Future health expenditures and its determinants in Latin America and the Caribbean: a multi-country projection study

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Summary

Background Countries in Latin America and the Caribbean (LAC) have experienced important demographic, epidemiological, economic, and policy developments that raise concerns about their ability to afford health expenditures in the future. This paper forecasts how current health expenditures (CHE) in LAC countries will change over the next 30 years and identifies key drivers of health expenditure growth.

Methods A statistical model to forecast CHE based on changing disease burden, economic growth, technology, and demography was developed. CHE by age and disease group at baseline (2018/19) were estimated for countries in the LAC region based on seven index countries. Baseline expenditures were projected to 2050.

Findings Per capita CHE will increase across the LAC region (median increase 2.75 times) between baseline and 2050. All Latin American countries are expected to double per capita CHE in this period. Expected increases in Caribbean countries are more variable. Large increases in CHE growth related to neoplasms, circulatory system and genitourinary conditions are observed. Growth in CHE will be highest in older age groups.

Interpretation Increases in health expenditures will be driven largely by economic growth and technology, while demography and epidemiology had smaller effects. The control of health expenditures and more efficient use of health resources must become a priority for the LAC region.

Funding This study was funded by the Inter-American Development Bank.

Keywords: Health financing; Latin America; Caribbean; Health expenditures

Introduction

Countries in Latin America and the Caribbean (LAC) have experienced important developments over the past several decades that will profoundly affect the growth of national health expenditures, as well as their ability to finance health care. Sustained economic growth in the LAC region (6.5% annual growth in 2021) has pushed most countries into upper middle-income status.[1] Rising income has increased health spending. Demographic and epidemiological transitions have led to significant increases in life expectancy and the proportion of the population that is elderly. In 2000, life expectancy in LAC

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Research in context

Evidence before this study

We searched PubMed and Google for English language studies related to health expenditure projections published before 2020 using a combination of search terms "health expenditures" "health spending" "cost growth" "forecasting" "projections" "modelling". We identified four studies relevant to our study objectives. These studies reported that national health expenditures are expected to increase substantially, particularly in middle-income countries. Further, the main factor driving health expenditure growth is economic/income growth and technology, and smaller contributions due to changes in population aging and disease prevalence, health sector inflation, and other factors.

Added value of this study

This is the first study to make comprehensive projections of health expenditures in Latin American and Caribbean (LAC) countries. We constructed national health expenditure data by age and disease group for countries in the region. This study enables understanding of the changing patterns in health expenditures related to these factors. This study finds that health expenditures in most countries in the region will double by 2025. Economic growth and technology will be the main drivers of health expenditure growth in the LAC region, while population aging, and disease prevalence will have smaller contributions to health expenditure growth. An increasingly larger proportion of health spending will be on non-communicable diseases and older age groups.

Implications of all the available evidence

Countries in the LAC region need to prioritize policies to control health expenditures and use health resources more efficiently.

was 71 years, which increased to 75 years in 2019 (though in 2021, life expectancy decreased to 72 years due to the COVID-19 pandemic).[2] The percentage of the population above 65 years increased from 6% in 2000, to 9% in 2022.[2] Non-communicable diseases (NCDs) have become the leading cause of death in the region accounting for 76% of all deaths in 2019 compared to 67% in 2000.[1,3] Population aging and a rise in NCDs are expected to exert upward pressures on health expenditures.

Several countries in the region, particularly in Latin America, have enacted constitutional rights to health and pursued universal health coverage policies; these commitments exert upward pressures on government health expenditures. As demand for health services increases in the region, there is real concern regarding the level of public health expenditure that will be required to finance and sustain access to health services.[4] In the medium to short term, the region's fiscal space is likely to have been reduced by the COVID-19 pandemic; spending and borrowing have increased while the unprecedented economic downturn has seriously reduced revenues. As such, there is a need to find ways to create more fiscal space, and use existing resources more efficiently.[4,5]

Growth in health expenditures is a constant concern to governments in the LAC region because many finance large proportions of their health expenditures through public and/or social insurance means.[4] Estimated growth in current health expenditures (CHE) between 2000 and 2018/19 indicates annual growth rates ranging between 0.3% and 7.0%. Ecuador, Nicaragua, Bolivia, Colombia, Chile, Panama, and Peru experienced about 4% annual growth in CHE.[6] Among Caribbean countries, Trinidad and Tobago, Dominican Republic, and Guyana experienced 4% and above growth in CHE between 2000 and 2018/19.[6] A comparison of per capita GDP growth rates between 2010 and 2017 with growth in health expenditures over the same period indicated that in most LAC countries (e.g., Chile, Peru, Bolivia, Brazil, and Trinidad and Tobago), the growth in health expenditures exceeded that of the national income (noting some countries like Guyana are an exception).[7] This raises important concerns about their ability to afford growth in future health expenditures, which are further amplified by the high rates of out-of-pocket expenses in LAC countries. As of 2019, out-of-pocket payments accounted for 32% of health spending in LAC countries (with significant variations across the region), notably higher than the average of 20% for all Organization for Economic Co-operation and Development (OECD) countries in the same year.[8]

Global concerns about the growth rate of health expenditures and the fiscal space available to accommodate this growth have motivated research to understand the future trajectory of health expenditures and their drivers. Several studies provided insights into the factors influencing health expenditure growth in different regions. In China, changes in service intensity, unit costs, risk factors and disease prevalence, particularly related to NCDs, were found to significantly drive health expenditure growth, surpassing the impact of population aging.[9] Similarly, in Australia, health expenditure growth due to aging was primarily linked to comorbidities in the population.[10] Another study in Australia identified health sector inflation, population growth, and aging as the main drivers of CHE growth.[11] Furthermore, an OECD report projected that changes in national income and to a lesser extent demographic effects are the primary drivers of projected increases in health expenditure growth across OECD countries.[12] A study by the Global Burden of Disease Health Financing Collaborator Network found that governments' growing prioritisation of the health sector along with economic development are the leading

factors associated with increasing government expenditure on health globally.[13] Recent studies have highlighted how the economic and social consequences of the COVID-19 pandemic have worsened these issues.[14,15] These findings also emphasize the complex interplay between risk factors, disease prevalence, population aging, comorbidities, income changes, and external factors on health expenditure growth. Understanding these factors is crucial for developing policies to improve the future sustainability of health systems.

This study aims to understand how CHE in LAC countries will change over the next 30 years. It also examines how the distribution and growth of CHE will change over time across population age groups and disease categories, while identifying the key drivers of the future growth in health expenditures.

