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SUSTAINABILITY OF THE HEALTHCARE SYSTEM IN CURAÇAO

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Sustainability of the Healthcare system in Curaçao

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Abstract

This study presents a multidimensional analysis of the sustainability of Curaçao's healthcare system by examining its economic, fiscal, and demographic foundations, while projecting expenditure trajectories through 2050 under varying assumptions. Historical data reveal that healthcare spending has consistently outpaced both inflation and government revenue growth, raising concerns about long-term affordability. Demographic projections based on a cohort-based approach reveal increasing vulnerability due to population ageing, with the proportion of individuals over 65 expected to nearly double by 2050. Expenditure forecasts indicate a sharp rise in healthcare costs, increasing by 41–42% under demographic trends alone, and by over 140% when price growth is also factored in. These dynamics suggest that, in the absence of substantial policy reform, Curaçao's healthcare system will face rising costs that could force the government to increase taxes, reduce service quality, or ration care. The findings underscore the urgent need for strategic interventions to ensure long-term sustainability. Policy interventions should target demographic restructuring, demand-side cost containment, and broadening the revenue base.

JEL Classification Numbers: H51, I13, I18

Keywords: healthcare expenditure growth, population ageing, long-term projections, financial sustainability

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1. INTRODUCTION

A healthcare system is an integrated set of activities that includes the demand for, provision of, and the organization, financing, control, and regulation of healthcare services. Any healthcare system should strive to improve the health of the population, meet people's expectations, and promote fairness of financial contributions (World Health Organization 2000). These objectives are influenced by additional subgoals such as accessibility, social participation, sustainability, and innovativeness (Murray and Frenk, 2000; Özer and Yildirim, 2018).

In striving to meet these objectives, the cost of healthcare has been increasing in most countries at a faster pace than general inflation and the growth of government revenues (Lorenzoni et al., 2019). One of the main causes of healthcare expenditures today is population ageing, caused by declining fertility rates and increased life expectancy. Ageing populations have resulted in greater disease burdens and, hence, a higher demand for quality healthcare in many countries. Another factor that has contributed to higher healthcare costs is innovation in medical technologies and treatments (Angelis et al., 2017; Harper, 2010). Although these innovations have contributed to improved healthcare quality and system efficiency, they are often associated with high implementation costs. As healthcare costs continue to rise, the sustainability of healthcare systems has become a much-debated topic.

In this regard, the sustainability of a healthcare system refers to whether society in general, and the government in particular, can finance healthcare over the long term. In Curaçao, the sustainability of the healthcare system is also high on the policy agenda. The aim is to establish a system that is affordable, efficient, and robust. Healthcare sector reform has received special attention in the country reform package (*Landspakket*) as agreed upon with the Netherlands.[1] The International Monetary Fund (IMF) has also emphasized the urgency of healthcare reform in Curaçao to ease its pressure on public finances (International Monetary Fund, 2022).

Against this background, the purpose of this paper is to assess whether the current structure of the healthcare system in Curaçao is financially sustainable in the long run. Historical data reveal that healthcare spending has consistently outpaced both inflation and government revenue growth, raising concerns about long-term affordability. Demographic projections, based on cohort-based approach highlight increasing vulnerability due to population ageing, with the proportion of individuals over 65 expected to nearly double by 2050. As the foundation for these projections, detailed data from the BZV[2] scheme were used to model current expenditure patterns and estimate future costs. Expenditure forecasts indicate a sharp rise in healthcare costs, increasing by 41–42% under demographic trends alone, and by over 140% when price growth is also considered. These dynamics suggest that, in the absence of substantial policy reform, Curaçao's healthcare system will face a widening financial gap that could force the government to increase taxes, reduce service quality, or ration care. The findings underscore the urgent need for strategic interventions to ensure long-term sustainability.

The structure of the paper is as follows. Section 2 begins by defining healthcare system sustainability from a multidimensional perspective. Section 3 describes the current healthcare system in Curaçao and evaluates its sustainability by benchmarking current expenditures against selected countries, while also considering demographic, economic, and fiscal factors. Section 4 covers projection methods used in comparable studies and details the methodology adopted in this research. Section 5 examines the primary data inputs that underpin the long-term projection of this research. Section 6 presents the results, and section 7 concludes the paper.

[1] The governments of Curaçao and the Netherlands agreed in 2020 on a package that includes reforms and investments in several key policy areas that should result in a more resilient economy and society.
[2] Basisverzekering Ziektekosten (BZV) is the Basic Healthcare Insurance scheme.

2. HEALTHCARE SYSTEM SUSTAINABILITY: A MULTIDIMENSIONAL PERSPECTIVE

From an accounting perspective, the sustainability of a system refers to whether revenues are sufficient to cover expenditures. In the case of public goods and/or services, a distinction can be made between economic and fiscal sustainability. A system is considered economically sustainable if the social costs of spending do not outweigh its benefits. Spending in one sector could, however, be perceived as economically unsustainable if it crowds out spending in other important sectors of the economy, especially in a stagnant or contracting economy (Thomson et al., 2009). This occurs when an increasing share of available resources is allocated to one sector, while other sectors face resource constraints. Spending as a percentage of GDP can thus be used as an indicator of economic sustainability. If spending on healthcare increases disproportionately relative to GDP at the expense of spending on other goods and services that also contribute to social welfare, the healthcare system becomes economically unsustainable (Figueras et al., 2011; Thomson, et al., 2009; Özer and Yildirim, 2018).

Meanwhile, fiscal sustainability refers to the ability of public revenues meeting public expenditures on goods and/or services without causing a continuous increase in the public debt-to-GDP ratio. If, in a specific sector, public revenues are insufficient to cover expenditures, then there is a fiscal sustainability problem in that sector. Thomson et al. (2009) highlights that in the case of healthcare, taxes cannot continue to rise indefinitely to meet increasing expenditures. This is because persistently high and increasing taxes can stifle economic expansion and reduce the government's long-term revenue potential, creating second-round effects through additional funding constraints (Skinner and Rovere, 2011). Furthermore, in a globalized economy, wage income is becoming inadequate to sustain the rising cost of care, as the share of labor falls relative to that of capital as a source of income (Stiglitz 2002).

At the same time, when employee and employer contributions to social healthcare insurance grow in tandem with increasing healthcare expenditures, the economy may suffer. In particular, increasing employers' contributions leads to higher labor costs, which can negatively impact the labor market and reduce competitiveness (Liaropoulos and Goranitis, 2015). To achieve fiscal sustainability in the healthcare system, Thomson et al. (2009) argue that policymakers should adhere to the fiscal balance constraint, i.e., revenues should match expenditures, when assessing how to best achieve the healthcare system's goals.

Beyond an accounting perspective and within the context of healthcare, Romanow (2002) defines sustainability as "ensuring that sufficient resources are available over the long term to provide timely access to both quality services and necessary medicament". Marchildon (2004) further specifies the resources needed in healthcare as input factors such as human resources, equipment, materials, treatment facilities, information technology, and financial resources.

Revenue generation is the most important factor determining the availability of resources for healthcare. These revenues can be generated through various mechanisms, i.e., publicly through taxes and social insurance contributions, and privately, through private healthcare insurance and medical saving accounts (Mossialos et al., 2008). Some countries also operate hybrid or two-tier healthcare systems that combine public and private funding.

Most national healthcare systems have a public funding component, making the sustainability of these systems largely a political decision regarding how much to spend on healthcare and how to generate the necessary revenues. As a result, national healthcare systems place significant pressure on public expenditures in many nations (Thomson et al., 2009; Popescu et al., 2018).

Public healthcare systems are primarily based on the principle of solidarity, where the contributions of all participants are pooled to cover the medical expenses of those in need. This allocation of revenues ensures equal access to healthcare for the entire population. Rather than each individual being solely responsible for their own healthcare costs, the risk is shared through taxation and social premiums, while care is provided free or at an affordable rate at the point of use. Better-off individuals - those who are wealthier or healthier - help absorb part of the financial risk incurred by worse-off customers (Davies and Savulescu, 2019).

In this context, pool size, i.e., the number of participants in the system, is a crucial determinant of fairness of access, administrative efficiency, and overall effectiveness of the system. In general, these factors tend to improve with pool size. Next to pool size, market structure and procurement methods are key in determining administrative efficiency, service delivery and the quality of care in such a system (Mossialos et al., 2008).

In healthcare systems with a public component, sustainability is achieved when healthcare spending is equal to or lower than economic growth and/or tax revenues growth, that is, the resource base (Di Matteo and Di Matteo, 2011). Hence, the sustainability of the healthcare system depends not only on fiscal policy and public financial management, but also on macroeconomic factors such as the rate of economic growth.

3. HEALTHCARE SYSTEM IN CURAÇAO

3.1. CURRENT SYSTEM

Around the world, healthcare systems have evolved based on socioeconomic, historical, cultural, legal, political, and other country-specific factors (Yıldırım 2015). This is also the case in Curaçao, where the system largely mirrors the universal healthcare model of the Netherlands, which is based on the principle of solidarity.

Two key actors in the healthcare system of Curaçao are the government and the Social Insurance Bank (*Sociale Verzekeringsbank* or SVB). The government oversees the healthcare system and shares organizational and regulatory responsibilities with the SVB. As part of its mandate, the SVB manages the basic healthcare insurance premiums, which covered 140,209 insured individuals in 2023, bringing the system close to universal coverage (SVB Sociale Verzekeringsbank 2024).[3] In addition to the management of healthcare insurance premiums, the SVB is also responsible for disbursing payments for the provision of medical goods and services, effectively creating a single management pool.

On the supply side, healthcare services in Curaçao are categorized into three levels, i.e., primary, secondary, and tertiary care, depending on the patient's condition and the required level of treatment. General practitioners, paramedics, and pharmacists provide primary care. Secondary care is provided by the Curaçao Medical Centre (CMC), Adventist Hospital, private clinics of medical specialists, and the psychiatric hospital. Meanwhile, tertiary care includes long-term care for chronic illnesses and disabilities and is provided by facilities offering specialized care and comfort for extended stays (Pan American Health Organization 2017).

The financial burden of healthcare is shared by both the government and residents of Curaçao. Prior to the 2013 reform, the healthcare system was financed through several schemes. Each scheme had its own legislation in place:

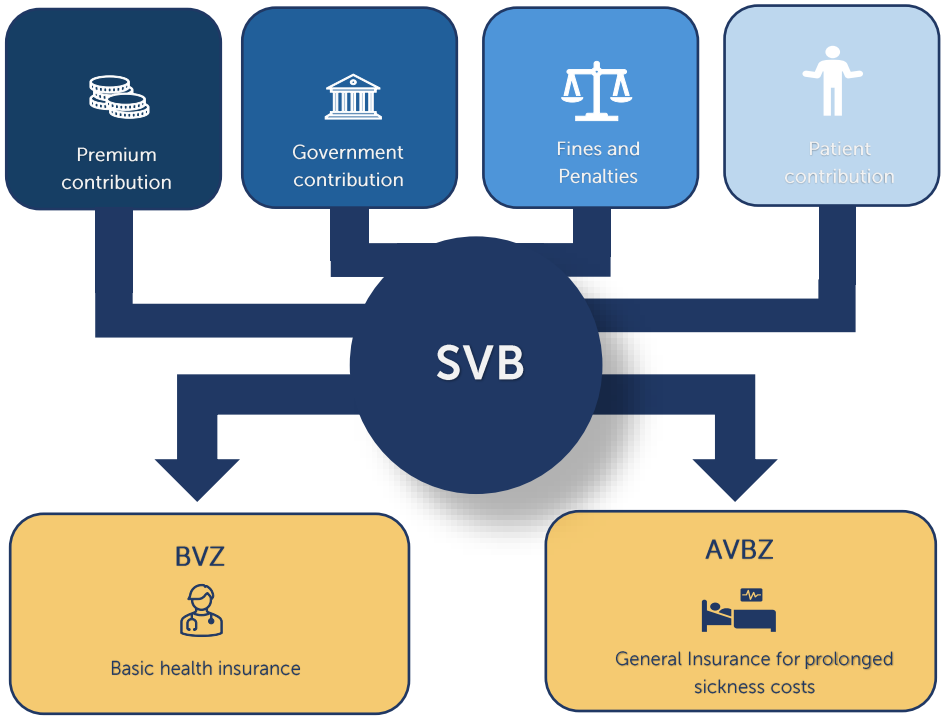
a) Compulsory healthcare insurance system for employees in the private sector, provided by the SVB and financed through premiums paid by both employers and employees.
b) Private healthcare insurance for individuals whose annual income exceeded the maximum for eligibility for the insurance provided by the SVB under a).
c) General Insurance Special Healthcare Cost, i.e., *Algemene Verzekering Bijzondere Ziektekosten* (AVBZ), covering care for individuals with chronic illnesses or impairments. Premiums were collected from both employers and employees.
d) Special scheme arrangement, i.e., *Garantie Toegankelijkheid Zorg* (*GTZ)* fund for retired employees of the refinery and the airline industries.
e) Government-financed healthcare for civil servants managed through the *Bureau Ziektekosten Voorzieningen* or BZV and for retired civil servants through the *Fonds Ziektekosten Overheidsgepensioneerden* or FZOG.
f) The *Pro Pauper* [4] *System* (PP-system) for the unemployed, very low-income individuals and uninsured retirees from the private sector.

[3] Curaçao's population was 153,488 people in 2023, thus SVB covered 91.3% of the population through BVZ.
[4] The term "pro pauper" refers to a person who is destitute of means, except for those derived from charity. More specifically, it denotes someone who receives legal or financial assistance funded by provisions set aside for the poor (Merriam-Webster.com Dictionary, s.v.)

The government was responsible for covering the costs of the schemes under e) and f) along with other public healthcare programs. These obligations placed a significant burden on public finances. By 2012, the government's contribution to healthcare expenditures had reached 11.4% of GDP, while total spending - including private contributions - stood at 13.1% of GDP (Felida 2017).

