatest proportion of people who live in such housing at 6.3% and 5.2%, respectively. Less than fully adequate housing is defined by a house lacking a wooden interior lining to walls, or having walls made of adobe, clay, quincha, pirca, or other traditional craft, or having a roof made of sheets of felt or straw. The amount of people living under such conditions amounts to 15.4% of the population, with the greatest proportions in O'Higgins (20.8%) and La Araucanía (20.8%) (61).

Health System Coverage: As of 2014, about 81.5% of the population is covered by either FONASA or ISAPRE, Chile's public and private insurance schemes, respectively. Another 6.3% is covered by the armed forces. The remaining population of Chile, constituting 12.2%, was not covered by any scheme (57).

16.1.2. Financial Protection

Chile's Program for Explicit Guarantees, GES, of 2005 and Ricarte Soto Law of 2015 both expanded financial protection for costly treatments of specific health problems. Despite these changes, Chile falls moderately high compared to its Latin American peers in terms of out-of-pocket (OOP) spending: 34.7% of total health expenditures are OOP (57). Additionally, in 2012, 4% of households were facing catastrophic health expenditures (57).

As of 2014, most of the population (75.2%) is insured under the national health fund (FONASA). The for-profit private sector (ISAPREs) insures 18.5% of the population, and the remaining population (6.3%) holds an insurance plan offered through the armed forces (FF.AA) or has no insurance (57). FONASA has four categories (A-D) that qualify a person for different levels of cost sharing, based on monthly gross income. A and B and all elderly over 60 years are fully covered in public facilities. FONASA covers 50% of total costs at

private facilities at Level 1, the lowest charged tariff of 3 levels. Effective coverage rates for either sector, when utilizing private insurance, is around 65% due to lack of coverage for various health concerns or lack of specification by the insurance company (57).

Compared to several of its Latin American peers, Chile has increased its rate of health spending the most at 4.55% (56). Health spending per capita and government health expenditures as a percentage of total spending in 2016 were both among the highest at 9.8% and 58.5%, respectively.

Appendix Table 6: 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 (56)).

Country	Health spending per capita, 2016 (US$)	Annualized rate of change in health spending per capita, 1995–2016 (US$)	Health spending per GDP, 2016	Government health spending per total health spending, 2016	Out-of-pocket spending per total health spending, 2016
Chile	1244	4.55%	6.8%	58.5%	34.7%
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%
Colombia	358	0.81%	3.9%	65.1%	20.6%
Peru	337	3.59%	4.5%	62.7%	29.1%

16.1.3. User Satisfaction

Research related to patient satisfaction is somewhat limited in Chile, but surveys about patient satisfaction has been conducted by the Chilean government, the results for which have been most recently published in 2016. According to the study, from 2007-2015, Chileans under FONASA have felt adequately covered between 42-54% of the time, whereas users of the ISAPREs have expressed such confidence between 68-80% of the time in the same period. The percentage of people confident that ISAPREs will protect them changes when surveying men and women separately; in 2015, men rated feeling 'very protected' or 'protected' under ISAPREs by 81%, whereas only 62% of women felt the same. The same question was not asked of FONASA users but was instead administered by age group. 54% of users 51 years and older felt adequately protected by FONASA, whereas only 45% of users 18 to 50 years of age felt the same in 2015. This latter group constitutes the largest proportion of members that includes FONASA and ISAPREs, forming 61% of the population (60).

Reasons for feeling unprotected by the FONASA vary, with the top three reasons being (1) bad quality of the healthcare system (32%), (2) high prices for services and/or low coverage (25%), and (3) long wait times (22%). For FONASA A specifically, the portion that serves the most impoverished in Chile, it is also important to mention that a sizeable 12% were not confident in Chile's healthcare system, in addition to having the three concerns stated above. Those covered by ISAPREs had similar concerns with bad quality

(20%) and high costs (39%), with the disclaimer that sample sizes were smaller under this survey (73) than it was with FONASA participants (336) (60).