Factors influencing national health expenditures

The following factors have been identified as responsible for increasing national health expenditures - economic growth, population aging, burden of disease and changes in risk factors, changes in medical technology and practices, general inflation in the economy, inflation in price of health care, and changes in the financing and management of the health system.[8,9]

Economic growth

Higher income countries spend more on health than lower income countries. Further, as the economies of countries prosper, they spend more on health as demand for healthcare and quality increases, and governments expand publicly financed service coverage. Several studies have pointed out that the level and growth in national income has large effects on increasing health expenditures.[16–18]

Demography

Per capita health expenditures generally increase with age and are typically highest in the oldest age groups because older people use health services more frequently and intensively than younger people. The prevalence of chronic illnesses also increases with age, requiring more expensive longer-term care. Further, health expenditures are generally highest in the period preceding death. Studies indicate that shifts in the population age structure to older ages over time explain only a modest part of the rise in health care expenditures relative to other drivers such as economic growth and treatment practices related to technology.[19,20] A study from China reported that population growth contributed 0.2 percentage points of the 8.4% growth in health expenditures over a 35-year period.[9] A report from the OECD found that the demographic effect increases health expenditures by 0.7% per year, and this can range from 0.1% to 1.5% per year, depending on the country.[12]

Epidemiology

Longer life spans are associated with shifts in the disease burden from communicable to NCDs. Chronic illnesses require care over extended periods and at high costs. The LAC region has a high burden of NCDs—around 77% of deaths are attributable to NCDs.[21] The consequences of this changing disease burden are closely linked to the effects of population aging discussed earlier. Changing patterns of disease burden make it difficult to judge the directional effect on health expenditures. Gains in reducing the disease prevalence of cardiovascular disease through control of risk factors such as smoking will reduce health expenditures, while the increasing prevalence of obesity and diabetes will put an upward pressure on health expenditures. As such, studies report that changes in disease burden have a minimal independent effect on growth in health expenditures.[9,10]

Other factors

Other drivers of health expenditures include treatment practices (e.g., treatment at tertiary care rather than at primary care facilities), intensity of care, and policies such as those that promote the expansion of service or insurance coverage. Technological change has increased health care spending[22,23]; the effects of new technologies on expenditures can be difficult to determine both due to methodological considerations, as well as variations in effect by type of technology. A study of OECD countries reported that technological change contributed to a 0.4% increase in health spending annually, all else equal.[12] Studies on the United States have reported that technology changes explain between 25%–75% of health expenditure growth.[23] Productivity increases (Baumol effect) in the health sector can also contribute to increased health expendtures.[24,25] A study of OECD countries reported that productivity factors contributed between 0.1% and 1% of health expenditure growth.[12]

Methods

We developed a model to project CHE in LAC countries based on estimated changes in three underlying factors: changes in the prevalence of diseases, population growth and aging, and economic growth and technology. This type of deterministic model where projections are based on expected growth in component parameters have been used in previous studies.[9,11,12] The model is depicted in the equation below.

$$CHE_t = \sum_j \sum_k S_{tj} * p_{tjk} * \varphi_{tjk} * CHE_{t-1jk}$$

where S_{tj} is the relative change of population size in age group "j" in time "t", compared to the base year (2018/2019); p_{tjk} is the relative change of prevalence of disease "k" in age group "j" in time "t", compared to the base year (2018/19); φ_t is a composite term that captures the annual real growth in CHE due to income growth and other factors, which we label "economic growth and technology"; and $CHE_{t-1\ jk}$ is the CHE in the previous year for disease "k" in age group "j". The parameter φ_t

captures the contribution of real GDP growth and other residual factors (e.g., technology, wage increases in the health sector, and such factors) to growth in health expenditures. $CHE_{t-1\ jk}$, the CHE for the previous year for disease "k" in age group "j" starting from baseline (2018/19), is upwardly adjusted iteratively based on relative changes over time in the other model parameters. The model parameters related to population size, disease prevalence, and economic growth and technology represent relative increases over the previous time period; they are multiplied together and with CHE in the previous period to get current period CHE. Finally, all these parameters are specific to the individual country for which the projection was made. We assumed that these three factors (disease prevalence, population, and economic growth and technology) change independently and in a linear fashion. We also assumed that the overall change is a product of the relative change due to each individual factor. In the results, we report the effect of each factor separately and combined.

The model presented above has some implicit assumptions. One is that the baseline levels of health systems efficiency (inefficiency) continue throughout the projection period. Second, that the growth in service coverage (and other implicit factors driving expenditures) also continues at the same rate throughout the projection period. Because this model projects expenditures based on historical growth trends, the pathways from increased expenditures to better health and potentially lower expenditures is not captured.

Baseline current health expenditures (CHE) for index countries

The starting point of our analysis was baseline information on CHE by age and disease group for a set of seven index countries—Costa Rica, Peru, Mexico, Argentina, Colombia, Trinidad and Tobago, and Brazil. These index countries were selected purposively based on their diverse geographical and health system contexts, as well as, the availability of local research teams, data availability, and suitable partner institutions. Age categories were in five-year groups, and diseases were classified according to the International Classification of Diseases, Tenth Revision (ICD-10) Chapter. In each of these countries, baseline data for 2018 (or 2019) was from household surveys, claims data from social insurance programs, and government sources (see Annex 1 for more details on data sources). The baseline year was 2019 for Brazil, Peru, and Trinidad and Tobago data, and 2018 for Costa Rica, Mexico, Argentina, and Colombia. While the process of arriving at these estimates differed by country due to varying data sources, in general, the following process was followed: (a) identifying the different health financing schemes in the index country, and (b) collecting available information from these health financing schemes—information was usually available for only one or two schemes. Information on age-disease expenditures from these sources was extrapolated to the other schemes keeping the overall expenditure envelope as per the CHE reported in the National Health Accounts of the country (as reported in WHO Global Health Expenditure database).[6]

Changes in disease prevalence

For changes in prevalence, we used Global Burden of Disease (GBD) data available from the Institute for Health Metrics and Evaluation (IHME) website.[26] We used the GBD to ICD-10 cause list to consolidate the prevalence data into every corresponding ICD-10 Chapter.[27] Most level 2 disease categories were mapped to a single ICD Chapter, and we used ICD level 3 categories for diseases in Chapters 4, 7, 8, and 14, and for ICD Chapter 21 (factors influencing health status), we assumed a flat prevalence trend. After extracting prevalence data for each country across all age categories, we used the GDB estimates from 1990 to 2019 to create a trend in prevalence until the year 2050. We fit a linear trend for each age category and disease category, using a logit transformation to constrain estimated prevalence values to a range between 0% and 100%. We implemented this model in Stata, using the *glm* command, with a binomial family and logit link. Where there was insufficient data to construct a model, we assumed a "no change" scenario (a flat trend). The "no change" assumption was made for one ICD-10 Chapter (Chapter 21)—"Factors influencing health status and contact with health services"; some countries do not have projections for all ICD-10 Chapters because the index countries Argentina, Mexico, and Peru did not report data for Chapters 17, 21, and/or 22. This methodology gave us prevalence estimates for 2020–2050 for all age and disease categories. From these estimates, we calculated the relative change in prevalence for the years 2019–2050 compared to the baseline values for 2018/2019.