To address these challenges, the Basic Healthcare Insurance national ordinance (*Basisverzekering Ziektekosten* or BVZ) came into effect on February 1, 2013. It replaced all healthcare insurance schemes administered by or on behalf of the government, except the general insurance special healthcare cost, AVBZ. The BVZ was enacted to consolidate previously fragmented regulations and to standardize access to healthcare facilities. The BVZ system is based on the principles of necessary and effective medical care, within the limits of capacity and solidarity (Landsverordening basisverzekering ziektekosten 2013).

Figure 1 – A snapshot of Curaçao's public healthcare and governance system



Under the BVZ, all residents are entitled to a uniform basic insurance package provided through the SVB. The BVZ guarantees coverage of medical expenses for all eligible residents, except those who were privately insured prior and up to February 1, 2013, and who chose to retain their private insurance coverage. However, if their private insurance coverage was or is below the level provided by the BVZ, they were/are required to switch to the BVZ. In addition, privately insured individuals retain the option to voluntarily join the BVZ. On September 1, 2015, the number of insured persons under the BVZ was further expanded to include civil servants and retired civil servants.

The funding mechanism for the BVZ is stipulated by national decree.[5] The BVZ is financed through four channels: (1) an income-based premium paid by insured individuals, (2) a nominal premium paid by insured individuals,[6] (3) an annual contribution by the government, and (4) other income sources (fines and penalties). The main sources of funding are the income-based premium and the annual contribution of the government. The nominal premium, which was abolished on January 1, 2015, and other income represent a negligible share of total BVZ funding.

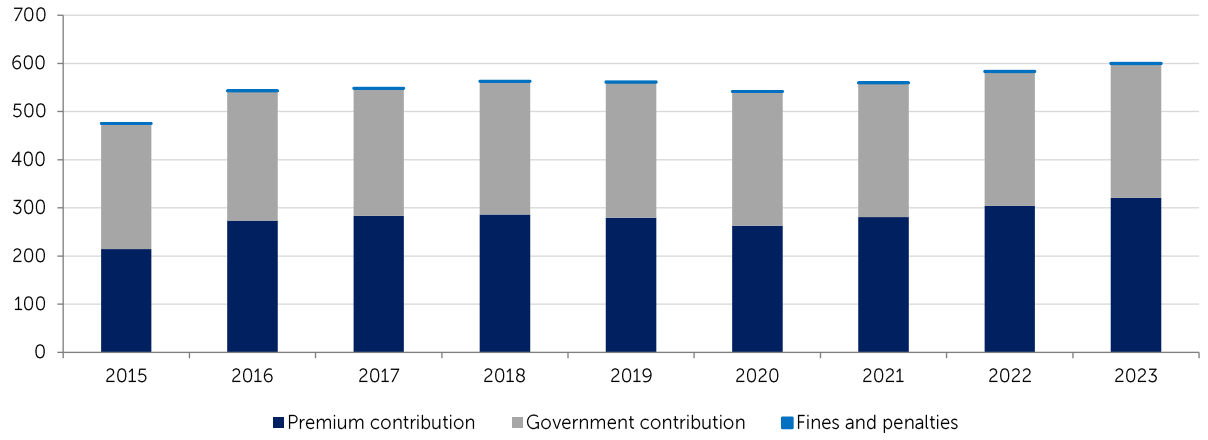
[5] National Decree on determining premium, premium income limits, personal contribution and surcharge for basic health insurance and health insurance premium" (P.B. 2013, no. 4).
[6] The nominal premium of NAf. 82 was abolished on January 1, 2015.

Between 2015 and 2023, income-based premium revenues averaged NAf.278.6 million per year, representing 50.2% of BVZ funding.[7] At the inception of the scheme, it was decided that the government would continue to make annual contributions to cover the costs associated with the implementation of the National Ordinance BVZ. This decision was based on the recognition that relying predominantly on income-based premiums would require excessively high contributions from insured individuals.

The government's contribution is intended to cover the expenses of insured people with limited or no income who are unable to contribute to the fund. The annual contribution of the government to the BVZ is determined in the government's budget and disbursed in equal monthly installments.

Between 2015 and 2023, the government's annual contribution to the BVZ averaged NAf.273.8 million, representing 49.6% of BVZ's total funding. The funding composition, comprising income-based premiums, government contributions, and minor revenues from fines and penalties, has remained relatively stable over the years. (see Graph 1).

Graph 1 - Composition of BVZ funding in millions NAf., 2015-2023



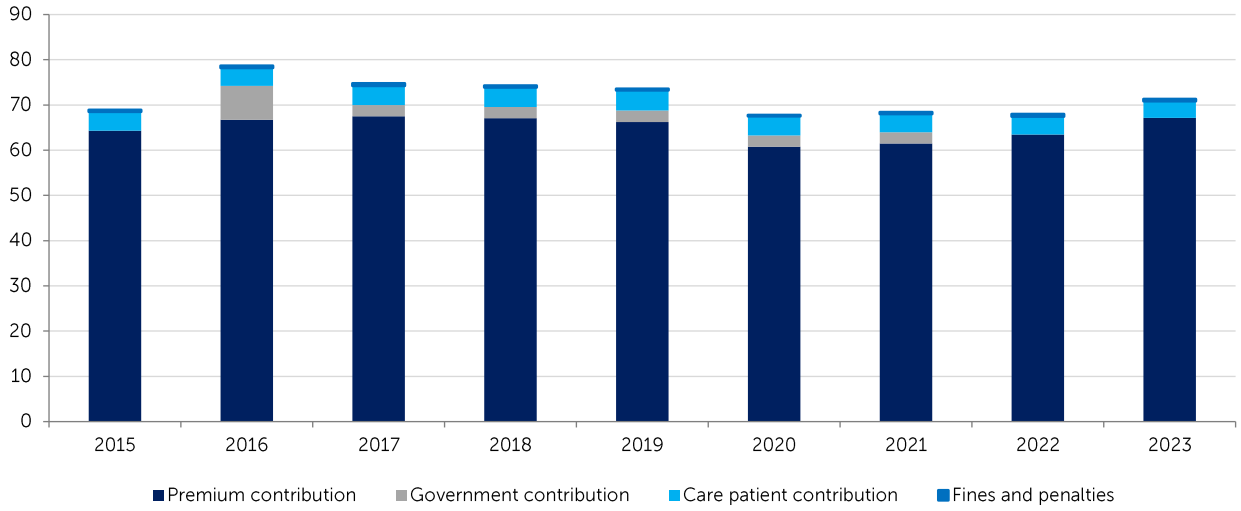
Source: SVB annual report 2017, 2021, and 2023

The AVBZ was introduced on January 1, 1997, as a national insurance scheme designed to cover risks that are otherwise uninsurable and are not addressed by existing regulations. The AVBZ fund provides coverage to those who, because of an illness, complications, or old age, are no longer able to function independently in society. All residents of Curaçao are eligible to receive care under the AVBZ.

Like the BVZ, the AVBZ is financed through multiple channels, i.e., (1) an income-based premium, (2) a (possible) contribution by recipients of care[8], (3) contribution by the government, and (4) other income from fines and penalties (see Graph 2).

[7] 2015 is used as the base year for the analysis because than is when the civil servants also joint the BVZ fund.
[8] The national decree allows for care through ABVZ to be contingent upon a financial contribution by the recipient of care, although this may not always be the case.

Graph 2 - Composition of AVBZ funding in millions NAf., 2015-2023

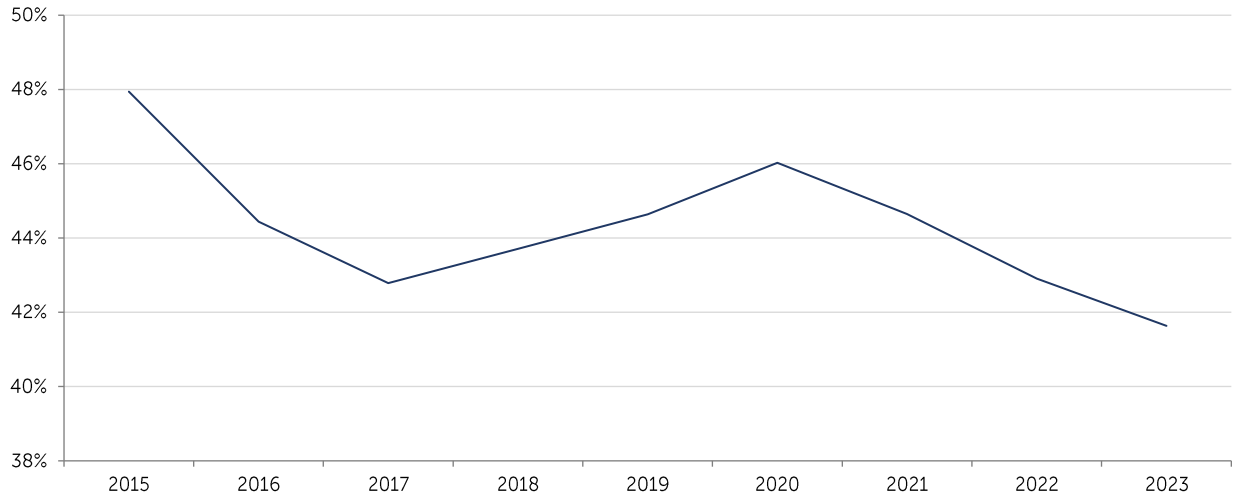


Source: SVB annual report 2017, 2021, 2023

The main funding source for the AVBZ is income-based premium. Between 2015 and 2023, total revenues from income-based premiums averaged NAf.65.0 million per year, accounting for 89.9% of the total AVBZ funding. The second largest funding source is the contribution from care patients, which averaged NAf.4.1 million per year over the same period, representing 5.7% of total AVBZ funding. The government began contributing to the AVBZ fund in 2016 with an initial contribution of NAf.7.5 million. This amount was subsequently reduced to NAf.2.5 million per year.[9] On average, the contribution of the government represented 4.2% of total AVBZ funding between 2016 and 2023.

Between 2015 and 2023, the contribution of the government accounted for on average 44.8% of the total funds available to both the BVZ and AVBZ combined. As shown in Graph 3, the share of government funding in overall healthcare funding dropped sharply between 2015 and 2017 but increased gradually through 2020. Starting 2021, the share of the government contribution dropped again, reaching 41.6% in 2023.

Graph 3 - Share of government's contribution to healthcare funding (BVZ and AVBZ funds), 2015-2023



Source: SVB annual reports 2017, 2021, and 2023 and CBCS

[9] 2017-2021.

In determining its contribution to these funds, the government considers two main factors: fiscal capacity and the financial development of each fund. Other factors such as the ageing of the population, the retirement age, and the growth in the number of insured individuals, are also taken into consideration.

Besides the BVZ and the AVBZ funds, the SVB manages five other social insurance funds, i.e., the Health Insurance Fund (*Ziektefonds, ZV*), the Accident Fund (*Ongevallenfonds, OV*), the General Widows and Orphans Fund (*Algemene Weduwen en Wezenfonds, AWW*), the Old Age Fund (*Algemene Ouderdoms Verzekering, AOV*), and the Cessantia fund.[10]

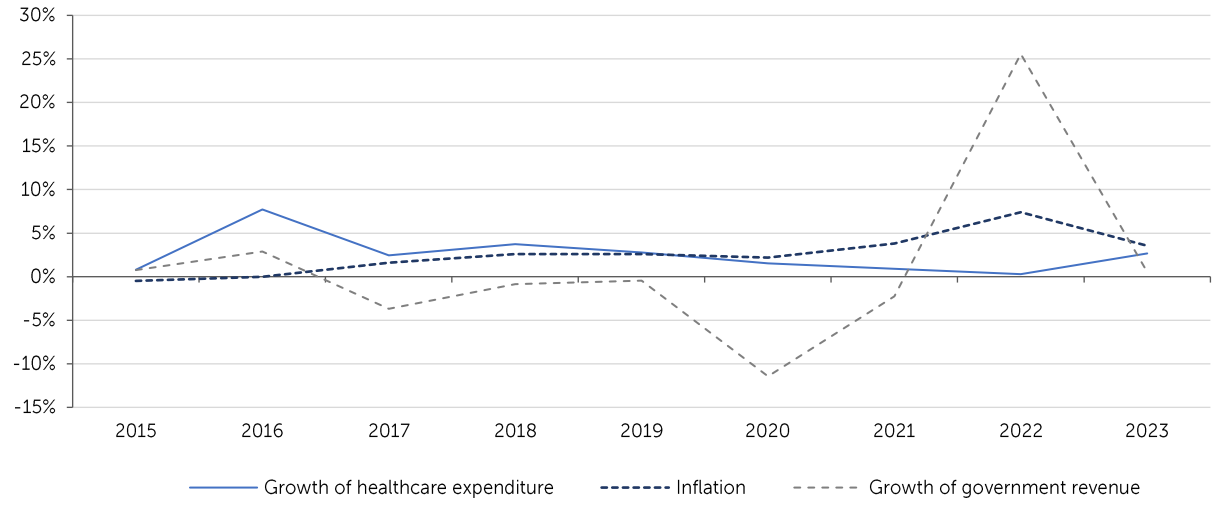
If an individual fund generates more revenue than is required to cover its outflows and the legally mandated reserves, the surplus is deposited into a general fund managed separately by the SVB, known as the *Schommelfonds Sociale Verzekeringen*, i.e., an equalization fund. The resources in this fund are used to supplement the individual funds when their revenues are insufficient to cover the allowances, pension payments, costs, and required reserves. In addition, if the equalization fund falls below the legal minimum threshold, the government is obligated to cover the shortfall.

3.2. ASSESSING SUSTAINABILITY

This section assesses the sustainability of Curaçaos' healthcare system from multiple perspectives. First, a comparison is made between healthcare expenditures, inflation, and government revenues. Second, the healthcare expenditures are benchmarked against those of other countries and country groups. Finally, the healthcare system is assessed from demographic, economic, and fiscal perspectives.