Patterns across more survey questions follow similar trends, with somewhat less confidence in the healthcare system among people with FONASA insurance compared to ISAPRE, and with women having worse experiences than men within the Chilean healthcare system (60).

The same survey also asked participants whether they had heard of the Ricarte Soto law. More people with ISAPREs (82%) knew of the law than those under FONASA (64%). All participants believed that FONASA users benefited the most from the law, though a significant number of participants from all insurance schemes were also unaware of who benefited from Ricarte Soto at all (60).

16.2. Health System Objectives

16.2.1. Equity

Chile has made significant strides in the realm of equity and efficiency. Recognizing that its public health system had not been adequately funded and that the private sector was proliferating, the government set out to change its primary care public provider payment mechanism from fee-for-service to capitation. As has been noted in developed nations that use a fee-for service model, such as that of the United States, it incentivizes providers to suggest sometimes unnecessary services or procedures that can be economically wasteful and/or physically harmful to the patient. A movement towards a capitation provider payment system begins to protect the most vulnerable who tend to use the public sector for most of their healthcare needs.

Beyond Chile's commitment to capitation in the public sector, it has prioritized equity in other realms as well. Development of FONASA, which has enrolled nearly all Chileans except those who opt into private insurance, is a significant step towards achieving universal health coverage. Those who enroll in FONASA and qualify for subgroups A or B also have full coverage at public institutions with few, if any, copays per event. GES and the Ricarte Soto laws take this goal even further, mandating that insurance companies, whether public or private, take steps to ensure equitable coverage of a set of specific conditions. Many of these conditions include expensive treatments, such as coverage for gastrointestinal stromal tumors (7).

However, out of pocket expenditures remain high in Chile. Appendix Table 7 below shows that while copays may end up being 0% for FONASA users, event maximum copays may still be upwards of 122 UF for one event and 181 UF for more than one event, regardless of whether one is a FONASA or ISAPRE user (74). Furthermore, financing is insufficient in regions away from the Metropolitan area, and restrictions exist on increasing spending on public services but not so on treatments performed in the private sector, thus potentially exacerbating catastrophic expenditures for the most vulnerable (74).

Appendix Table 7. Event Financing for FONASA and ISAPRE Users Partaking in GES-defined Treatment (Source: Implementation of Explicit Guarantees (GES) Reform (74))

FONASA User Contribution	ISAPRE User Contribution
• Payment of a 0-20% co-payment per event • Maximum per event 122 UF and for more than one event 181 UF	• Payment of a 20% co-payment per event • Maximum per event 122 UF and for more than one event 181 UF

For a more detailed view at user co-payments and deductibles, see Appendix Table 10 under the Health Financing section.

16.2.2. Efficiency

Before 1989, during the Pinochet regime, payment for primary care services in Chile was based on a fee-for-service model. At the same time, Chile allowed for the proliferation of a private sector that would be able to compete with the public sector, resulting in "overprovision of curative services that garnered higher fees and did little to promote primary care or address equity or quality of care" (75).

Under this context, FONASA rolled out reforms in 1994 that shifted payment towards a capitation system for the public sector. Reforms also included performance targets that would, in theory, incentivize providers to provide better care and introduce fixed monthly payments for providers who decide to practice in areas with smaller catchment populations. ISAPREs continue to purchase private provider services using the fee-for-service model, though according to the Joint Learning Network, an unknown number of ISAPREs (unknown due to lack of available data) are considering the use of capitation to purchase services (75).

Capitation payments to municipalities from FONASA cover what is offered in the Family Health Plan, which includes the following: Well-child health (0-9 years), maternal health, women's health, adult health (40-64 years), elderly health (65+ years), oral health, and GES services (including a list of 80 pathologies that both private and public providers are required to treat in an affordable and timely manner). Annual goals set by the National Health System (and further tailored by municipality) are rewarded by offering a 13-month salary bonus. Failure to meet capitation targets (eg. covering preventive exams for men ages 20-45 reaching 25% in 2016) can result in a reduced capitation transfer for the following financial period (75).