Population growth and aging

For population growth, we used estimates from the UN World Population Prospects (WPP) 2022 database, maintained by the UN Department of Economic and Social Affairs, Population Dynamics team.[2] With these data, we calculated the relative change in population size, for each five-year age category, for the years 2018/19–2050 compared to 2018/19.

Economic growth and technology

Several factors affect the growth of CHE, including: population growth and structure, disease prevalence, economic growth, medical price inflation (due to increase in health sector prices), technology (e.g., use of generics), the intensity of medical service use, coverage of health services, policies, and other factors which can inflate health expenditures.[22] In our model, the "economic growth and technology" parameter captures these factors except the contribution of population growth and structure, and disease prevalence. The economic growth

and technology parameter is estimated as the sum of (i) the contribution of economic growth to health expenditures, and (ii) the contribution of a residual factor that includes increases in medical prices, the effects of introducing new technologies, the intensity of medical service use, changes in health service coverage and other factors. This residual factor is estimated by subtracting the contributions of demographic changes, disease prevalence, and economic growth from total health expenditure growth. Note that we do not include general inflation in the economy because we use real health expenditures in our projections. In this study, we used historical (2000–2017) data on CHE to estimate income elasticity for Latin American (0.88) countries and for Caribbean countries (1.14). The 2000–2017 health expenditures were deflated using the GDP deflator and expressed in Purchasing Power Parity (PPP) terms - they are in constant 2017 PPP dollars. We estimated country-specific growth rates for the economic growth and technology parameter by combining the country-specific contribution of economic growth to health expenditure growth with a regional (i.e., Latin America or Caribbean) residual factor (see Annex 5). We applied this rate to project medical expenditures for 2019 and 2021 onwards.

COVID-19 pandemic

To account for the COVID-19 pandemic, we adjusted our projection for 2020 before returning to the regression trend rate. Because countries in the LAC region responded very differently to the pandemic regarding health spending, we varied our approach for each country based on reports of how economic growth was affected in 2020. All LAC countries experienced negative economic growth in 2020 (except Guyana). In our study, we set economic growth and technology for 2020 to zero in all countries.

Extrapolating from index countries to the region

A key challenge for making regional-level projections in health expenditures is the availability of baseline data on the distribution of CHE by age and disease group. For most countries in LAC, this information is not readily available. Our regional extrapolations are confined to the countries listed in Annex 2 which are borrowing member countries of the Inter-American Development Bank. To extrapolate from the seven index countries to others in the region, we first grouped countries in LAC separately by their average per capita health expenditures from 2015 to 2018 (Annex 2).

The seven index countries generated reference expenditure profiles for the whole group. For country groups with more than one index country, we took the simple average of expenditure values within each age group. Once the health expenditure in each age group was estimated for a country, we then distributed this across disease groups based on the index country proportion of expenditures in each disease group within an age group. In this manner, the baseline age-disease distribution matrix was established for each country in the LAC region. These baseline expenditures were then projected into the future based on country-specific changes in population, epidemiology, and economic growth and technology. Note that this assumption only means that the distribution of relative health expenditures across age groups is common to countries within a group, not the absolute levels. Because we had only one index country from the Caribbean, we used Peru and Colombia as reference countries for Groups 1 and 2 in the Caribbean region. We exclude Venezuela and Haiti from our projections because of the difficulty in getting data for projections in Venezuela and the challenge to extrapolate from the index countries in our study to Haiti due to of widely different economic and financing contexts (e.g., health expenditures in Haiti are heavily reliant on external sources of funds).

Sensitivity analysis

We ran a sensitivity analysis to evaluate the potential uncertainty in our projected estimates of expenditure, using a Monte Carlo simulation (repeated sampling) to vary the three input parameters for our model: inflation, population, and prevalence. For the inflation parameter, we used a triangular distribution, with the upper and lower bounds being ± 20% of the inflation point estimate. In each run of the simulation, we sampled a single inflation estimate for each country, and used that estimate for all years. For the population parameter, we used a triangular distribution of projections, using the high and low projection variants provided by the UN World Population Prospects. For the prevalence parameter, we used a triangular distribution, using the upper and lower bounds of the historical estimates provided by IHME. For each simulation run, for each disease, we independently sampled a prevalence distribution for the baseline year (2018/2019) and end year (2050), assuming no correlation in the error between start and end years and interpolated a linear trend over time for all diseases and age categories. We assumed correlation between the error in the age categories, but we allowed the error across diseases to vary independently. In our results, we present the 95% highest density interval for estimated expenditure in 2030 and 2050.

Role of the funding source

This study was possible due to a grant from the Inter-American Development Bank. The sponsor reviewed the analysis and provided technical inputs.

Results

Projections of current health expenditures

CHE per capita are projected to increase across LAC countries between baseline (2018/2019), 2030, and 2050

(Figs. 1 and 2—see Annex 3 for country abbreviations). Also shown is the CHE level in 2018/19. In almost all Latin American countries, there is at least a doubling of CHE per capita between baseline and 2050, spanning over 30 years. Caribbean countries will also experience increases in per capita CHE, but the magnitude varies between countries due to the baseline levels and contribution of underlying factors (Fig. 2). Between baseline and 2050, per capita CHE is projected to more than double in Trinidad and Tobago (276%), Belize (123%), and Jamaica (112%) while other Caribbean countries will have more modest increases in CHE. It is important to note that projections for Guyana do not account for the discovery of oil reserves which will likely affect future CHE values.[28]

Most LAC countries will experience annual growth in per capita CHE of around 3% or higher. In Latin America, relatively high (>3.7% in 2030–50) projected growth rates are seen in Dominican Republic, Panama, Peru, Chile, and Nicaragua. In the Caribbean, a high (>3.7% in 2030–50) growth rate is observed in Trinidad and Tobago.