Consistent with the findings of Lorenzoni et al. (2019), the cost of healthcare in Curaçao has been increasing at a faster pace than both inflation and government revenues. Graph 4 shows the trends in healthcare expenditures, inflation, and government revenues[11] for the period 2015 - 2023. For this study, healthcare expenditures are defined as the healthcare expenses incurred by the SVB through the BVZ and the AVBZ schemes. This simplification is necessary because of a lack of comprehensive data on private healthcare spending. Therefore, the figures on national healthcare expenditures presented in this study are slightly lower than the actual total.

Graph 4 – Growth of healthcare expenditures vis-à-vis inflation and government revenues (%), 2015-2023



Source: CBS Curaçao[12], SVB annual reports 2017, 2021, and 2023, and Government of Curaçao

[10] The Cessantia is an insurance scheme for employees that covers the costs of unemployment through no fault of their own. It provides a one-time payment, the amount of which depends on the duration of employment and the last earned wage (Sociale Verzekeringsbank (SVB) 2019).
[11] Government revenues consist of tax revenues, non-tax revenues and grants.
[12] Central Bureau of Statistics Curaçao (CBS).

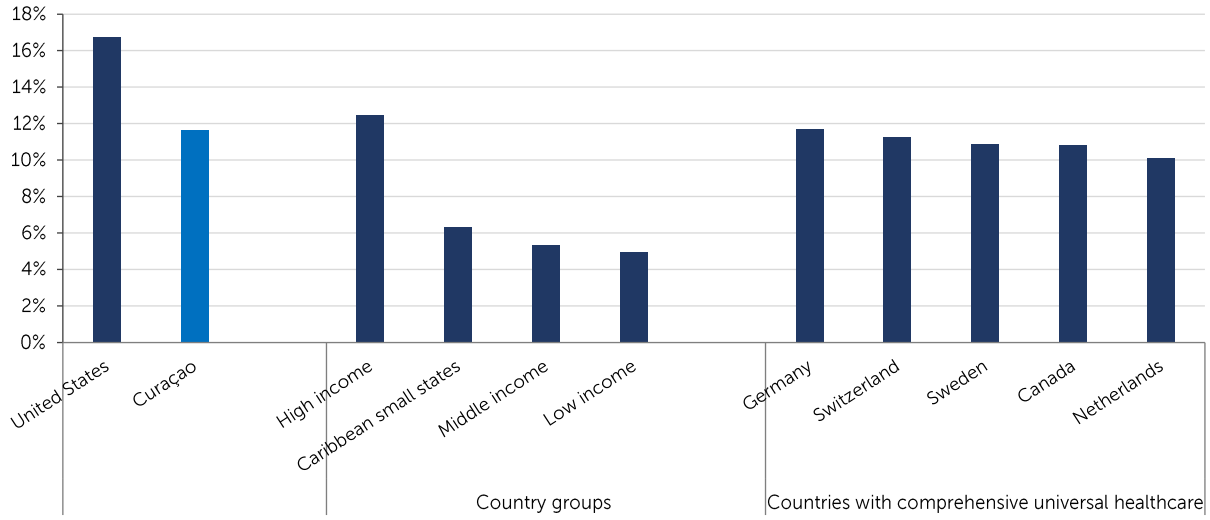
As depicted in Graph 4, healthcare expenditure grew at a faster pace, averaging 3.5% per year, than inflation, which averaged 1.3% per year, up to 2019. A reversal of this trend can be observed beginning in 2020.[13] It is important to note that this break in the general trend corresponds to the extraordinary circumstances caused by the COVID-19 pandemic.

Meanwhile, over the period 2015-2021, government revenues contracted at an average rate of -2.1%[14] per year. However, starting in 2020, the government began recording positive revenue growth, averaging 3.1% annually between 2020 and 2023. While this recent return to positive growth is encouraging, it follows a prolonged period of decline and may still be subject to volatility.

Benchmark

Graph 5 provides a comparison of Curaçao's healthcare expenditures as a percentage of GDP with selected country groups and individual countries. The comparison is based on data for 2019, the year prior to the significant impact of COVID-19 on healthcare expenditures in most countries.

Graph 5 - Healthcare expenditures in 2019 (% of GDP)



Source: World Bank - World Development Indicator, SVB and CBCS

In 2019, healthcare expenditures in Curaçao represented 11.6% of GDP.[15] The comparison with selected country groups reveals that Curaçao spends significantly more on healthcare than the average of Caribbean small states (6.3%)[16], middle-income countries (5.3%), and low-income countries (5.0%). High-income countries spend on average only marginally more (12.5%) than Curaçao.

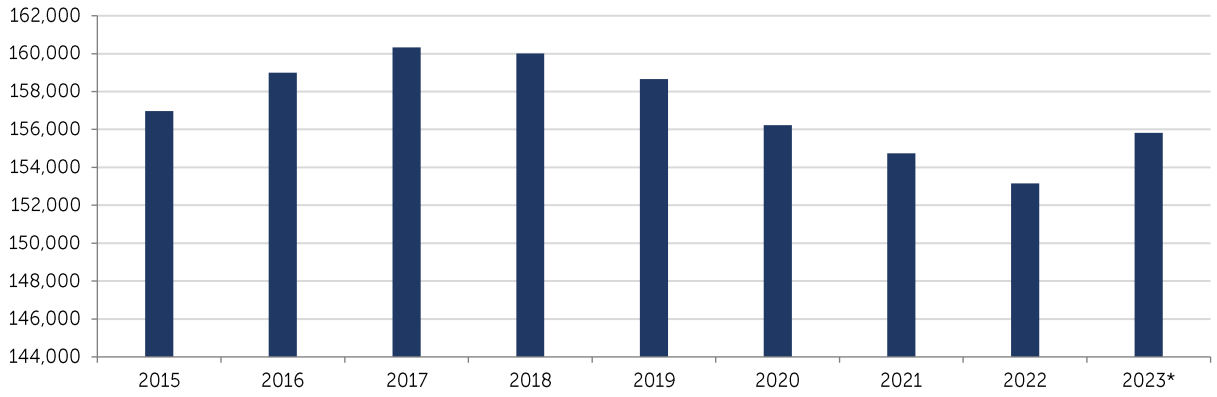
The individual countries included in the benchmark were selected based on their comparable healthcare access and coverage, specifically the presence of some form of universal healthcare coverage. However, all of these countries belong to the high-income group. Curaçao spends more on healthcare than all of them, except Germany and the United States. Curaçao's healthcare expenditure as a share of GDP is similar to Germany's at 11.7%. The only high-income country in the benchmark that significantly outspends Curaçao is the United States, where healthcare expenditure represents 16.8% of GDP. It should be noted, however, that the United States does not have a system of universal healthcare coverage.

[13] Over the 2015-2023 period, both healthcare expenditures and inflation grew on average 2.5% and 2.6% percent per year, respectively.
[14] Excluding 2020 and 2021 still resulted in negative growth of government revenues on average (-0.3% per year).
[15] Healthcare expenditure as a share of GDP is calculated solely based on SVB-incurred costs. As such, the actual figure is likely somewhat higher; however, due to data limitations, only SVB-related spending is included in this calculation.
[16] Caribbean small states consist of Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Surinam, and Trinidad and Tobago.

Demographic assessment

To assess the sustainability of the healthcare system from a demographic perspective, it is important to first analyze key demographic developments. Data from the Central Burau of Statistics Curaçao (CBS) show that Curaçao's population grew by an average of just 0.1% per year between 2015 and 2023. Extraordinary shocks — including the closure of the refinery and the COVID-19 pandemic — weighed heavily on growth, keeping population growth largely stagnant during much of the period. However, the 2023 census recorded a 1.7% rise in the population, marking the strongest single-year increase observed during the entire reference period (see Graph 6).[17]

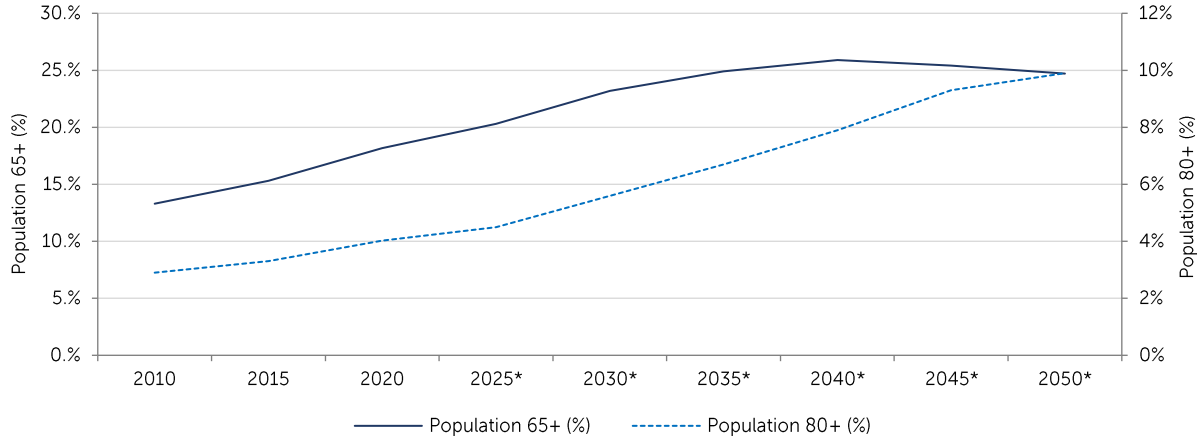
Graph 6 - Development in Curaçao's population, 2015-2023



Source: CBS Curaçao, 2024 and CBS Curaçao Census, n.d.
*Census 2023

Another key demographic trend relevant to the assessment of the sustainability of the healthcare system is the ageing of the population. In Curaçao, the share of the population aged 65 and older rose from 15.3% in 2015 to 20.7% in 2023, while the proportion of those aged 80 and above increased from 3.3% to 4.5% during the same period[18] (see Graph 7). Meanwhile, life expectancy increased from 78.2 years in 2015 to 79.7 years in 2023 (Central Bureau of Statistics Curaçao (CBS) 2024). Current data reveal a clear progression in the aging of the population, indicating a clear acceleration in population ageing.

Graph 7 - Demographic developments in Curaçao, 2010-2050



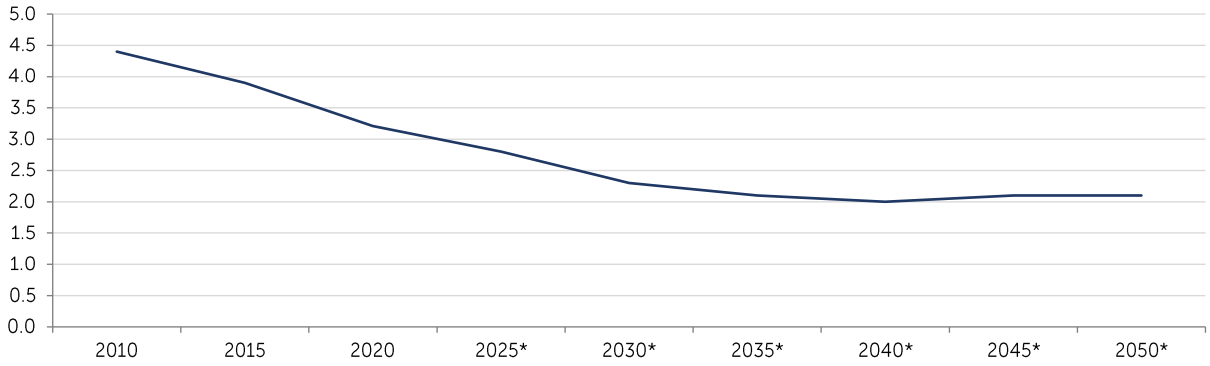
Source: CBS Curaçao, 2024 and Population projections 2015-2025, CBS Curaçao
*Projections CBS

[17] Persons without a valid residency status are not eligible for coverage under the BVZ or AVBZ. Nevertheless, in practice, they do receive medical care through the hospital, which, based on its duty of care, is obligated to provide necessary medical treatment.
[18] CBS population projection, standard migration variant.

The ageing of the population is expected to lead to higher healthcare expenditures. Research by Colombier and Bräendle (2018) shows that long-term care beginning at the age of 65 have a more significant impact on healthcare costs than earlier stages of life-long care consumption. Hence, the ageing of the population places increasing pressure on the sustainability of Curaçao's healthcare system.

More than half of healthcare revenues are derived from income-based premiums, with their share steadily rising from 54.5% in 2019 to 57.6% in 2023. This growing dependency on contributions from the working age population makes the old-age support ratio a critical metric in assessing the long-term sustainability of the current healthcare funding model. This ratio represents the number of people aged 20 to 64 who can provide economic support measured against those aged 65 and older, who are more likely dependent on such support (OECD 2011). Due to the ageing of the population, the old-age support ratio in Curaçao dropped from 3.9 in 2015 to 2.8 in 2023 (see Graph 8). The decrease in the support rate suggests that the financial burden on the working age population is increasing, as their contribution to healthcare funding is higher than those of retirees.

Graph 8 - Development in old-age support ratio in Curaçao, 2010-2050



Source: CBS Curaçao, 2024 and Population projections 2015-2025, CBS Curaçao
*Projections CBS

In addition to the burden posed by demographic changes, the high prevalence of chronic diseases in Curaçao, which are among the most expensive medical conditions, also contributes significantly to elevated healthcare expenditures. Chronic conditions can result in hospitalization, long-term impairment, and a lower quality of life. These conditions include cancer, diabetes, hypertension, stroke, heart disease, respiratory conditions, arthritis, obesity, and dental diseases. The costs associated with the treatment of chronic illnesses place substantial pressure on the healthcare system due to long-term dependence on medical assistance and care. Today, chronic illnesses are among the main causes of death and disability, with far-reaching effects on employment patterns, including absenteeism, as well as overall healthcare spending (Raghupathi and Raghupathi, 2018).