Base capitation rates in 2017 amounted to 5,396 pesos (about $8.40 USD) per enrollee, further tailored according municipal health center characteristics (socioeconomic status of enrollees, rurality). Fixed cash transfers are provided to municipalities unable to use a capitation system, such as those with poor and vulnerable populations with less than 3,500 people (75).

Despite these changes, high out-of-pocket expenditure coupled with a continuously large use of the private sector by public insurance beneficiaries both remain large barriers that suggest some level of inefficiency. Low satisfaction with the healthcare system suggests that government inefficiencies such as bureaucratic obstacles, corruption, and/or lack of timely innovation are to blame with the public provider system, at least at the primary care level. Low satisfaction may also partly explain why patients seek healthcare at private settings, thus incurring the possibility of high out-of-pocket expenditures.

16.2.3. Effectiveness

Chile's healthcare system has evolved to provide much higher quality health care since the end of the military dictatorship. Infection rates in public hospitals, for example, declined by 26% from 1985 to 1994 to 3.5% by the mid-1990s. Furthermore, Chile has made available a public health insurance that opens the path towards universal accessibility of healthcare.

While GES is one of the most significant reforms enacted in Chile, yet one of the concerns expressed about the law involves a lack of measurement parameters for establishing the quality of services provided. As of 2010, there was no uniform agreement about how to accredit health care organizations that are to provide services under GES. Furthermore, the logistical concerns with implementing a law covering a wider range of services should also be considered. For instance, administrative burdens placed on health care providers on recording new patient information when diagnosing hypertension or diabetes may offset the gains made through healthcare reform at the political level (77).

In terms of breast cancer screening, coverage remains low. At 37% coverage in 2019, it is much lower than the OECD average of 60%, even with reforms that have made screening more physically and financially accessible. Incidence of breast cancer in Chile is about half of the OECD average, yet mortality rates are only about 20% lower than the OECD average. Education on screening also appears to be lacking. In a survey, about half of women between ages 50 to 75 (and who did not undergo mammography) stated that they did not need it, does not apply to them, or did not know they needed to do it. An OECD report states that the successes involved in HPV education among local stakeholders could be replicated for Chile's breast screening program, taking into account cultural and socio-economic backgrounds of different regions (13).

Furthermore, while screening tests and vaccinations for cancer-causing diseases like Hepatitis B are free, public awareness remains low, provider incentives to screen are not fully developed/implemented yet, and waiting time can be long in public primary care settings. As a result, Chile has seen either increases in mortality rates over the past decade (as is the case in colorectal and liver cancer) or has mortality rates that linger above the OECD average (as is the case in prostate, stomach, and liver cancer). The OECD report suggest a systematic monitoring system to ensure greater effectiveness of the healthcare system, particularly within the realm of cancer screening (13).

16.2.4. Responsiveness

The existing social response to cancer can be grouped into two main areas: political responses and the scope of health services.

Political Response

Several laws have been created to respond to the needs of rising costs of healthcare. Services under FONASA have sought to cover the poor for most basic treatments while requiring little to no copay, while GES in 2005 expanded financial coverage for traditionally expensive treatments. Ricarte Soto has responded further by addressing rare, often genetic, diseases that are also expensive to cover.

Scope of Health Services

Due to the political changes in law, the scope of services offered has significantly increased since the beginning of the 21st century. Among the most salient portions of coverage include preventive screenings,

diagnosis, and treatment of cancer for patients enrolled in social health insurance. Chile's scope of health services are delineated further under section 15.3.4 (Service Delivery).

However, Chile's out-of-pocket expenditures continue to plague a significant amount of the population, despite increased scope of coverage for health services. Additionally, Chile will have to respond to a continuing rise in non-communicable disease burden, particularly that of obesity.