Current health expenditure growth by disease groups

Growth in CHE varies across disease groups. Figs. 3 and 4 show the median annual growth rates in CHE by disease group for LAC countries. In general, there is positive growth in CHE between baseline and 2050 across all ICD-10 Disease Chapters, as indicated by the median annual growth rates. The median growth rate values in Figs. 3 and 4 indicate the disease groups expected to drive CHE growth between baseline and 2050. In Latin America, median annual growth rates in CHE of 4.0% or more are seen for mental and behavioural disorders (Chapter 5); diseases of the digestive system (Chapter 11); nervous system (Chapter 6); external causes of morbidity and mortality (Chapter 20); disease of the eye and adnexa (Chapter 7); endocrine, nutritional, and metabolic diseases (Chapter 4); diseases of the musculoskeletal system and connective tissue (Chapter 13); neoplasms (Chapter 2); disease of the circulatory system (Chapter 9); and diseases of the genitourinary system (Chapter 14). Note that special purposes (Chapter 22–including new diseases and resistance to antimicrobial and antineoplastic drugs) has high growth based on a few observations because the index countries of Argentina, Peru, and Mexico did not report prevalence information for this chapter. Further, some disease groups will experience relatively lower growth in CHE, including certain infectious and parasitic diseases (Chapter 1); certain conditions originating in the perinatal period (Chapter 16); pregnancy, childbirth, and the puerperium (Chapter 15); diseases of the blood (Chapter 3); and congenital malformations, deformations, and chromosomal abnormalities (Chapter 17). Similar trends are also observed for Caribbean countries, though the median growth rates are lower than those of Latin America and typically hover around an average of 2% per annum (Fig. 4). Some countries do not have projections for all ICD-10 Chapters because three index countries–Argentina, Mexico, and Peru–did not report data for Chapters 17, 21, and/or 22.

The results of our sensitivity analysis are shown in Figs. 1 and 2. The error bars in the charts show the uncertainty arising from our sensitivity analysis, in which we allowed the input parameters of inflation, population, and prevalence to vary (see Methods). For

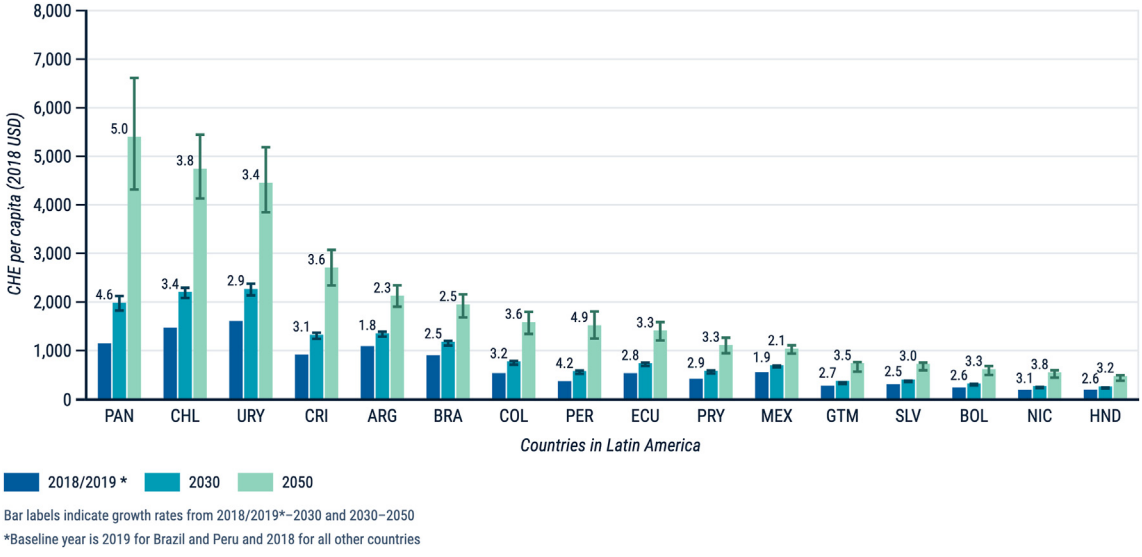


Fig. 1: Current health expenditure per capita (2018 US$) in Latin America, 2018/2019*–2050.

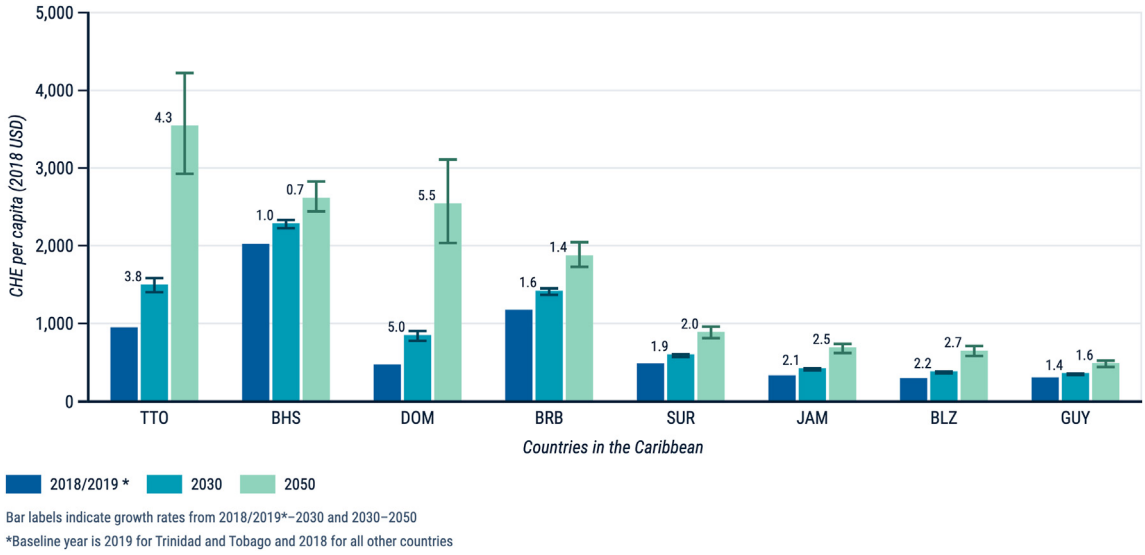


Fig. 2: Current health expenditure per capita (2018 US$) in the Caribbean, 2018/2019*–2050.

the 2030 estimates, the uncertainty (95% highest density interval) was between ± 3% and ± 8% of the estimate for most countries, with the highest variability being ± 10% of the estimate. For the 2050 estimates, the uncertainty was between ± 9% and ± 20% of the estimate for most countries, with the highest variability being ± 23% of the estimate. These bounds give a sense of the uncertainty in our results, given the assumed uncertainty in the input parameters. We note that the uncertainty shown here does not undermine our findings from this