Table 1 presents the prevalence of chronic diseases in Curaçao, the Netherlands, and the United States. The data shows that prevalence rates in Curaçao are lower than in the other two countries. Hence, it can be concluded that chronic illnesses currently pose a comparatively smaller threat to healthcare sustainability in Curaçao. Nevertheless, due to their long-term implications, health and economic implications, chronic conditions still exert a considerable burden on healthcare expenditures and must be effectively managed and monitored.

Table 1 - Prevalence of chronic diseases

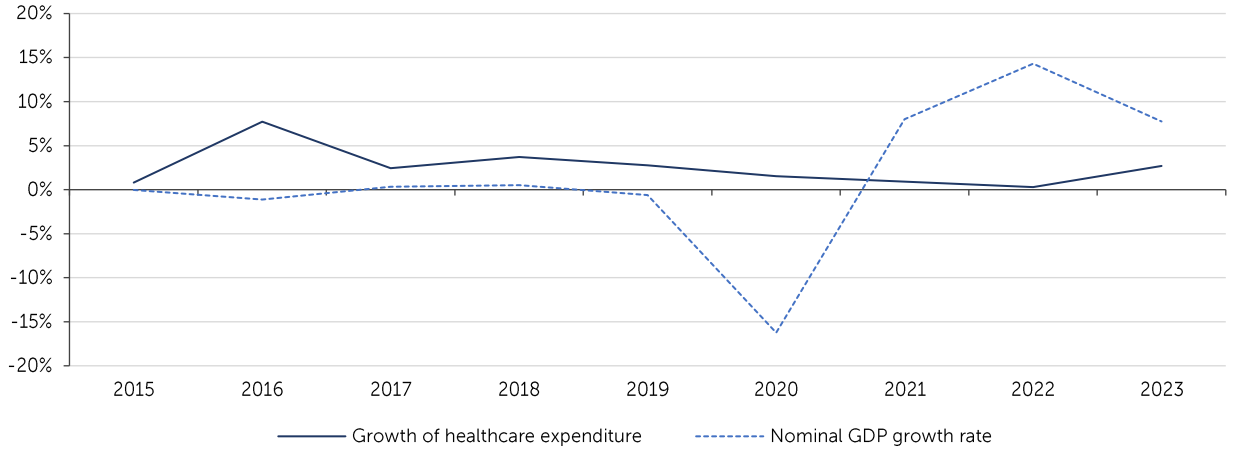
	Morbidity[19]	Multimorbidity[20]
Curaçao (2017) [1]	37.0%	12.6%
The Netherlands (2018) [2]	57.3%	30.8%
United States (2018) [3]	51.8%	27.2%

Source: [1] (Volksgezondheid Instituut Curaçao (VIC), 2017), [2] (NIVEL and RIVM, 2020), [3] (Boersma, Black, and Ward, 2020)

Economic assessment

To assess the sustainability of the healthcare system from an economic perspective, the pace of growth in healthcare expenditures is compared with nominal GDP growth in Curaçao (see Graph 9).

Graph 9 - Economic assessment of healthcare sustainability (%), 2015-2023



Source: SVB annual reports 2017, 2021, and 2023 and CBCS

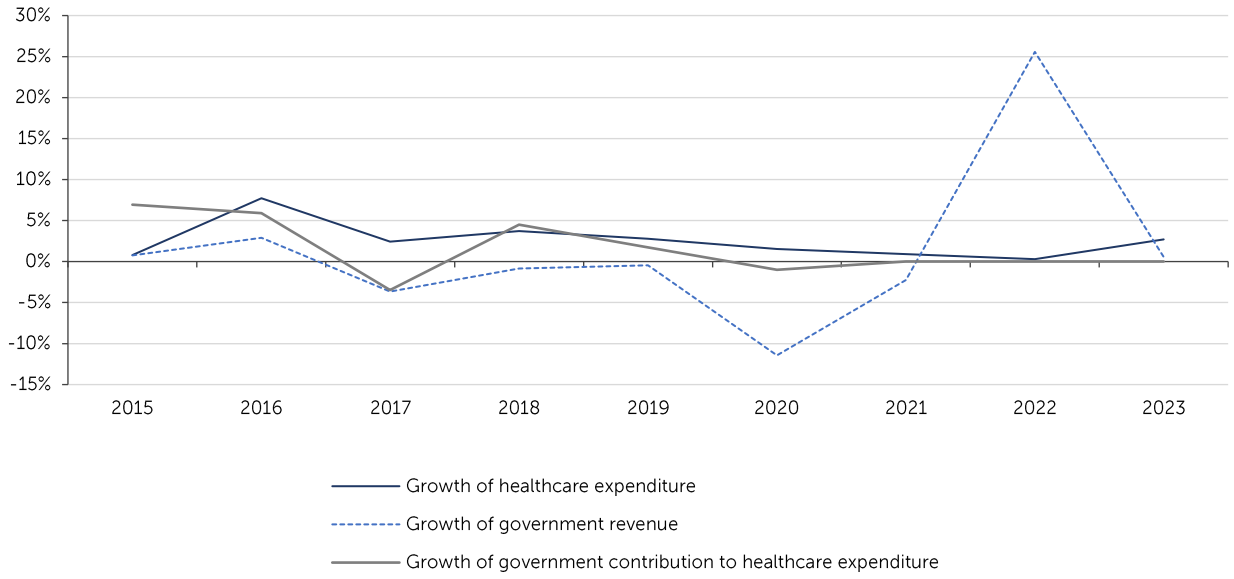
Between 2015 and 2021, healthcare expenditures in Curaçao grew at an average of 2.5% per year, while nominal GDP increased by only 1.4% per year on average. This indicates that spending on healthcare goods and services has been outpacing economic growth, suggesting that other areas of the economy are possibly being crowded out as healthcare expenditures are taking up growing share of GDP. This development is even more concerning during the pre-COVID period (2015-2019), when healthcare expenditures grew by an average of 3.5% per year, while GDP contracted by 0.3% annually.

[19] Morbidity refers to the presence of a disease or its symptoms, as well as the overall burden of disease within a population. It can also denote medical complications or adverse effects resulting from a treatment (National Cancer Institute n.d.).
[20] Multimorbidity refers to a situation in which an individual lives with more than one health condition at the same time (Uijen and Van de Lisdon, 2008).

Fiscal assessment

To assess the fiscal sustainability of the healthcare system of Curaçao, the growth in healthcare expenditures is compared to the growth in government revenues and the government's contribution to healthcare expenditures (see Graph 10).

Graph 10 - Fiscal assessment of healthcare sustainability (%), 2015-2023



Source: CBCS, SVB annual reports 2017, 2021, and 2023, and Government of Curaçao

The fiscal assessment reveals that although healthcare expenditures and government's contribution to these expenditures generally moved in the same direction between 2015 and 2023, healthcare expenditures grew on average at a faster pace (2.5%) per year than the government's contribution (1.6%). In addition, total government revenues grew even more modestly, at an average annual rate of 1.2%. This indicates that the revenue base from which the government allocates its healthcare contributions is not keeping pace with the rising costs of healthcare. This asymmetry between the growth of healthcare expenditures and the government's contribution raises serious concerns about the long-term sustainability of the current system.

If the COVID-19 years 2020 and 2021 are excluded from the analysis[21], the situation appears even more concerning. Government revenues decreased by an average of 0.3% per year, while healthcare expenditures grew by 3.5% per year and the government's contribution to healthcare expenditures rose by 3.1% annually. These trends indicate that the government's contribution is consuming a growing share of government revenues, while still failing to match the pace of healthcare expenditures growth.

As argued by Mossialos et al. (2008), public resources must grow at a sustainable pace to fulfill public healthcare obligations. In Curaçao's case, both government revenues and the government's contribution to healthcare expenditures are not growing quickly enough to meet rising healthcare costs. If this imbalance is not addressed, it will threaten economic and fiscal sustainability. Potential consequences would include the crowding out of other public services, increased taxes and premiums, out-of-pocked contributions for services currently covered, and a decline in the standard of care (Falk et al., 2011).

[21] Period analyzed is from 2015-2023.

4. METHODOLOGY

To assess the sustainability concerns outlined in Section 3.2, this study employs forecasting techniques. Forecasting involves predicting future developments based on systematically acquired knowledge or, in some cases, informed intuition (Soyiri and Reidpath, 2013). By generating accurate projections of medical expenditures, policymakers can anticipate emerging challenges and allocate resources more effectively, supporting both financial sustainability and the delivery of quality care (Erker 2024). Rather than relying on estimation techniques, studies on fiscal sustainability in the health sector commonly employ forecasting and projection approaches to capture future trends. This methodology has been applied in studies such as Colombier and Brändle (2018), Lorenzoni et al. (2019), and Brändle and Colombier (2022) to assess and illustrate long-term sustainability risks in public healthcare financing.

Forecasting models for health expenditure vary according to the level of aggregation they employ—ranging from individual-level projections to those concerning broader population groups or the entire community (Hollenbeck, 1995). In addition, models are commonly classified based on their chosen unit of analysis, which fundamentally shapes the degree of expenditure disaggregation they can achieve and determines the scope of data and simulation required (Marino et al., 2017; Astolfi et al, 2012; Colombier and Brändle, 2018). Based on both the analytical unit and the granularity of the expenditure categories considered, forecasting frameworks can be grouped into three broad categories: microsimulation models, macro-level models, and component-based models.

Firstly, microsimulation models simulate healthcare expenditure by tracing the health trajectories of individuals over time, allowing for the incorporation of detailed life events and behavioral responses. While highly granular and capable of modeling complex policy interactions and epidemiological transitions, their use is constrained by significant data requirements (Astolfi et al., 2012). A major limitation of microsimulation models is their narrow focus on individual-level dynamics, which makes it difficult to incorporate broader system-level factors. These models often struggle to account for structural characteristics of the healthcare system and policy variables that influence service provision, such as changes in diagnostic or treatment outcomes. They also tend to exclude significant components of expenditure, including administrative costs and investments in research. Crucially, microsimulation models are not designed to reflect the wider economic context in which these “virtual” individuals operate, limiting their ability to capture interactions between healthcare and the broader macroeconomy (Marino et al., 2017).

Macro-level models, at the opposite end of the spectrum, operate at the level of aggregate national expenditure. They are less data-intensive and better suited for short-term forecasting, particularly when structural trends remain stable. However, their simplified structure limits their usefulness in anticipating turning points or capturing the distributional effects of specific policy interventions. Computable General Equilibrium (CGE) models extend the macro framework by integrating health expenditure within a broader economic context. However, they rely heavily on equilibrium assumptions and are often constrained by computational complexity and restrictive behavioral assumptions (Astolfi et al, 2012). Macro-level models also face limitations in identifying explanatory variables that capture turning points in healthcare expenditure, i.e., those shifts from expansion to contraction that define critical moments in spending trends. Regression-based approaches are only as effective as the foresight embedded in their variables; without predictors capable of anticipating structural changes, their projections risk overlooking key transitions. Dynamic Computable General Equilibrium (CGE) models, while offering a more integrated economic perspective, demand significantly greater computational and data resources. Their reliance on equilibrium conditions and heavily simplified assumptions about the behavior of individuals, firms, and governments often leads to a disconnect from real-world dynamics and limits their empirical reliability (Marino et al., 2017).

Lastly, component-based models, which occupy the middle ground, disaggregate the population and healthcare expenditure into defined groups or "cells" based on characteristics such as age, gender, health status, and proximity to death. A prominent subclass within this approach is the cohort-based model, which stratifies the population into age cohorts and projects healthcare expenditure by multiplying the average cost per cohort by the projected population in each group. This method allows for projections that are both

demographically grounded and analytically tractable (Astolfi et al., 2012). However, component-based models present several notable limitations. They struggle to capture the distributional impacts of policy interventions aimed at curbing healthcare expenditure growth, offering limited insight into how such policies affect different segments of the population. Their capacity to simulate "what if" scenarios is also constrained, reducing their usefulness for assessing the implications of new or alternative policy measures. Furthermore, these models rely heavily on fixed assumptions about the future burden of disease and the overall health status of the population, which limits their flexibility. Lastly, they face challenges in estimating how population-level behavioral changes, such as increased adoption of healthy lifestyles, translate into long-term shifts in healthcare spending (Marino et al., 2017). Nevertheless, the strength of the cohort-based approach lies in its ability to isolate and analyze the primary demographic drivers of healthcare expenditure, particularly ageing and proximity to death, while maintaining enough flexibility to incorporate additional variables such as morbidity trends, behavioral risk factors, and technological change. By offering a structured yet adaptable framework, the cohort-based model enables the construction of policy-relevant scenarios without overburdening the model with unnecessary complexity (Astolfi et al., 2012).

In sum, the cohort-based methodology offers a robust middle path between the data-intensive granularity of microsimulation models and the broad generalizations of macro-level models. Its pragmatic balance between depth and model simplicity makes it particularly well-suited for long-term forecasting of healthcare expenditure in systems undergoing demographic transition.

Despite its limitations, the cohort-based model is adopted as the methodological foundation of this study, given data constraints that preclude the use of more complex analytical frameworks. The choice of this model reflects a compromise between analytical complexity and data feasibility, achieved by focusing on age cohorts and incorporating population projections. This approach aligns with internationally accepted practices, as used by institutions such as the Swiss Federal Statistical Office, the OECD, and the European Commission, which also employ cohort-based models for expenditure projections.

Following the approach used in Brändle and Colombier (2022), this study employs a cohort-based model in which healthcare expenditures, segmented by age cohorts, is projected in line with demographic developments over the period 2030 to 2050. The model specification adopted here is a simplified adaptation of the framework presented in the study by the Swiss Federal Statistical Office (Brändle and Colombier, 2022). The annotation and structure follow a streamlined version of the original model, tailored to reflect the specific scope and data constraints of this analysis.

The model calculates total healthcare expenditures for each age cohort and insured individual. These expenditures are based on the average medical cost per cohort and insured person, multiplied by the population size within that cohort for the projected year. In addition, a second model is constructed that relies on the interaction between demographic composition, average medical costs, and projected inflation. By doing so, this study provides a forecast of healthcare expenditures for the period 2030-2050, which can be used to assess the long-term sustainability of the healthcare system.