16.3. Health system functions

16.3.1. Governance and Organisation

The Ministry of Health oversees governance and regulation of the healthcare system. Public health services are overseen by the regional ministerial secretariats of health, the Institute of Public Health, the Ministry of Health, and the Superintendency of Health (7). Chile's National Health Service consists of the Ministry of Health and its sub agencies: "the 29 Health services (SS), the National Health Fund (FONASA), the Public Health Institute (ISP), the Central Supply Clearinghouse (CENABAST) and the ISAPRE Authority" (72). See under "Resource Management" for brief descriptions of each agency under the Ministry of Health.

Goal setting falls to the National Health System, examples of which include "increased screening for cervical-uterine cancer for women, higher rates of normal HbA1c tests for diabetic patients, and higher rates of normal blood pressure findings in people with hypertension." Capitation targets evaluate performance of general activities (eg. preventive care and timeliness), continuity of care (including availability for late night and weekend care), and care involved with GES benefits (Appendix Table 8) (75).

Appendix Table 8. General Activity Targets for 2016 (Source: Case Studies on Payment Innovation for Primary Health Care (75))

Target Number	Activity	Goal	2015 Level
1	Coverage of preventive exam for men ages 20-45	25%	16.7%
2	Coverage of preventive medicine exam for women ages 45 to 64	26%	25.20%
3	Coverage of preventive medicine exam for adults ages 64 and older	55%	44.89%
4	Early admission for maternity care (before 14 weeks)	87%	87.30%
5	Proportion of people under age 20 receiving comprehensive dental treatment	24%	26.19%
6	Patient satisfaction with PHC	97%	99.30%
7	Coverage of care for diabetes mellitus in people ages 15 and older	55%	55.60%
8	Coverage of care for hypertension in people ages 15 and older	71%	69.30%
9	Coverage of neurological/cognitive treatment for children ages 12-23 months within PHC	94%	93.90%
10	Home care visit rate in underserved areas	22%	25%

11	Coverage of care for asthma and chronic obstructive pulmonary disease in people ages 40 and older	22%	17%
12	Coverage of comprehensive care for mental disorders in people ages 5 and older	17%	25%
13	Comprehensive health coverage for adolescents ages 10 to 14	15%	(new)

16.3.2. Health Financing

Chile has a mixed health system that is financed by both public and private funds. Public funds are derived from the general budget and tax revenue, whereas private funds come from out-of-pocket (OOP) expenditures and premiums made through available private health plans. All people who are employed must pay an obligatory contribution of 7% their wages, which contribute to either their public or private health insurance (71). The monthly income tax for this mandatory contribution, whether paying into public or private insurance, must not exceed 80.2UF (measured in "units of account"), amounting to 2,360,399 Chilean pesos or $3,379 USD (73). Almost every Chilean, excluding the military, is covered by public insurance (Fondo Nacional de Salud or FONASA) unless they choose to enroll in private insurance (Instituciones de Salud Previsional or ISAPRE) (71). FONASA is further separated into four sections (A-D): FONASA A and B are fully covered by the Chilean state while C and D cover individuals with a combination of individual contributions and low subsidies from the state (74).

The program of Explicit Guarantees in Health, GES, that was introduced in 2005 to reduce equity gaps between vulnerable and well-off sectors and narrow the gap between these private and public insurance schemes, added further funding to the healthcare system of Chile. Its funding source comes from an increase in value added tax from 18 to 19% in 2006. For example, a FONASA beneficiary can expect to have his/her premium 100% financed by the state, which then draws its funding from the 19% value added tax. However, financing at this point may or may not also be contributed by the FONASA beneficiary, who has a 0-20% copay for each event (Appendix Table 9, 10) (74).