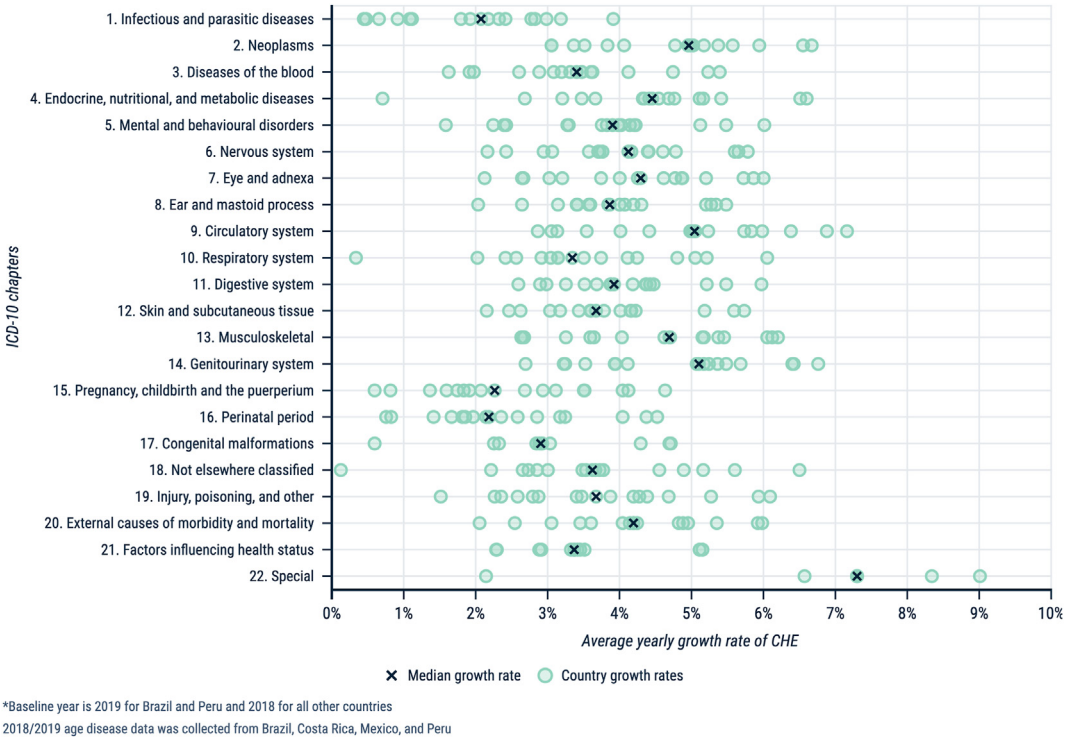


Fig. 3: Median annual growth rate of current health expenditure in Latin America by ICD-10 Chapter, 2018/19*–2050.

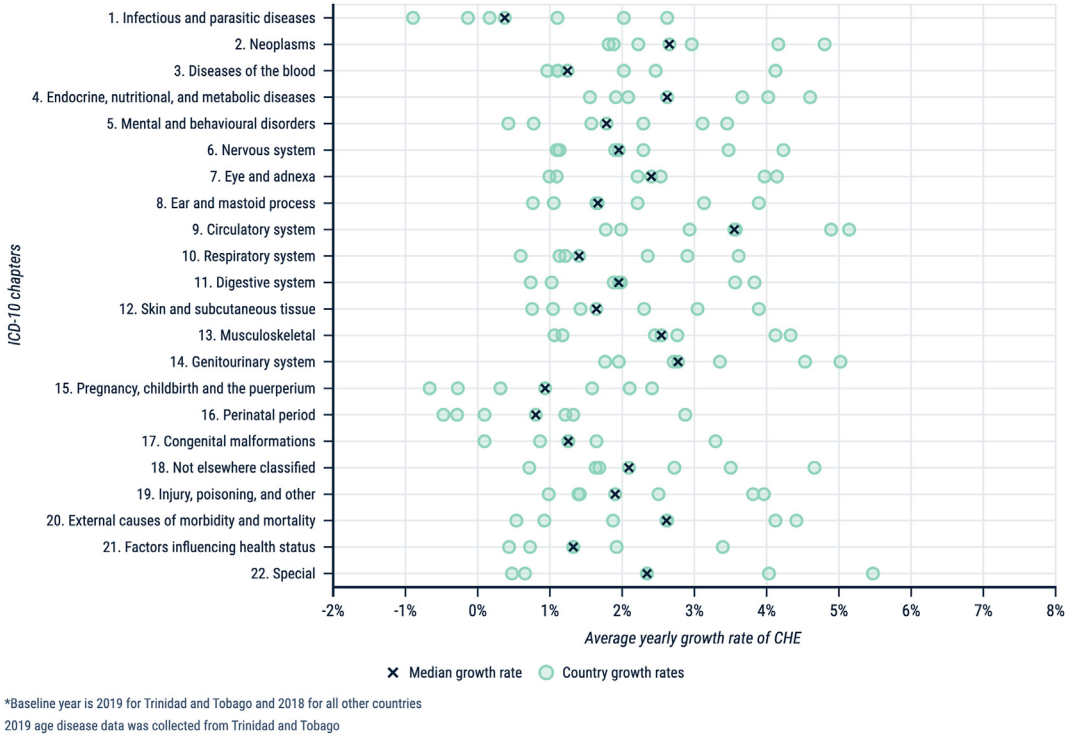


Fig. 4: Median annual growth rate of current health expenditure in the Caribbean by ICD-10 Chapter, 2018/19*–2050.

analysis. Even at the lower bound, there will be significant growth in expenditure across all countries.

Figs. 5 and 6 present the median share of each ICD-10 Chapter at baseline (2018/19) and 2050 in LAC countries. The direction of the arrows shows the increase or decrease between the two time periods. Among Latin American countries, between baseline and 2050, the largest increase in median share of CHE is seen in diseases of the genitourinary system (Chapter 14); neoplasms (Chapter 2); and diseases of the circulatory system (Chapter 9). Large declines in median CHE share between baseline and 2050 are observed for certain infectious and parasitic diseases (Chapter 1); pregnancy, childbirth, and the puerperium (Chapter 15); and diseases of the respiratory system (Chapter 10).