The following equation formally defines the projection methodology used to estimate healthcare expenditure for age cohort *j* in year *t*, forming the basis of all subsequent projections.

$$E_{(t,j)} = \mu\, Med_{(j)} \times Pop_{(t,p)} \quad (1)$$

$$E_{(t,j)} = \mu\, Med_{(j)} \times\ Mult_{\ (\pi,t)}\ \times Pop_{(t,p)} \quad (2)$$

Whereby:

- t=1….,27 (2050) and 0:=base year (2023).
- $E_{(t,j)}$:= Nominal healthcare expenditure per age cohort and insured *j* in year *t*, stratified into five-year age groups (from 0 to 85+), and disaggregated by sex (i.e., men and women).
- $\mu\, Med_{(t,j)}$ = The average medical cost per age cohort and insured *j*.

- $Pop_{(t,p)}$:= Number of men or women of age cohort *p* in year *t* according to the projected demographic breakdown.
- $Mult_{(\pi,t)}$:= Inflation π multiplier for a given forecast year *t*.

The two equations presented above provide two key projection outcomes ($E_{(t,j)}$). Equation (1) represents a constant-expenditure projection variant, in which average medical costs are held constant (μ $Med_{(t,j)}$) over time. It calculates expenditure by multiplying the average per capita medical cost for each cohort by the projected population of that cohort in year *t* ($Pop_{(t,p)}$). This approach isolates the effect of demographic change on expenditure, without the influence of inflation. Equation (2) adjusts projected expenditure to account for price growth by applying an inflation multiplier ($Mult_{(\pi,t)}$) specific to each forecast year *t*. This adjustment captures the cumulative effect of healthcare cost inflation over time.

An essential element of the applied approach is the use of five-year age groups (i.e., cohorts), analyzed at five-year intervals. This choice is driven by the availability of data published by the Statistics Bureau of Curaçao. As Preston, Heuveline, and Guillot (2001) note, the concept of the cohort is almost as important to demography as the concept of the population itself. A cohort consists of all individuals or units that experience a specific demographic event, such as birth, marriage, or migration, within a defined time interval and geographic context. Although commonly applied to birth cohorts, cohorts can be defined for any demographic event and are typically named to the event and time it occurs.

A defining feature of cohorts is their suitability for longitudinal analysis, in which rates and probabilities are calculated by tracking members over time. Unlike general population measures, cohorts allow for the calculation of probabilities, providing insights into the likelihood of events (e.g., death, childbirth) rather than just their observed rates. This approach enables demographers to link aggregate population patterns to individual life courses.

5. Data

The expenditure projections are based on two key inputs: healthcare expenditure patterns by age cohort, and long-term demographic developments. Age-specific healthcare expenditure data is provided by the Social Insurance Bank of Curaçao (SVB), while demographic forecasts are derived from the Central Bureau of Statistics of Curaçao's 2015 publication, Population Projections 2015-2050.

Healthcare expenditure data

The healthcare expenditure data is compiled from the multiple reimbursement models used by the SVB to finance healthcare, including fee-for-service arrangements, capitation systems [22], and lump-sum budgeting. These varied financing mechanisms result in differing levels of data granularity.

SVB applies the following methodology to derive healthcare expenditures under the BVZ scheme:

Approximately 80% of total healthcare expenditures can be disaggregated by age and sex. This allows for a detailed and accurate breakdown by age group and sex for most of the scheme. The remaining 20% is extrapolated by analyzing the portion of healthcare spending for which detailed data is available to discern spending patterns by age and sex. From this analysis, an allocation key is constructed, representing the distribution of costs across demographic groups. This key is then applied to reconcile the remaining 20%, which represents the difference between the sum of the detailed data and the total reported expenditure in the SVB's annual financial statements. Using this method, approximately 80% of BVZ expenditure is supported by detailed data.

Unlike the BVZ scheme, the AVBZ scheme is almost entirely financed through lump-sum budgeting allocated to institutions. As a result, there is no direct link between individual healthcare consumption and institutional budgets under the AVBZ scheme.

In addition, SVB has underscored that analyzing BVZ and AVBZ expenditures separately may lead to distortions, as individuals receiving care under the AVBZ scheme are typically also eligible under the BVZ scheme. Consequently, SVB has advised caution when analyzing aggregated BZV and AVBZ expenditures, as combining both without adjustment may result in double-counting. This occurs because healthcare costs for AVBZ insured individuals - such as medications, certain paramedical services, and specialist visits - are also funded under the BVZ scheme.

Given the granularity constraints of the AVBZ data and the risk of double counting, this study uses only BVZ data for the projection of healthcare expenditures, as it aligns with the granularity requirements. In addition, BVZ expenditures account for most of the SVB's healthcare costs, averaging 86.8% of total expenditures over the 2015-2023 period.

The data provided by SVB has been stratified into five-year age cohorts, except for the 85+ age group. The data covers the period 2013-2023. To compute μ $Med_{(t,j)}$, i.e., the average healthcare expenditures per age cohort and insured person, the stratified expenditure profiles were averaged in two ways. First, an average over the full reference period, i.e., 2015-2023, and second, an average excluding the COVID-19 years. Table 2 provides an overview of the computed averages, while Appendix 1 presents the complete stratified data for 2013-2023.

[22] Capitation is a payment model in which healthcare providers or organizations receive a fixed, upfront sum to cover the expected costs of delivering specified health services to a patient or group of patients over a defined period (U.S. Centers for Medicare and Medicaid Services 2023).

Table 2 - The average annual healthcare expenditure per age cohort and insured

Age cohort	Men Average 2015-2023	Men Average 2016-2019, 2023	Women average 2015-2023	Women Average 2016-2019, 2023
0-4	1,307.73	1,230.43	1,036.67	972.98
5-9	786.47	811.54	468.70	459.85
10-14	947.55	955.08	855.40	851.24
15-19	919.32	951.35	1,369.86	1,366.56
20-24	1,009.22	1,058.80	2,002.85	2,049.12
25-29	1,209.89	1,205.25	2,481.07	2,427.47
30-34	1,394.35	1,456.58	2,820.32	2,840.64
35-39	1,670.53	1,725.01	2,896.21	2,864.29
40-44	2,000.90	2,010.91	3,016.42	3,025.51
45-49	2,503.27	2,530.49	3,553.93	3,561.39
50-54	3,626.46	3,637.99	5,894.25	5,955.25
55-59	4,440.37	4,563.95	4,751.48	4,805.10
60-64	5,535.33	5,693.28	5,589.73	5,501.63
65-69	7,001.04	7,057.82	6,709.74	6,690.09
70-74	7,992.82	8,118.44	7,825.50	7,957.82
75-79	9,069.13	8,929.10	8,421.01	8,228.49
80-84	9,563.75	9,918.42	8,558.53	8,491.00
85+	8,754.44	8,714.26	8,098.96	8,110.19

Source: Expenditure by age category and gender BVZ, SVB 2024 and authors calculations.

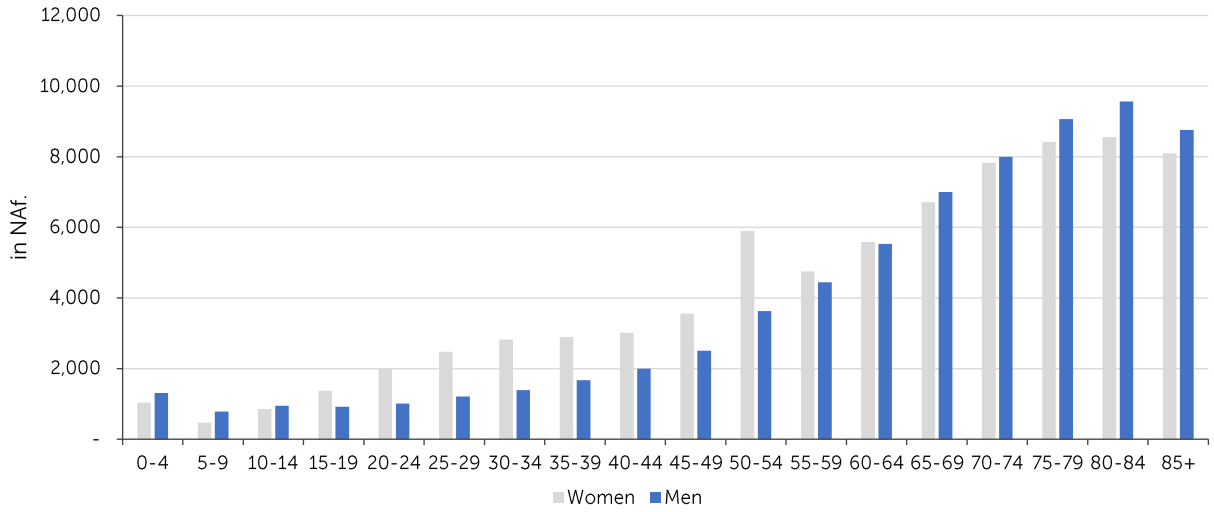
An analysis of the expenditure profiles by age cohort and insured individual reveals that, on average, girls have lower expenditure profiles than boys between the ages of 0 and 14 years (see Graph 11).[23] However, this trend reverses from adolescence through mid-adulthood. Between the ages of 15 and 54, women's healthcare spending significantly outpaces that of men, peaking between ages 50-54 at an average of NAf.5,894.25 annually for women, compared to NAf.3,626.46 for men. This gap likely reflects the impact of reproductive health services, maternity care, and gender-specific chronic conditions that emerge for women during these years.

From age 55 onward, the pattern begins to shift, with men's average healthcare expenditures gradually surpassing those of women. By ages 65-69, men's healthcare expenditure average NAf.7,001.04 annually, slightly more than women's average of NAf.6,709.74, and this trend continues into later life. At ages 80-84, men's expenditures reach NAf.9,563.75 on average per year, compared to NAf.8,558.53 for women. However, costs decline slightly for both sexes in the 85+ group, possibly due to reduced medical interventions, higher mortality, or a transition to less intensive care. Overall, the data unsurprisingly reveal

[23] The period considered is 2013-2023.

that women bear higher healthcare costs during their reproductive and working years, while men's expenses increase more significantly in older age.

Graph 11 - Average healthcare expenditure per age cohort and insurer (NAf.), 2013-2023



Source: Expenditure by age category and gender BVZ, SVB 2024 and author's calculations.

Demographic development data

For the analysis on demographic developments, data of the (CBS) is used, in line with a similar study by Brändle and Colombier (2022).[24] The data serves to capture population trends. The population projection analysis by the CBS presents various demographic development scenarios for Curaçao over a period of 35 years - from 2015 to 2025. These scenarios include expected population growth and changes in age composition of the population based on differing assumptions on fertility, mortality, and migration. The analysis includes five scenarios, using a combination of two fertility assumptions, one mortality assumption, and four migration assumptions.

Migration is identified as the component with the greatest impact on population development. Nevertheless, all projection scenarios show that population aging is inevitable and will significantly alter Curaçao's demographic structure. High net migration may delay the aging process, while emigration tends to accelerate it. As life expectancy rises toward 2050, the median age is projected to increase to between 46 and 52 years. By that year, individuals aged 65 or older are projected to comprise between 24% to 30% of the total population.

At the same time, falling fertility rates will reduce the proportion of youth in Curaçao's population. Their share is projected to drop from 19% in 2015 to between 14% and 17% by 2050. As a result, the old-age support ratio will deteriorate from four working-aged individuals per elderly person in 2015 to just two by 2050. Among all the scenarios, an emigration wave would cause the sharpest drop in the youth share, intensifying the aging of the population.

Under the standard migration scenario, population growth is largely driven by migration, contributing roughly 15% to the increase. Rising life expectancy contributes nearly 4%, and baseline age structure adds 1%. Meanwhile, declining fertility reduces the population by 6%. The net result is a 13% increase in the total population by 2050 compared to 2015. In addition to the standard migration scenario, CBS provides four alternative population projection variants. The first assumes constant fertility, where fertility rates remain constant at 2015 to 2020 levels, while maintaining standard mortality and migration assumptions. The

[24] For a more detailed view on the methodology used to project demographic development please reference, Population projection 2015-2050, Central Bureau of Statistics (2015).

remaining three variants explore different migration assumptions: high immigration, an emigration wave, and zero migration. Each of these uses medium fertility and standard mortality assumptions. These variants are designed to isolate the effects of migration changes while keeping fertility and mortality assumptions consistent. Appendix 2 presents an overview of the key assumptions outlined above, along with a numerical summary of projected population trends over the forecast horizon.

Given the uncertainties associated with population projections, this research adopts the standard migration population projection scenario as the basis for the analysis. In this study, the migration scenario only considers legal migration flows, as undocumented immigrants are not covered by the BVZ. In urgent and emergency situations, costs incurred by illegal immigrants at the hospital are covered by the government, as the hospital has a legal duty of care to provide necessary treatment.

The standard migration variant is used due to its neutral baseline that balances the different assumptions components of the population projection, including fertility, mortality, and migration. By anchoring migration assumptions to historical averages without introducing extreme shifts, it provides a stable reference scenario for long-term demographic analysis. This scenario applies medium fertility[25], normal mortality[26], and standard migration[27] assumptions to forecast population trends (United Nations 2014).

Under this scenario, Curaçao's population is projected to peak at approximately 183,000 in 2040 before declining to around 178,000 by 2050. The standard migration variant projects a future where Curaçao's population size in 2050 falls between the high-immigration[28] and emigration-wave scenarios[29].