Appendix Table 9. Financing Model in Chile for the GES plan (Source: Implementation of the Access with Explicit Guarantees (GES) Reform (74))

Premium Financing: FONASA users	**Premium Financing: ISAPRE users**
Premium 100% covered by the Chilean state Financed via VAT increase of 1% to 19%. Financed other government programs apart from GES	Premium of contributor initially financed by private insurance companies because required coverage of GES covered pathologies were already included in health plans

Appendix Table 10. Co-payments and Deductibles associated with GES Financial Protection (Source: Implementation of the Access with Explicit Guarantees (GES) Reform (74))

Event Number	Copay/Deductible	FONASA Section A:	FONASA Section B:	FONASA Section C:	FONASA Section D:	ISAPRE: Users who

		Homeless, people with no incomes	Taxable monthly income less than 210,000 Chilean pesos ($300 USD)	Taxable monthly income between 210,001-306,600 Chilean pesos ($300-437 USD)	Taxable monthly income more than 306,600 Chilean pesos ($437 USD)	have hired a private health plan
One Event	Copay	0%	0%	10%	20%	20%
	Maximum deductible: dependent worker	0%	0%	21x Monthly Contribution (up to 122 UF)	29x Monthly Contribution (up to 122 UF)	29x Monthly Contribution (up to 122 UF)
	Maximum deductible: independent worker	0%	0%	1.47x Average Monthly Income (up to 122 UF)	2x Average Monthly Income (up to 122 UF)	2x Average Monthly Income (up to 122 UF)
More than One Event	Copay	0%	0%	10%	20%	20%
	Maximum deductible: dependent worker	0%	0%	31x Monthly Contribution (up to 181 UF)	43x Monthly Contribution (up to 181 UF)	43x Monthly Contribution (up to 181 UF)
	Maximum deductible: independent worker	0%	0%	2.16x Average Monthly Income (up to 181 UF)	3x Average Monthly Income (up to 181 UF)	3x Average Monthly Income (up to 181 UF)

Aguilera et al. make a disclaimer that GES officials have recognized a deficiency in both supervision and further study on the subject of GES financing (74).

16.3.3. Resource Management

The Ministry of Health is the regulatory body overseeing administration of FONASA while it also regulates adequate rollout of the provisions of healthcare guaranteed under GES. Under the Ministry of Health, institutions and organizations described below ensure the proper administration of healthcare.

The administration of health insurance relies on the FONASA and ISAPRES schemes, forming parts of the public and private sectors of healthcare, respectively.

Regulatory Bodies of the Chilean Healthcare System

MINSAL (Ministerio de Salud)

The major regulatory arm of the Chilean healthcare system. The 29 Health Services (SS) under the Ministry of Health are in charge of ensuring health promotion and protection in their respective regions (72).

FONASA

The entity responsible for "collecting, administering, and distributing fiscal resources and funds from the 7% compulsory contribution for health under MINSAL policy" (72).

CENABAST

A public institution whose mission is to "contribute to the wellbeing of the population, securing the availability of medications, food, supplies and equipment to the Health Network, through the management of an excellent, efficient and quality supply service, to improve the health of all the people who live in Chile" (76).

ISAPRE Authority

An institution that regulates the legal and financial portions of the private insurance schemes, helping to resolve any concerns between beneficiaries and the ISAPREs (72).

Provision of Healthcare

The National Health Service (SNSS) oversees the delivery of public health services to citizens of Chile. Primary care is administered by municipalities and provided by local health centers, while hospitals and public outpatient facilities cover secondary and tertiary care services. The private sector manages secondary and tertiary care via privately-owned laboratories, pharmacies, clinics, and other health centers. Both public and private facilities allow individuals who pay the 7% monthly contribution the freedom to participate in prepaid health services under the Free Choice Modality (71).

ISAPREs are able to contract with public facilities to cover patients for specific services, such as emergency care, but the majority of people who take advantage of public health services are those with FONASA, particularly patients who are lower-income and high-risk. At the same time, as many as 43% of services provided by the private sector were used by individuals covered under FONASA (71). According to the WHO's profile of Chile's health service system, there seems to be little coordination between the public and private sector providers (72).