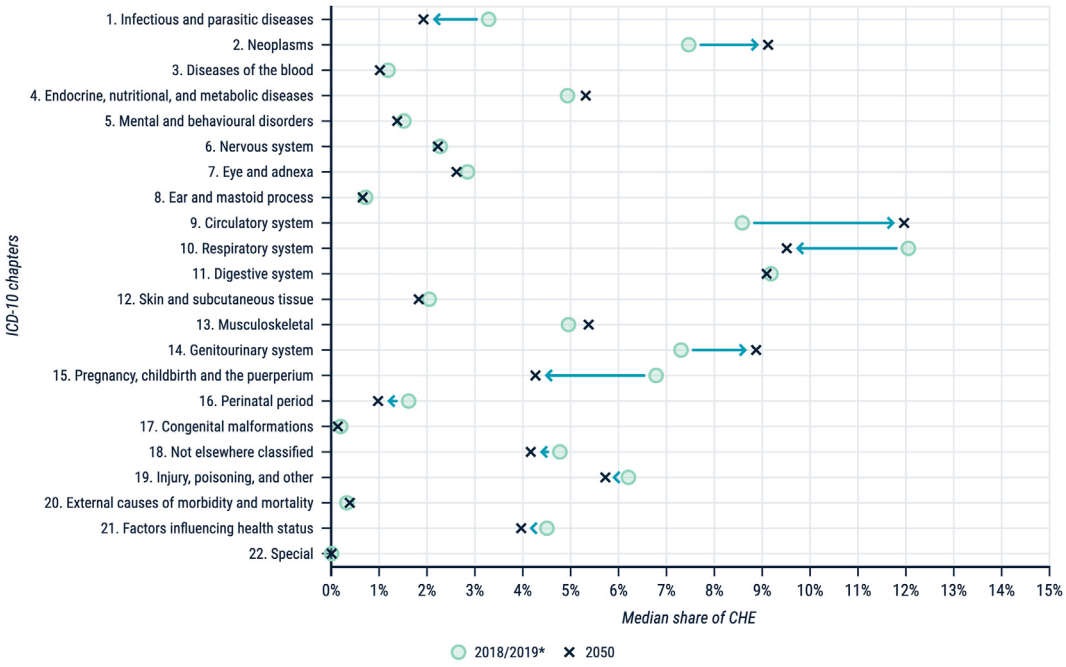
Similar patterns are observed for Caribbean countries with some differences (Fig. 6). Between baseline (2018/19) and 2050, the largest increases in the median share of CHE are seen in neoplasms (Chapter 2); diseases of the genitourinary system (Chapter 14); and diseases of the circulatory system (Chapter 9). Large declines in median CHE share between baseline and 2050 are observed for certain infectious and parasitic diseases (Chapter 1); factors influencing health status (Chapter 21); and pregnancy, childbirth, and the puerperium (Chapter 15).

Current health expenditure growth by age groups

The median annual growth in CHE between baseline and 2050 in LAC countries is lowest for the youngest age groups and then increases with age (Figs. 7 and 8). In the Latin America region, the median growth rate is at or below 2% a year until around age 25, and then increases to over 6% for the oldest age groups. In the Caribbean region, similar trends are observed but the median annual growth rates are lower compared to Latin America. Overall, these trends in growth rates indicate that the growth in CHE will be driven by expenditures in the older age groups, which in turn is driven by the growth in the size of these age groups and the growth in the per capita health expenditure in these age categories.

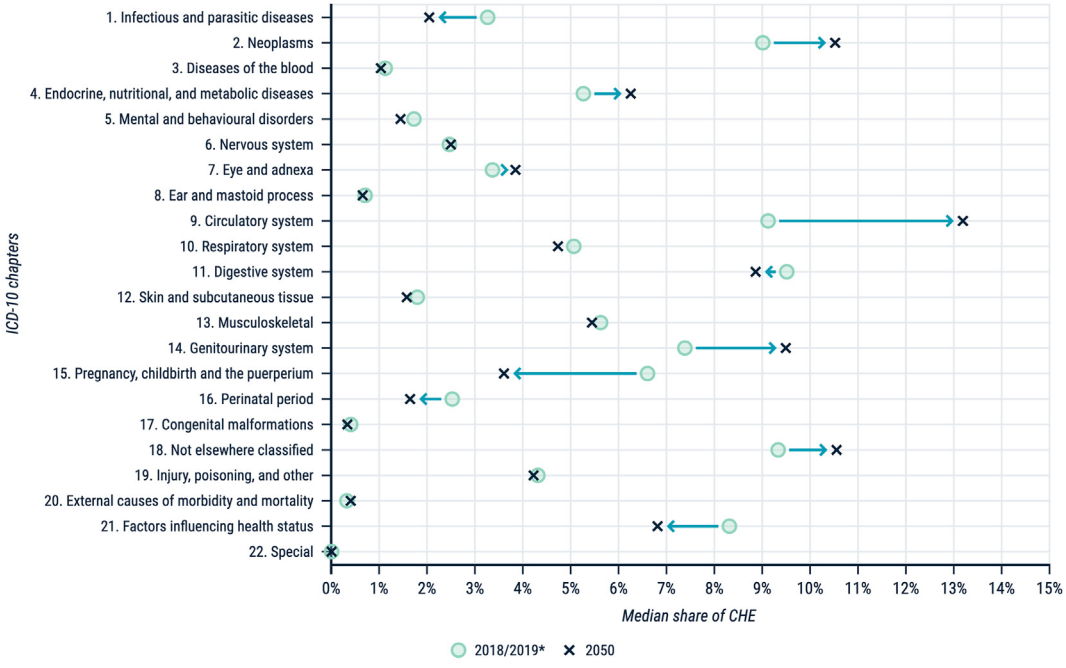
Factors contributing to growth in current health expenditures

To estimate the independent contribution of each factor—economic growth and technology, population growth, age structure, and disease prevalence—on CHE, a particular factor was allowed to vary while keeping the others constant. For example, when estimating the role of population growth alone on CHE, the size of the population in each age group was allowed to increase while keeping the country's baseline age distribution (the proportion of the population in each age category) and other factors



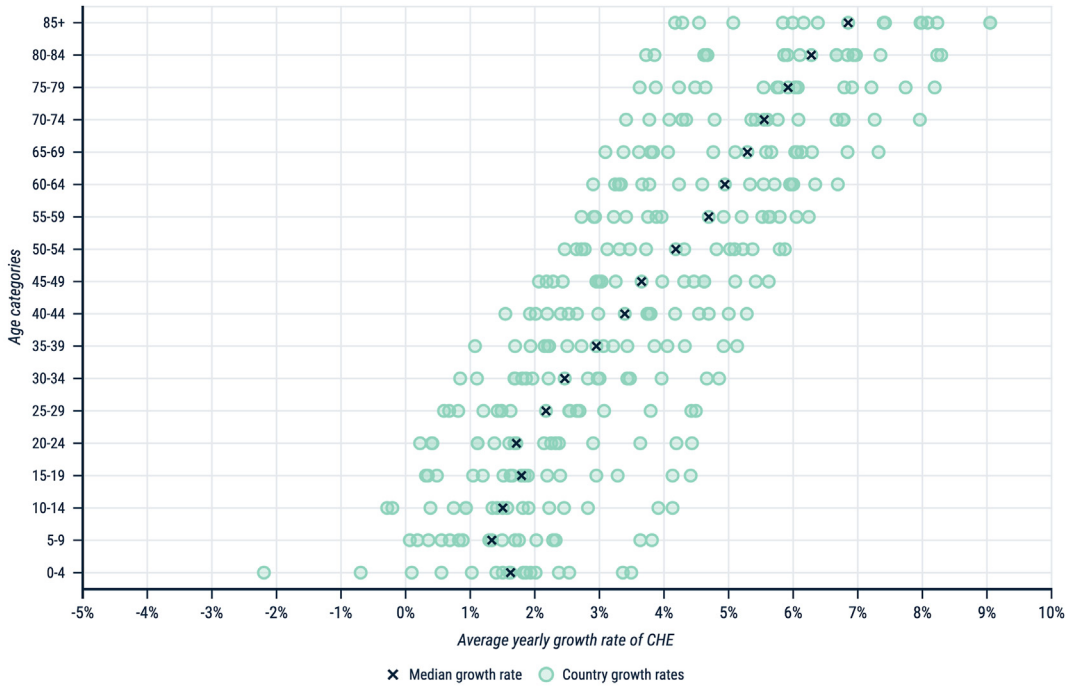
*Baseline year is 2019 for Brazil and Peru and 2018 for all other countries
2018/2019 age disease data was collected from Brazil, Costa Rica, Mexico, and Peru
Arrows indicate the direction of change from 2018/2019 to 2050