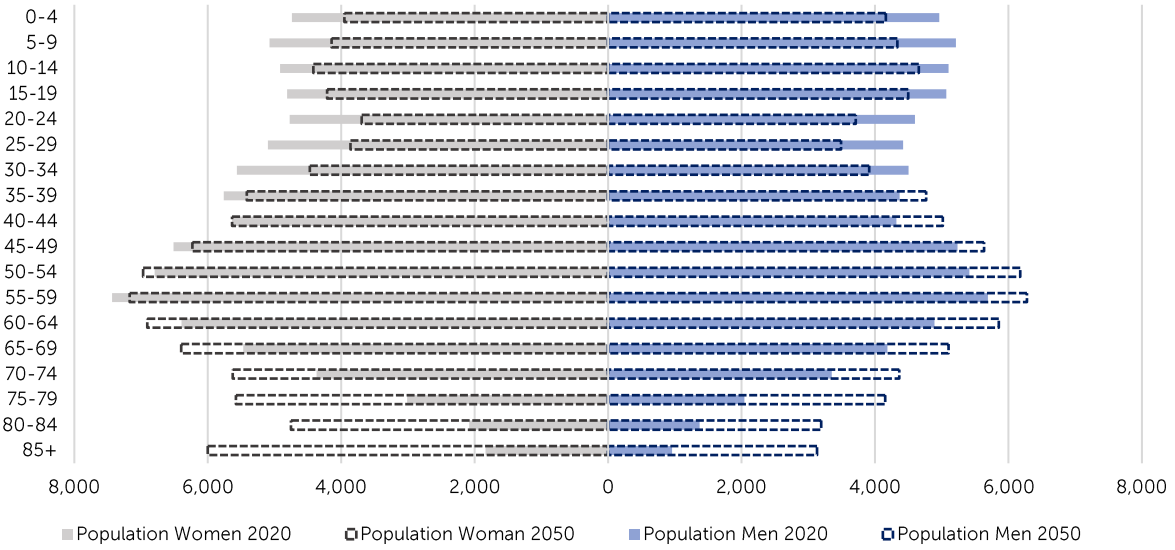
In this scenario, net migration remains positive but gradually decreases over time. After 2030, annual deaths are projected to surpass births due to declining fertility. As a result, population growth will turn negative from 2045 to 2049, declining by 0.4% annually.

The demographic structure will shift significantly: the proportion of youth (0-14 years) will decrease from 19.0% in 2015 to 14.4% in 2050. Meanwhile, the share of elderly (65+) will increase from 15.3% to 27.2%, doubling in absolute numbers over the projection horizon. As a result, the median age for both men and women will rise, and the share of the "oldest old" (80+) will triple - in absolute terms - due to increasing life expectancy. Correspondingly, the old-age support ratio[30] will fall from 3.9 to 2.0, and the working-age population - defined by the United Nations as those aged 15 to 64- will decline in share from 66.0% to 58.0% over the projection horizon.

Graph 12 illustrates a population pyramid showing the projected population development, providing a visual representation of the significant shift in population distribution. Appendix 3 presents an overview of the full forecast horizon.

[25] The medium fertility assumption projects a slight decline in the total fertility rate from 1.88 children per woman in 2015–2019 to 1.84 in 2045–2049, following a more pronounced drop from 2.10 in 2010–2014. The mean age at childbirth is expected to rise modestly from 28.3 to 28.5 over the same period. Age-specific fertility rates are projected to decline at both younger and older reproductive ages, concentrating more heavily in the 25–29 age group.
[26] The normal mortality assumption projects a steady increase in life expectancy at birth. For females, it is expected to rise from 80.8 years in 2015–2019 to 84.6 years in 2045–2049. For males, life expectancy is projected to increase from 74.6 to 79.8 years over the same period. As a result, the gender gap in life expectancy is anticipated to narrow from 6.2 years to 4.8 years.
[27] The standard migration assumption sets immigration and emigration levels in 2025 at the average observed between 2011 and 2014. By 2050, both are aligned with the average immigration level recorded from 2005 to 2014, resulting in zero net migration. A linear transition is assumed between 2015–2025 and 2025–2050. Additionally, the age and sex distribution of migration is based on the 2010–2014 average and is held constant throughout the projection period.
[28] The high immigration assumption sets immigration and emigration levels in 2025 based on the 2005–2008 average, a period marked by elevated immigration and strong positive net migration. By 2050, both flows are aligned with the 2005–2014 average, maintaining a positive net migration throughout the projection period, with levels changing along a linear trend.
[29] The emigration wave assumption mirrors the standard migration path but introduces a temporary spike in emigration between 2020 and 2025, replicating the scale and intensity of the 1998–2001 emigration wave in Curaçao. After this period, migration levels return to the standard trajectory, with the emigration surge modeled using historical rates from the earlier wave.
[30] An indicator of the pressure that the elderly portion of the population poses on the working age population.

Graph 12 - Projected development in Curaçao's demographic distribution



Source : Population indicators standard migration variant, Population projections 2015-2025, CBS Curaçao

Other variables of interest

The expenditure projection also incorporates assumptions about future economic conditions. To compute the coefficient $Mult_{(\pi,t)}$, - the inflation multiplier used in Equation 2 - the medium-term inflation forecast of the CBCS is extended through 2028.[31] Beyond that point, a fixed annual price inflation rate of 2.0% is assumed, with no adjustment for year-to-year fluctuations or price volatility.

The assumption that healthcare expenditure prices will rise at the same rate as general inflation is based on the following considerations. As noted by Soyiri and Reidpath (2013), forecasting relies on both, systematically acquired knowledge and informed intuition. The sustainability assessment in Section 2.2 shows that healthcare expenditure growth outpaced inflation up to 2019, but this trend reversed in the subsequent period leading up to 2023. Over the full 2015–2023 period, healthcare expenditure and general inflation grew at average annual rates of 2.5% and 2.6%, respectively. Given the near-identical growth rates, the assumption that healthcare price growth will mirror general inflation is supported by both empirical evidence from the reference period and informed judgment about future price developments.

[31] The medium-term inflation forecast extension is based on figures published by the CBCS in its December 2024 Economic Bulletin. Inflation projections for the years 2024 through 2028 are as follows: 3.1% in 2024, 2.5% in 2025, 2.1% in 2026, and 2.0% in both 2027 and 2028.

6. RESULTS

This section presents the projection results. The analysis focuses on how demographic changes - particularly shifts in Curaçao's age structure and population size - affect total healthcare expenditures. The cost effect of demographic change reflects the impact of an aging population, demonstrating how increases in the proportion of elderly residents drive rising demand and costs across the healthcare system. In addition to the demographic scenario, this section also presents results from a combined demographic and price scenario, which incorporates both population dynamics and projected changes in healthcare service costs. Together, these scenarios outline a range of possible expenditure outcomes through 2050.

Demographic scenarios

The projections are based on period averages - as outlined in Table 2 - to estimate healthcare expenditures over the forecast horizon, driven solely by demographic developments. [32] Graphs 13-18 illustrate the projection results, showing potential healthcare expenditure outcomes for men, women, and the total population through 2050. For each gender and the total population, results are presented for the full reference period (2015 - 2023) as well as for the period excluding incidental "shocks", specifically the year 2015 when the public servants were included in the BVZ, and the COVID years i.e., 2020 - 2022. In each graph, the forecast year is displayed on the Y-axis, while the expenditures in millions Cg[33] are shown on the X-axis. To assess the expenditure in macroeconomic context, results are reported as the ratio of healthcare spending to GDP. Future nominal GDP levels are based on the medium-term growth forecast of the CBCS through 2029. [34] Beyond that horizon, a fixed nominal annual growth rate of 4.0% is applied, with no adjustment for year-to-year fluctuations or potential economic shocks. This represents a no-policy scenario, in which projections assume the continuation of current trends without additional policy measures.

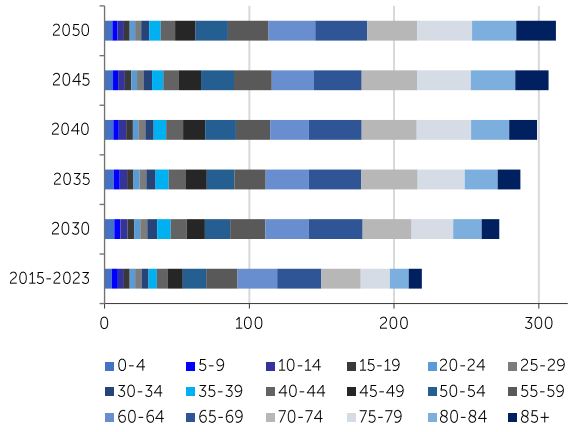
These visualizations reflect the findings of the expenditure analysis, highlighting how demographic trends may shape future healthcare costs across different segments of the population. The detailed numerical projections are presented in Appendix 4. The projections using the full reference period and those excluding the incidental shocks do not produce significantly different results. For men, the projection based on the full reference period yields healthcare expenditures that are approximately Cg 3 million lower than the projection excluding incidental shocks. In contrast, for women, the trend is reversed: the full reference period results in projected costs about Cg 0.8 million higher than those derived from period excluding the incidental shocks.

As shown in Graphs 13 and 14, healthcare expenditures for men are projected to rise significantly by 2050, increasing by approximately 42-43%, or around Cg 100 million, from baseline averages[35] to between Cg 312 million (1.7% of GDP)and Cg 316 million (1.8% of GDP). A closer examination reveals that this growth is not evenly distributed across the population but is instead driven by specific demographic shifts. The composition of this growth is skewed: expenditures for children and young adults remain flat or decline, while healthcare expenditures for men over 60 rises sharply. The most dramatic increase occurs in the 85+ male age cohort where healthcare spending is projected to more than triple by 2050. The 75-79 and 80-84 cohorts follow closely, with each projected to exceed Cg 30 million in expenditure, up from baseline averages of Cg 13.5 million and Cg 19 million, respectively. These developments underscore the growing

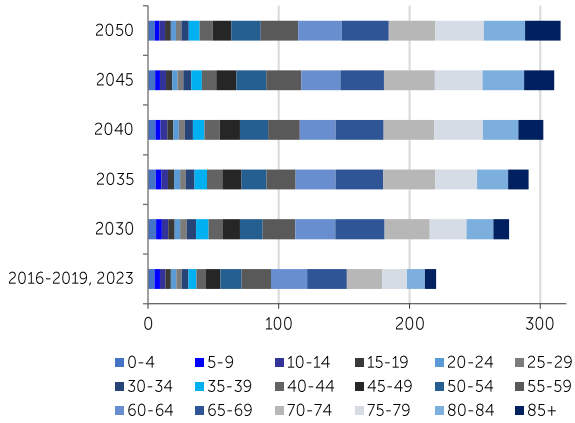
[32] Equation 1 as presented under the methodology section.
[33] As of March 31, 2025, the Netherlands Antillean Guilder (NAf.) was replaced by the Caribbean Guilder (Cg) as the official currency of the monetary union between Curaçao and Sint Maarten, with the conversion rate set at 1:1. Accordingly, all projected results are denominated in Cg to reflect future expenditures in the corresponding currency.
[34] The medium-term inflation forecast extension is based on figures published by the CBCS in its June 2025 Economic Bulletin. Nominal growth projections for the years 2025 through 2029 are as follows: 5.7% in 2025, 4.5% in 2026, 4.1% in both 2027 and 2028, and 3.8% in 2029. See Appendix 2, Table 5 for an overview of the projected nominal GDP levels.
[35] The baseline average refers to the total healthcare costs summed across all age cohorts within the full reference period and the period excluding the incidental shocks. This aggregate figure serves as the central input from which projected healthcare expenditures are calculated, ensuring that age-specific cost patterns are preserved in the projection process.

impact of an ageing population on the healthcare system, highlighting the increasing burden of advanced age and its central role in shaping future healthcare demand.

Graph 13 - Demographic scenario - Men 2015-2023

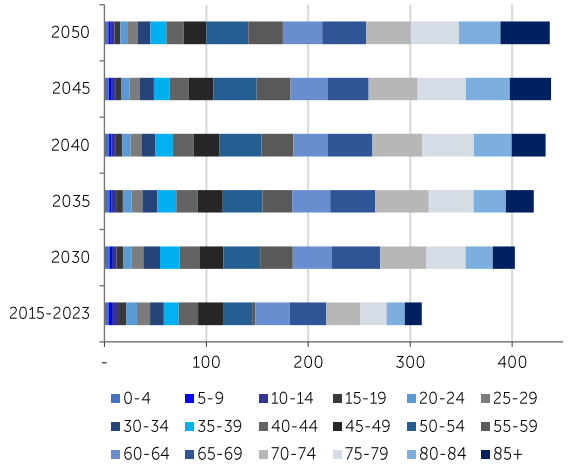


Graph 14 - Demographic scenario - Men 2016-2019, 2023

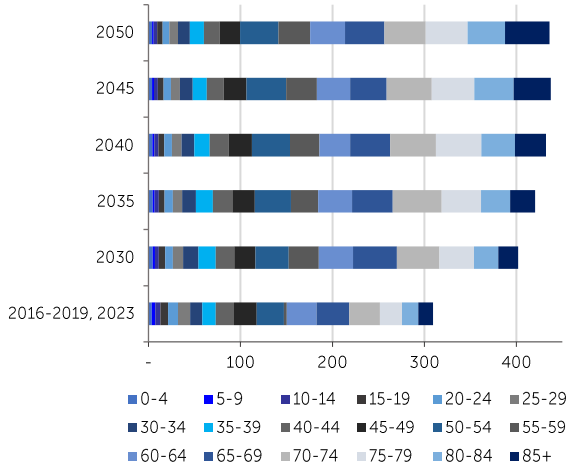


Healthcare expenditures for women are also projected to increase substantially by 2050, rising by approximately 40-41%, or around Cg 126 million, from baseline period averages to between Cg 436 million (2.4% of GDP) and Cg 437 million (2.4% of GDP). Similar to the trend observed for men, this growth is heavily concentrated in the older age cohorts. Expenditures for girls and young women under 25 either decline or remain stable, while healthcare costs for women aged 60 and above rise sharply, particularly in the last decades of life (see Graphs 15 and 16).