Within the private sector, non-profit institutions can provide ambulatory care within Chile, with providers most often paid under a fee-for-service model. Private organizations include "the Red Cross, the Corporation for Assistance to Burned Children (COANIQUEM), the Corporation for Assistance to Children (CORDAM), the Institute for Child Rehabilitation, Churches of various denominations, NGOs and Employer Mutual (which administers insurance for work-related injuries and occupational disease) (72). For-profit providers include various medical centers and departments throughout the nation, such as specialized radiology, dialysis, or dentistry centers as well as some laboratories or pharmacies (72).

Municipal governments own primary care facilities, with public hospitals owned and administered by regional health authorities. The latter delivers secondary and tertiary care for FONASA beneficiaries (77).

16.3.4. Service Delivery

All citizens are entitled to take part in FONASA unless they choose to enroll themselves in private insurance. Under FONASA, several services are offered:

General Services Offered under Social Health Insurance (FONASA) (79)

- Financial coverage for all medical care and interventions.
- Access to care in the Public or Private Network.
- Benefits offered under the GES program.
- Law of Urgency
- Benefits offered under the Ricarte Soto Law.
- Special programs: Bono Pad and others currently being processed in Congress, such as el Seguro Clase Media (Middle Class Insurance), for catastrophic illnesses.
- Other potential benefits:
  - Disbursement of Medical Loans
  - Debt forgiveness
  - Work Disability Subsidy

Non-Cancer Medical Services Fully or Partially Covered under Social Health Insurance (FONASA) (79)

- Preventive exams (consults, lab tests, physical exams). Some of which include:
  - STI Infection Screening
  - Gestational Diabetes Screening
  - Hypertension Screening
  - Weight screening for patients of both child and adult ages
- Dental preventive health and treatment
- Mental health treatment
- Diagnostic Testing
- Procedures that may involve equipment, instruments, or facilities
- Surgery
- Rehabilitation services

GES Cancer Treatment Coverage (78)

GES offers patients the opportunity to receive financial coverage for traditionally expensive diseases. Those specifically related to cancer are listed below. Furthermore, coverage for rarer conditions, including some types of cancers, were further allocated funding to provide coverage for them under the Ricarte Soto Law.

- Uterine and cervical cancer
- Cancer pain relief and palliative care
- Breast cancer (15 years of age or more)
- All cancers (under 15 years of age)
- Testicular cancer (15 years of age or more)
- Lymphoma (15 years of age or more)
- Cholecystectomy for prevention of gallbladder cancer in people ages 35-49 years
- Gastric cancer

- Prostate cancer
- Primary tumors of CNS in people aged 15 years or older
- Adult leukemia
- Osteosarcoma in people aged 15 years and older
- Chronic Hepatitis B
- Hepatitis C
- Treatment for eradication of H. pylori

Cancer Services Covered under Ricarte Soto (16)

- Gastrointestinal Stromal Tumors (GIST)
- Myelofibrosis
- Pancreatic neuroendocrine tumors

17. Appendix I: Stakeholder Meeting Report & Participants

From mid-November to Mid-December 2020, the ICCI-LA held stakeholder meetings virtually, rather than in-person attendance. Four separate stakeholder meetings were held, each with a particular Cancer policy topic: Organization and Governance (November 19, 2020), Financing (December 3, 2020), Resource Management (December 10, 2020), and Service Delivery (December 17, 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 Chile'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 Chile'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 Chile. 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.