Fig. 5: Median share of ICD-10 Chapter in current health expenditure, Latin America, 2018/19*–2050.



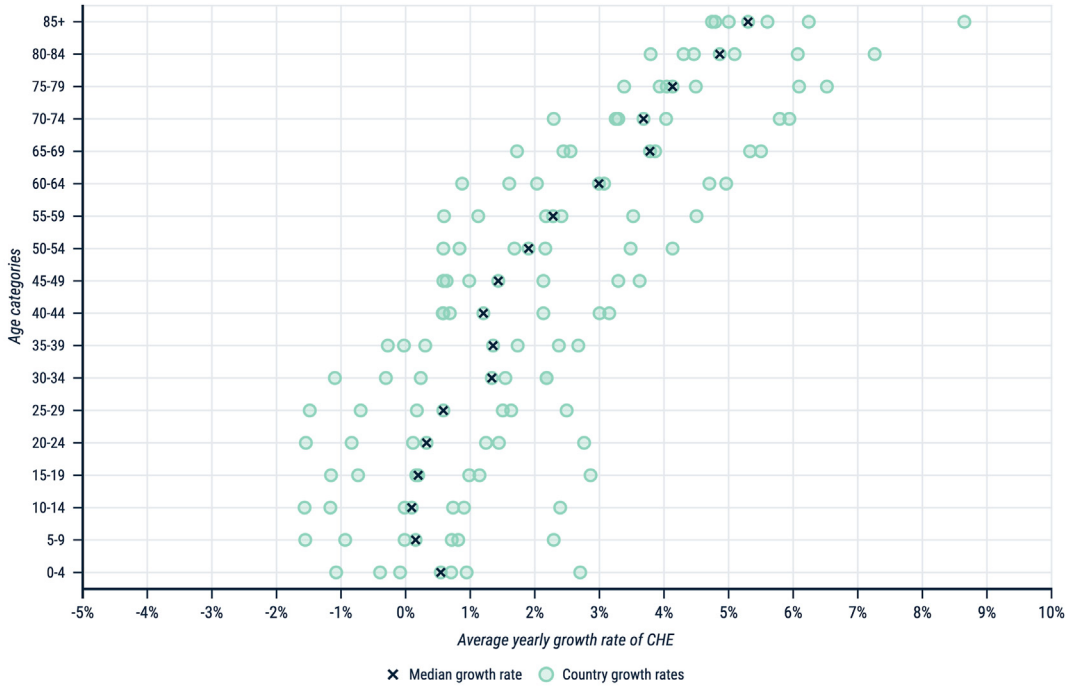
*Baseline year is 2019 for Trinidad and Tobago and 2018 for all other countries
2019 age disease data was collected from Trinidad and Tobago
Arrows indicate the direction of change from 2018/2019 to 2050

Fig. 6: Median share of ICD-10 Chapter in current health expenditure, the Caribbean, 2018/19*–2050.



*Baseline year is 2019 for Brazil and Peru and 2018 for all other countries
2018/2019 age disease data was collected from Brazil, Costa Rica, Mexico, and Peru

Fig. 7: Median annual growth rate of current health expenditure in Latin America by age group, 2018/19*–2050.



*Baseline year is 2019 for Trinidad and Tobago and 2018 for all other countries
2019 age disease data was collected from Trinidad and Tobago

Fig. 8: Median annual growth rate of current health expenditure in the Caribbean by age group, 2018/19–2050.

constant. To estimate the effect of population aging on CHE, we held the total population and other factors constant at baseline levels, while adjusting the distribution across age groups over time to match the changing age structure of the population as estimated by the WPP. To estimate the independent effect of disease prevalence, we kept all other factors at baseline levels.

Table 1 shows the average relative increase in CHE between baseline and 2050 among countries in the region resulting from the influence of all factors combined and each factor individually. Overall, CHE increased by 2.8 times between baseline and 2050 in LAC countries, 2.7 times for Latin American countries, and 4.7 times for Caribbean countries. In LAC countries, economic growth and technology had the largest independent contribution to increasing CHE—on average, it nearly doubled CHE in Latin American countries and increased CHE by nearly three times in Caribbean countries. The independent effect of demographics and epidemiology (including population growth, aging, and age-specific disease prevalence) was the second largest for LAC. The independent contribution of only population growth and only aging was modest in comparison to economic growth and technology.

*This column shows the effects on health expenditures growth from population growth, population aging, and changes in age-specific prevalence.

Discussion

Countries in the LAC region will experience real increases in CHE over the coming decades; the average increase is expected to be 2.8 times between baseline and 2050. In nearly all Latin American countries and some Caribbean countries there is at least a doubling of CHE per capita between baseline and 2050. The average annual per capita CHE growth from baseline to 2050 for Latin American countries is expected to be around 3.2% per year, and 2.4% for the Caribbean. Most LAC countries will experience annual growth in per capita CHE of around 2% or higher. In Latin America, relatively high (>3.4% in 2030–50) projected growth rates are seen in Panama, Peru, Nicaragua, Chile, Costa Rica, Bolivia, Colombia, and Guatemala. In the Caribbean, high (>3.0% in 2030–50) growth rates are observed in Dominican Republic and Trinidad and Tobago. These estimates of projected annual CHE growth are consistent with other studies that report projections of annual CHE growth ranging between 2.7 during 2015-30 for OECD countries to 8.4 in China between 2015 and 35.[9,12] Our results also support what other research work has found regarding increasing expenditures in countries with larger populations of elderly individuals and those suffering from NCDs such as cardiovascular disease and cancer.[9]

Our findings indicate that economic growth and technology is the main driver of future health expenditures in LAC countries. Other studies in different contexts have also identified economic growth to be the main driver of health expenditures.[12,17,18] Previous work has shown that technology might explain 25%–75% of health expenditure growth in the United States.[23] Demographics and epidemiology (including population growth, aging, and age-specific disease prevalence) had the second largest effect on CHE growth in LAC countries. The contributions of only population growth (1.15 times) and only aging 1.37 times) were more modest in increasing CHE between 2018/19 and 2050 compared to economic growth and technology (1.6 times). However, there are exceptions to this; in Mexico, the main driver of health expenditures is population growth, aging, and epidemiology. These combined factors exceeded the effect of economic growth and technology on future CHE.