Graph 15 - Demographic scenario - Women 2015-2023



Graph 16 - Demographic scenario - Women 2016-2019, 2023

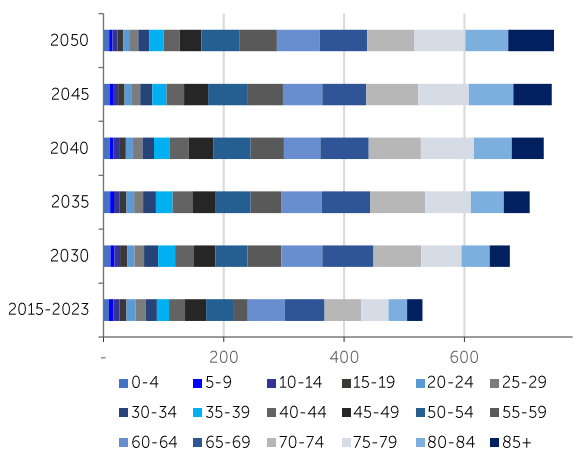


The most pronounced increase occurs in the 85+ female age group, where healthcare spending nearly triples, increasing from about Cg 16.5 million to over Cg 48.6 million by 2050—a 194-203% increase, depending on the period average used. The 75-79 and 80-84 groups follow closely, with each projected to exceed Cg 40 million by 2050, up from Cg 25.7 million and Cg 17.9 million, respectively. Even among the 65-69 and 70-74 cohorts, significant increases are recorded, with gains of over Cg 7 million and Cg 10 million, respectively.

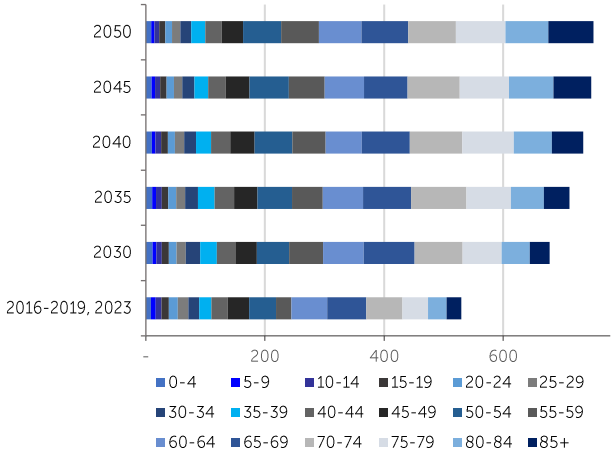
In contrast, younger age groups, notably the 5-9, 10-14, and 15-19 cohorts, are projected to experience a pronounced decline in expenditure of 27% to 46%. This contraction is attributed to their declining share in the population. These dynamics highlight the growing dominance of advanced age in shaping healthcare demand, with older women emerging as the principal drivers of long-term expenditure growth.

Aggregating the projected healthcare expenditures for both males and females further highlights the significant rise in projected healthcare expenditures by 2050, with total costs projected to increase by approximately 41-42%, or around Cg 218-222 million compared to the period averages. This would bring overall healthcare spending from as average of Cg 529-530 million to between Cg 748 million (4.2% of GDP) and Cg 752 million (4.2% of GDP) by 2050. This increase is driven primarily by a substantial shift in the population's age distribution, alongside population growth driven by migration and an increase in life expectancy. Expenditure patterns shift markedly from younger cohorts toward older adults, especially those aged 60 and above, having a considerable impact on overall spending (see Graphs 17 and 18).

Graph 17 - Demographic scenario – Population 2015-2023



Graph 18 - Demographic scenario – Population 2016-2019, 2023



In line with the individual projections for males and females, expenditures for the 85+ cohort shows the most dramatic rise, tripling by 2050—from Cg 24.6-25.4 million to over Cg 75-76 million, representing a 199-208% increase. The 80-84 and 75-79 age groups also experience substantial growth, with projected increases of 129-130% and 85-93%, respectively—each surpassing Cg 70 million by 2050. Even mid-senior cohorts, such as 70-74 and 65-69, grow by 18-33%, accounting for an additional Cg 12-20 million.

As a result of declining birth rates, expenditures for children and young adults (ages 0-24) either stagnate or decline, with reductions of 20-30% across most subgroups. This shift in healthcare spending toward older age groups reflects the structural impact of population aging, which will increasingly shape the financial trajectory of Curaçao's healthcare system.

Demographic and price scenarios

Consistent with the methodological assumptions outlined earlier, the forecasts in this section employ period averages - as presented in Table 2 - as the projection baseline. In addition to demographic developments, the projection model incorporates price developments, thereby providing an extension of future healthcare expenditures in nominal terms. [36]

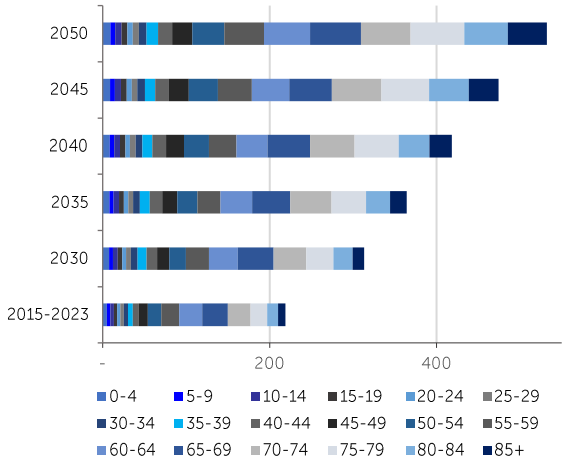
Graphs 19-24 illustrate the projection results, showing potential healthcare expenditure outcomes for males, females, and the total population through 2050, taking both demographic and price developments into account. These graphs highlight the compound effects of population ageing and price trends on the distribution of expenditure across age groups. The numerical projection results are presented in Appendix 5. Similar to the findings based on demographic developments only, the projections in this section, which incorporate both demographic and price scenarios, show no substantial differences between using the full reference period and the period excluding incidental shocks. For men, the projection based on the full reference period results in healthcare expenditures approximately Cg 5 million lower than those derived from the average in the period excluding incidental shocks. In contrast, for women, the trend is reversed:

[36] Equation 2 as presented in the methodology section.

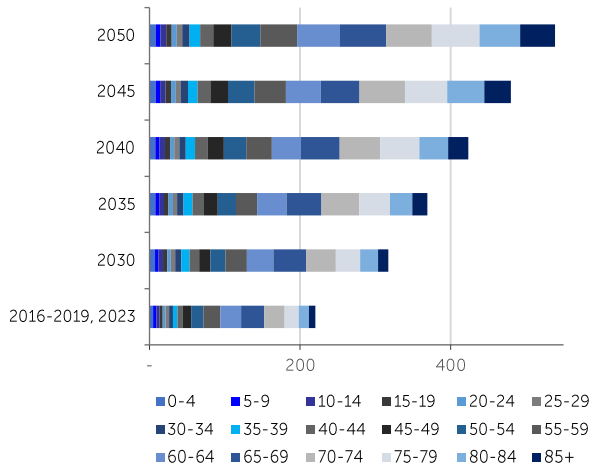
the full reference period yields projected costs roughly Cg 1 million higher than those excluding incidental shocks.

Healthcare expenditures for men are expected to rise sharply by 2050 under the combined influence of demographic and price developments. Under this scenario, total costs increase by approximately 143-144%, or over Cg 313 million, rising from baseline averages of Cg 219-220 million to between Cg 532 million (3.0% of GDP) and Cg 539 million (3.0% of GDP) (see Graphs 19 and 20).

Graph 19 - Demographic + price scenario - Men 2015-2023



Graph 20 - Demographic + price scenario - Men 2016-2019, 2023

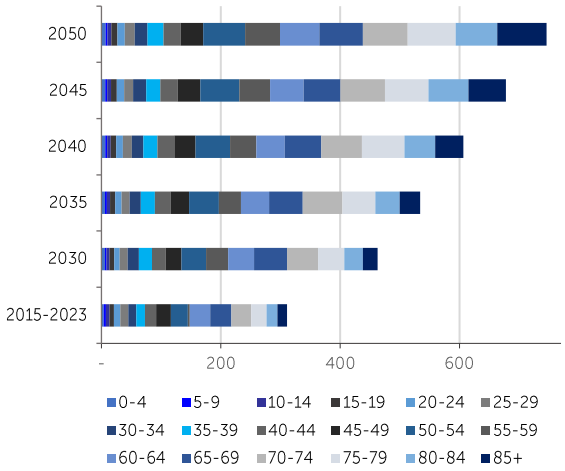


Unlike the purely demographic scenarios, which reflect structural population aging and net migration, this combined scenario compounds those dynamics with projected price pressures, resulting in significantly steeper expenditure growth across all age cohorts. Consistent with previous projections, the 85+ male age cohort shows the most dramatic increase in healthcare expenditure, increasing by more than fivefold—from Cg 8.6-8.9 million to nearly Cg 46.6 million, a 427-441% increase by 2050. The 75-79 and 80-84 cohorts also exhibit substantial increases, with costs climbing by 221-235% and 296-298%, respectively. Together, these older age groups account for a disproportionate share of total system costs, reflecting both the demographic weight of aging and the escalating cost of late-life care in an inflationary environment.

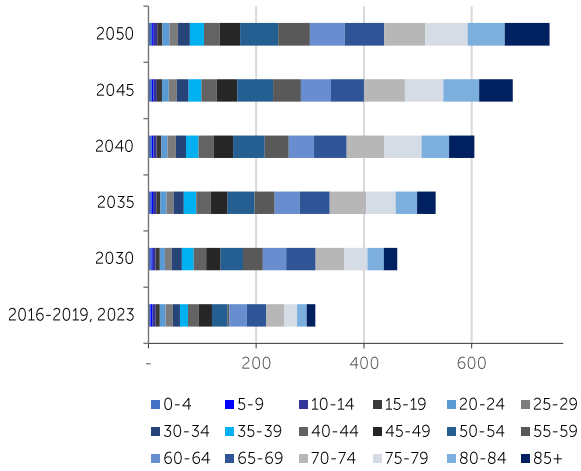
Meanwhile, expenditures for younger age groups (ages 0-24) also grow in absolute terms due to price effects, but at much slower rates—ranging from 42% to 84%, indicating that demand intensity remains concentrated among the upper age cohorts. These findings underscore how the combination of population aging and rising healthcare prices magnifies financial pressure across the system, accelerating the cost curve into steeper, and potentially unsustainable territory by 2050.

As shown in Graphs 21 and 22, healthcare expenditures for women are projected to rise steeply under the combined demographic and price scenario, with total costs increasing by approximately 140-141%, or Cg 435-435 million, from baseline averages of around Cg 309-311 million to between Cg 744 million (4.2% of GDP) and Cg 746 million (4.2% of GDP) by 2050. Similar to the male population, this increase is driven by both population aging and rising healthcare costs. These results highlight how price effects significantly amplify the sustainability challenges posed by demographic trends, particularly among older women.

Graph 21 - Demographic + price scenario - Women 2015-2023



Graph 22 - Demographic + price scenario - Women 2016-2019, 2023

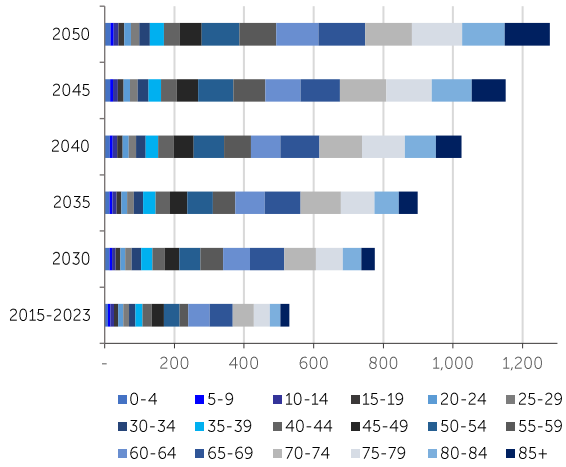


Applying the same methodology, the 85+ female cohort shows the most dramatic increase in healthcare spending, increasing by more than fivefold over the forecast horizon—from Cg 16.0-16.5 million to over Cg 82-83 million, a 402-417% rise. Similar exponential growth is observed in the 75-79 and 80-84 age groups, with expenditures increasing by 212-225% and 288-296%, respectively. The 65-69 and 70-74 groups also exhibit robust growth, rising by 105-130%, fueled by both increased life expectancy and price pressures.

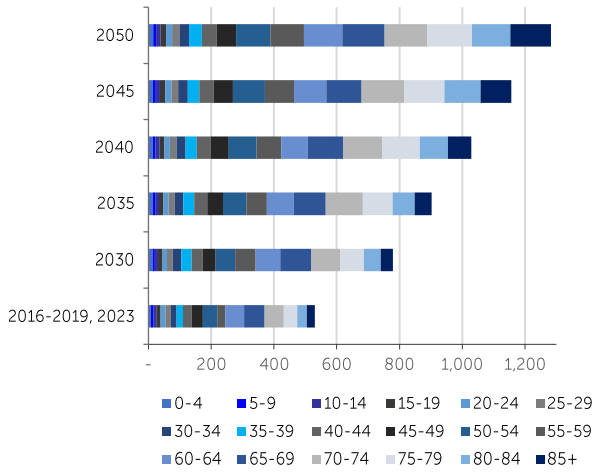
In contrast, younger age groups such as those aged 5-9 experience a slight decline in expenditures (–8% to –9%), while spending for other cohorts under age 30 grows modestly. These results illustrate a healthcare system increasingly shaped by the combined forces of aging and price development, concentrating financial pressure at the upper end of the age spectrum, while the younger segment of the population is set to decline.

Under the combined demographic and price scenario, healthcare expenditures in Curaçao are projected to increase substantially across all population segments by 2050. For the total population, expenditures are expected to rise by approximately 141-142%, from baseline levels of Cg 529-530 million to between Cg 1.278 billion (7.1% of GDP) and Cg 1.283 billion (7.2% of GDP) (see Graphs 23 and 24). In the absence of substantial reforms in healthcare delivery, expenditure control, and population health management, Curaçao's healthcare system is poised to face significant sustainability challenges.