Workshop 1: Organization and Governance

November 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 Chile 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 • Support from UICC in managing the list of people who want to speak • ·Support from the Local Committee and the Harvard team to take notes • 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 and Dr. Eduardo Cazap**
	• Overview of the objectives of ICCI-LA • Why Chile? • 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 Chilean 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 Chilean 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 Chile'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 Chilean 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 Chilean 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 – 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 Chile'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**

17.1. Workshop 2: Financing

December 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 Chile and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Rifat Atun**
	• 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 • Support from UICC in managing the list of people who want to speak • ·Support from the Local Committee and the Harvard team to take notes • 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 Chile? • 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 Chile's health system in terms of financing? 2. In your experience and perspective, what do you consider the main challenges for Chile'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**

17.2. Workshop 3: Resource Management

December 10, 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 Chile and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Jorge Jiménez**

	• 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 • Support from UICC in managing the list of people who want to speak • ·Support from the Local Committee and the Harvard team to take notes • 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 Chile? • 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 Chile'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 Chile'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 Chile's health system for cancer control in terms of resource management (human resources, technology, and information)? 2. How has resource management of Chile'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**

17.3. Workshop 4: Service delivery

December 17, 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 Chile and UICC
Notetakers:	Harvard research team and members of the Organizing Committee

Agenda

3:00 - 3:10:	**Welcome – Dr. Jorge Jiménez**
	• 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 • Support from UICC in managing the list of people who want to speak • ·Support from the Local Committee and the Harvard team to take notes • 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 Chile? • 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 Chile'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 Chile'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 Chile'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 Chilean health system? 2. In your experience and perspective, what are some potential solutions for the challenges previously identified for Chile'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 I: Stakeholder Meeting Participants

Participant Names and Affiliations

1. Atun, Rifat — **Harvard University**
2. Rendler-Garcia, Melissa — **Union for International Cancer Control (UICC)**
3. Cazap, Eduardo — **Sociedad Latinoamericana y del Caribe de Oncología Médica (SLACOM)**
4. Jiménez, Jorge — **Fundación Foro Nacional de Cáncer**
5. Debrott, David — **Consultor**
6. Espinoza, Manuel — **Pontificia Universidad Católica de Chile**
7. Guzman, María Jose — **Fondo Nacional de Salud**
8. Herrera, María Elisa —**Hospital Regional de Valdivia**
9. León, Felipe — **Red de Salud UC Christus**
10. Nervi, Bruno — **Fundación Chilesincáncer**
11. Ortiz, Nancy — **Fundación Foro Nacional de Cáncer**
12. Posada, Gloria — **Hospital Regional Coyhaique**
13. Rodríguez, Francisca — **Cámara de la Innovación Farmacéutica**
14. Vera, Victor — **Hospital Regional de Puerto Mont**
15. Walbaum, Magdalena — **University College London, University of London**
16. Walbaum, Benjamin — **Pontificia Universidad Católica de Chile**
17. Arteaga, Oscar — **Escuela de Salud Pública Universidad de Chile y Foro Nacional del Cáncer**
18. Espinoza, Pilar — **Universidad San Sebastián**
19. Fernández, Jorge — **Fundación de Ayuda a Personas con Cáncer Vi-Da**
20. Huidobro, Christian — **Universidad San Sebastián**
21. Inostroza, Manuel — **Consorcio Universidades de Políticas de Salud**
22. Martínez Gutiérrez, María Soledad — **Universidad de Chile**
23. Romero, María Inés — **Ministerio de Salud**
24. Vergara, Marcos — **Instituto de Neurocirugía**
25. Yáñez, Nicolás — **Hospital Regional de Talca**
26. Zilic, Martin — **Universidad de Concepción**
27. Goic, Carolina — **Senator**
28. Herrera, Cristian — **OECD**
29. Ortiz, Nancy — **Fundación Foro Nacional de Cáncer**
30. Palma, Silvia — **Pontificia Universidad Católica de Chile**
31. Posada, Gloria — **Hospital Regional Coyhaique**

32. Tapia, Roberto — **Consultor**
33. Corbeaux, Tatiana — **Fundación Oncoloop**
34. Fernandez, Piga — **Fundación GIST**
35. Rojas, Daniela — **Fundación Yo Mujer**
36. Mendales, Jake — **Harvard University**
37. Sánchez, Jeremy — **Harvard University**

ICCI-LA

Iniciativa Integrada para el Control de Cáncer en América Latina

Integrated Cancer Control Initiative in Latin America

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