Changes in the distribution and growth of health expenditures by disease and age groups in LAC countries are influenced by their demographic and epidemiological transitions. CHE growth by ICD-10 Chapter showed lower median growth values for infectious and parasitic diseases; perinatal conditions; and pregnancy and childbirth, while increased values were observed for expenditures associated with endocrine, nutritional, and metabolic diseases; diseases of the musculoskeletal system; neoplasms; diseases of the circulatory system; diseases of the genitourinary system; and special purposes (including new diseases, and resistance to antimicrobial and antineoplastic drugs). Health expenditures increased with age in all countries, which suggests that countries with older populations will continue to experience rising CHE over the years. However, our results generally show a more modest effect of the epidemiological and demographic transitions on CHE. One explanation for this is that the main contributor of high health expenditures in older ages is the care required in the period before death. As people live

Country	All factors	Economic growth & technology	Population growth	Population aging	Demographics and epidemiology[a]
LAC	2.77	1.80	1.14	1.40	1.53
Latin America	2.72	1.78	1.14	1.40	1.53
Caribbean	4.80	2.98	1.32	1.31	1.56

[a]This column shows the effects on current health expenditures growth due to population growth, aging, and changes in age-specific prevalence.

Table 1: **Relative change in real CHE from 2018/19 to 2050, by contributing factor.**

longer, these expenditures shift to the oldest age groups reducing health expenditures in the now 'younger' age groups over time.

Rising health expenditures are a concern because of affordability. This is a particular challenge in Latin American countries because of the upward pressures on health expenditures due to the constitutional right to health in many countries, the aspiration for universal health coverage, and greater equity in service coverage. As such, it is imperative for governments in LAC countries to control health expenditures and finds ways to increase efficiencies within the health system. There are several tested strategies to achieve this. Governments can attempt to directly control health expenditures through active negotiations on prices between payers and providers, regulation of prices related to drugs and diagnostics, and more efficient technologies.[29] Orienting health systems towards primary health care can introduce greater efficiency within the health system by encouraging preventive care and treatment at ambulatory care facilities rather than hospitals. In addition, deploying provider payment mechanisms like capitation or case-based payments that encourage more efficient provider behaviour while ensuring quality and patient-centred care, can also contribute to better managing health expenditure growth.

Health expenditure increases in LAC countries over the next 30 years will occur simultaneously with declines in the share of out-of-pocket expenditures across most LAC countries. These two factors comprise a health financing transition as conceptualized by Fan and Savedoff.[22] There are some concerns that this transition may have stalled or will not be complete in the short term. For example, despite historical declines in out-of-pocket payments, they remain persistently high in many LAC countries.[8] So, it appears that increased public expenditures on health may not translate into proportionately lower out-of-pocket expenditures in some countries. Factors such as the quality and coverage of public and/or social security financed health services, as well as, the segmentation and fragmentation of these services also contribute to this.[30] Policy action directed towards these issues, and the management of health funds is important to reduce growth of CHE in the LAC region in the future.

The availability of detailed and complete health expenditure information at the country-level is critical for understanding health expenditure dynamics and designing optimal policy responses. However, in almost every LAC country included in our study, health expenditure data related to different health financing schemes was fragmented. Disaggregated expenditure information by age or disease group was available only for one or two financing schemes within countries, typically from social health insurance schemes. Although disaggregated expenditure data was available in some countries, accessing these databases was challenging. In addition, several countries in our study had data systems on health expenditures that were not very informative, particularly regarding public health spending. LAC countries need to create better mechanisms for the collecting and reporting of health expenditure data, so they can understand their specific situation and what to expect in the future.[23]

Limitations

This study has some limitations, including the fact that health expenditure projections are inherently uncertain, particularly over the long term. Extrapolating parameters from past trends may not be good predictors for the future. However, we address uncertainty in the model by varying the parameters for population, population aging, disease prevalence, and economic growth. Further, limited data on health expenditure schemes in the index countries introduced uncertainty regarding expenditures by age-disease group. Extrapolating the health expenditures by age-disease group from the index to other countries may have introduced further errors in the projections. We selected a non-random group of seven index countries to infer age-disease profiles for other countries in the region—as such, the index countries may not be representative of countries in the region and inferences based on them could bias projections made for other countries in the region. In addition, our model does not adequately capture expenditures related to functional limitations and dementia, due to the of lack of information on the prevalence of these conditions. In projecting health expenditures, we used long term historical growth rates in the contribution of economic growth to health expenditures. However, this will likely not reflect the future accurately given the many uncertainties that effect the economic growth of individual countries or entire regions. The data related to health expenditures from the index countries came from a mix of sources. Some of the data on demographic trends and disease prevalence are based on models. As such, it was difficult to judge the accuracy of this information. Incorporating the effect of the COVID-19 pandemic is not straightforward; we took the simple approach of setting the contribution of economic growth to health expenditures to zero for the year 2020. We acknowledge the limitations of this simplistic approach but also offer that this study is focused on long-term trends and the projections are based on long-term historical trends. Finally, unanticipated factors, such as another pandemic, or long-term challenges such as climate change, may make the future look different than the past.

Conclusions

The projections presented in this study offer insights into the direction of health expenditures for LAC countries in the coming decades. With an understanding of the drivers of health expenditure, including economic growth

and technology and to a lesser extent demographics and epidemiology, governments in the LAC region can consider a range of policies and programs to improve their approaches to control healthcare costs and increasing spending efficiency. Strengthening countries' health information systems and data comparability across the region will help inform these policy decisions and propel countries toward UHC.

Contributors

KDR was involved with funding acquisition, project administration, conceptualization, methodology, analysis and writing; TR, AVO, CMN were involved in conceptualization, methodology, analysis and writing; ALH, CM, AMP, AVL, NPM, YF, TAS, CM, CL, ALF, VB, DM were involved in data curation, analysis and reviewing and editing.

Data sharing statement

Data from this study can be made available on request.

Declaration of interests

We declare no competing interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lana.2024.100781.

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