Graph 23 - Demographic + price scenario - Population 2015-2023



Graph 24 - Demographic + price scenario - Population 2016-2019, 2023



The asymmetric growth in the population's age structure has significant impact on overall healthcare expenditures. The 85+ cohort emerges as the single largest driver of increased spending, with healthcare costs increasing more than fivefold, from Cg 24.6-25.4 million to over Cg 129-130 million, a 411-426%

increase. The 75-79 and 80-84 groups follow closely, with expenditures rising by 216-229% and 291-292%, respectively. As highlighted by previous projection outcomes, healthcare expenditures of the 0-24 age range grow at a much slower pace (typically between 19-39%), with some age cohorts exhibiting only modest or flat growth due to relatively stable population levels and lower per capita spending.

Mid-life cohorts (ages 45-64) also show sustained expenditure growth, but at a more moderate rate compared to the elderly. For example, spending in the 60-64 age group is projected to double (+97-102%), while the 55-59 cohort more than quadruples, rising by 323-327%. This suggests that inflationary pressures combined with the prevalence of chronic diseases in these age groups may drive higher spending intensity.

These results highlight the growing financial pressure of meeting the healthcare needs of an ageing population in Curaçao. Not only is the population getting older, but the cost of care in later life is rising faster than demographic change alone would suggest, particularly when inflation is taken into account. Although healthcare expenditure appears manageable when expressed as a share of GDP, this assessment may be overly optimistic. Economic shocks, whether domestic or external, could suppress GDP growth and increase the relative fiscal burden of healthcare. In addition, the GDP projections are based on aggregate growth assumptions and do not reflect the specific contributions of its components, such as private demand, public expenditure, and net exports. Each of these elements plays a distinct role in the system's capacity to finance healthcare. Without structural reforms in service delivery, cost containment, and population health management, Curaçao is likely to face a fundamentally different fiscal landscape by 2050, shaped by both demographic shifts and rising healthcare costs.

7. CONCLUSION

The cost of healthcare has been increasing in most countries at rates that are much higher than general inflation and increases in government revenues (Lorenzoni et.al., 2019). Curaçao is no exception, where the sustainability of the healthcare system is a major topic of discussion and high on the policy agenda. This study presents a multidimensional analysis of the sustainability of Curaçao's healthcare system by examining its economic, fiscal, and demographic foundations, while projecting expenditure trajectories through 2050 under varying assumptions. The findings point to a healthcare landscape under growing strain, shaped by both structural demographic shifts and escalating healthcare costs.

First, historical data confirm that healthcare expenditures in Curaçao have consistently outpaced both inflation and government revenue growth. This imbalance raises fundamental concerns about the system's long-term affordability. Curaçao spends a disproportionately high share of its GDP on healthcare relative to its regional and income-level peers - aligning more closely with high-income economies despite having a more constrained fiscal capacity. In addition, government contributions to healthcare have grown more slowly than overall healthcare expenditures, while revenue growth has struggled to recover from a decade-long stagnation.

Second, demographic projections underscore the system's growing vulnerability. Population ageing is accelerating, with the share of individuals over 65 expected to nearly double by 2050. This shift will not only heighten the demand for healthcare services but will also compress the working-age base that finances the system. The deterioration of the old-age support ratio—from 3.9 to 2.0—is a stark indicator of the fiscal pressure looming on the horizon.

Third, long-term projections reveal that under both the demographic only and demographic-plus-price scenarios, healthcare expenditures are set to rise sharply—by 41-42% and over 140%, respectively. The aging population is not only driving a rise in the volume of services needed, but also increasing the cost intensity of care, with expenditures increasingly concentrated in the upper age groups. Price inflation compounds this challenge, especially in end-of-life care, where spending is projected to increase more than fivefold in some cohorts.

Without substantial reforms, the government's ability to sustainably finance healthcare will be severely compromised. This could result in adverse outcomes such as tax increases, diminished service quality, or the rationing of care. Curaçao's healthcare system stands at a critical inflection point. The status quo is unsustainable. Without substantive reforms in service delivery, cost containment, and preventative health strategies, the healthcare system will confront an increasingly steep fiscal trajectory—driven not merely by demographic inevitability, but also by the escalating cost of longevity itself. Ensuring future sustainability will require difficult political choices, a reimagining of funding mechanisms, and actively embrace innovation in both care provision and public health.

Addressing the structural pressures on Curaçao's healthcare system calls for a strategic approach along three key dimensions: (1) reshaping future population dynamics, (2) mitigating age-related medical costs, and (3) strengthening the revenue base. Demographic rebalancing can be supported through well-designed policies that influence population structures such as incentivized migration schemes aimed at attracting working-age residents, and family support programs that encourage higher fertility rates. These measures would gradually improve the old-age dependency ratio and expand the pool of contributors to the healthcare system.

Such efforts should include inclusive preventive care programs, particularly targeting common chronic conditions in Curaçao. A coordinated national strategy to promote healthier lifestyles, early diagnosis, balanced nutrition, and community-based care is essential to reducing the incidence and severity of chronic diseases, lowering hospital admissions, and improving quality of life. In parallel, the government should broaden the healthcare revenue base through fair and transparent co-payment systems and health-related consumption taxes. These measures are critical to building a more resilient and equitable financing framework, one capable of withstanding the fiscal pressures of an ageing population without compromising access or quality of care. Decisive policy action is needed now to contain future costs and protect the long-term sustainability of the healthcare system.

It is also important to note that this study is subject to some limitations. First, the projections account solely for demographic and price changes and do not incorporate the potential impact of long-term care demand (i.e., AVBZ). Second, the effects of technological advancement and medical innovation, both known to drive healthcare costs upward, have not been modeled. Finally, the analysis does not consider changes in income levels or societal preferences; as Curaçao becomes more affluent, demand for healthcare may rise disproportionately, reflecting its characteristics as a quasi-luxury good. These omissions suggest that the projected expenditure trajectories may underestimate the full scope of future cost pressures.

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Appendix 1: Medical cost (in NAf.) per age cohort and insured

	Men								
Age cohorts	2015	2016	2017	2018	2019	2020	2021	2022	2023
0-4	1,067	1,343	1,247	1,168	1,023	1,483	1,371	1,697	1,371
5-9	646	757	762	787	802	714	776	884	950
10-14	721	937	916	916	911	916	1,026	1,090	1,095
15-19	632	895	929	919	922	838	992	1,056	1,092
20-24	773	974	1,114	1,024	1,119	913	1,097	1,006	1,064
25-29	927	1,065	1,152	1,187	1,314	1,221	1,375	1,339	1,309
30-34	1,276	1,390	1,404	1,489	1,516	1,275	1,327	1,389	1,484
35-39	1,340	1,673	1,516	1,856	1,759	1,480	1,799	1,790	1,820
40-44	1,625	1,867	1,993	1,897	2,068	1,950	2,282	2,097	2,230
45-49	2,189	2,568	2,397	2,556	2,641	2,374	2,579	2,736	2,491
50-54	3,510	3,854	3,605	3,289	3,468	3,216	3,937	3,786	3,973
55-59	3,621	4,180	4,147	4,828	5,254	4,639	4,611	4,273	4,411
60-64	5,207	5,682	5,753	5,863	5,743	5,461	5,314	5,370	5,426
65-69	6,935	7,178	7,143	6,837	7,003	6,829	6,986	6,970	7,128
70-74	7,353	7,626	7,907	7,994	8,623	7,950	7,864	8,175	8,443
75-79	9,852	8,851	8,810	9,062	9,062	9,333	8,830	8,961	8,861
80-84	9,216	9,986	9,964	8,913	10,122	8,695	8,801	9,769	10,607
85+	7,594	8,198	8,437	8,598	9,416	9,461	8,614	9,549	8,922

Source: Expenditure by age category and gender BVZ, SVB 2024

	Women								
Age cohorts	2015	2016	2017	2018	2019	2020	2021	2022	2023
0-4	1,086	1,201	872	689	869	1,100	1,108	1,171	1,234
5-9	325	402	439	425	438	477	519	597	595
10-14	620	780	771	748	812	894	974	955	1,145
15-19	972	1,193	1,305	1,386	1,389	1,470	1,533	1,521	1,558
20-24	1,673	1,895	1,958	1,978	2,002	1,818	2,176	2,113	2,412
25-29	2,174	2,371	2,232	2,282	2,471	2,449	2,737	2,833	2,781
30-34	2,200	2,410	2,735	2,848	2,993	2,753	3,137	3,090	3,217
35-39	2,348	2,650	2,622	2,793	2,911	2,929	3,193	3,275	3,346
40-44	2,570	2,866	2,933	3,112	3,024	2,942	3,095	3,413	3,192
45-49	2,921	3,392	3,472	3,658	3,565	3,477	3,974	3,807	3,720
50-54	4,931	5,670	5,652	5,800	5,770	5,806	6,163	6,372	6,884
55-59	3,385	4,250	4,532	4,985	5,195	5,074	5,143	5,136	5,065
60-64	5,350	5,320	5,348	5,395	5,606	5,916	5,965	5,569	5,838
65-69	6,403	6,222	6,658	6,869	6,808	6,836	6,719	6,979	6,893
70-74	7,589	7,823	8,339	7,874	7,685	7,608	7,608	7,835	8,069
75-79	7,991	8,561	7,938	8,082	8,095	9,152	8,741	8,762	8,466
80-84	7,659	8,038	7,627	8,602	8,846	8,793	8,587	9,533	9,342
85+	6,370	7,711	7,764	7,928	8,694	8,703	8,362	8,905	8,455

Source: Expenditure by age category and gender BVZ, SVB 2024

Appendix 2: Population projection variants

Table 3: Projection variants by fertility, mortality, and migration assumptions

Projection Variant	Assumptions		
	Fertility	Mortality	Migration
Standard migration	Medium	Normal	Standard
Constant fertility	Constant as of 2015-2020	Normal	Standard
High immigration	Medium	Normal	High immigration
Emigration wave	Medium	Normal	Emigration Wave
Zero-migration	Medium	Normal	Zero-migration

Source: Population indicators standard migration variant, Population projections 2015-2025, CBS Curaçao

Table 4: Total population by variant, 2030-2050

Projection Variant	2030	2035	2040	2045	2050
Standard migration	178,834	181,885	182,626	181,261	177,878
Constant fertility	182,780	187,375	189,740	190,150	188,877
High immigration	188,588	198,000	206,134	212,967	218,468
Emigration wave	152,242	153,504	152,801	150,346	146,170
Zero-migration	159,926	159,623	158,607	156,974	154,793

Source: Population indicators standard migration variant, Population projections 2015-2025, CBS Curaçao

Table 5: Nominal GDP Projection in million Cg, 2030 - 2050

	2030	2035	2040	2045	2050
Nominal GDP	8,169.2	9,939.08	12,092.4	14,712.3	17,899.7

Source: Author's calculations

Appendix 3: Population projection

Population project men								
Age cohorts	2015	2020	2025	2030	2035	2040	2045	2050
0-4	5087	4962	5181	5130	4876	4611	4399	4162
5-9	4864	5212	5056	5242	5160	4873	4577	4333
10-14	5301	5102	5421	5237	5399	5291	4980	4658
15-19	5328	5070	4838	5118	4890	5006	4853	4496
20-24	4515	4599	4296	4007	4209	3904	3942	3711
25-29	3902	4420	4452	4096	3747	3885	3519	3492
30-34	3751	4504	4973	4966	4583	4206	4310	3914
35-39	3843	4369	5078	5513	5485	5083	4684	4765
40-44	4909	4320	4809	5485	5898	5851	5431	5015
45-49	5224	5234	4628	5089	5741	6133	6069	5634
50-54	5646	5415	5409	4802	5245	5876	6250	6175
55-59	4963	5691	5465	5458	4869	5299	5912	6275
60-64	4381	4893	5592	5389	5395	4839	5258	5855
65-69	3724	4186	4674	5344	5179	5204	4695	5102
70-74	2488	3350	3781	4245	4877	4758	4806	4363
75-79	1889	2042	2770	3160	3583	4152	4084	4154
80-84	1158	1372	1504	2066	2390	2744	3213	3191
85+	740	956	1183	1383	1796	2203	2629	3131

Source: Population indicators standard migration variant, Population projections 2015-2025, CBS Curaçao

Population projection women								
Age cohorts	2015	2020	2025	2030	2035	2040	2045	2050
0-4	4864	4737	4933	4877	4634	4381	4179	3954
5-9	4650	5075	4897	5048	4954	4673	4383	4143
10-14	5023	4918	5293	5073	5188	5060	4744	4420
15-19	5161	4812	4650	4969	4697	4760	4579	4211
20-24	4678	4773	4336	4089	4327	3973	3954	3692
25-29	4638	5101	5089	4558	4232	4391	3958	3860
30-34	4987	5565	5930	5838	5249	4865	4964	4473
35-39	5102	5762	6261	6563	6425	5793	5364	5417
40-44	6162	5634	6231	6678	6941	6767	6099	5635
45-49	6575	6516	5942	6492	6904	7133	6928	6231
s50-54	7360	6796	6698	6098	6616	6999	7200	6971
55-59	6422	7433	6856	6740	6134	6628	6990	7173
60-64	5615	6392	7362	6795	6678	6083	6561	6908
65-69	4682	5469	6210	7143	6608	6503	5933	6398
70-74	3437	4372	5112	5818	6708	6230	6149	5627
75-79	2611	3012	3851	4531	5189	6019	5622	5579
80-84	1705	2084	2429	3138	3728	4311	5046	4756
85+	1586	1837	2216	2656	3350	4140	4997	6002

Source: Population indicators standard migration variant, Population projections 2015-2025, CBS Curaçao

Appendix 4: Projection Results - Demographic scenario

Demographic scenario - MEN

	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	4,909,544	6,312,123	5,999,593	5,673,528	5,412,677	5,121,064
5-9	4,213,372	4,254,107	4,187,561	3,954,648	3,714,431	3,516,415
10-14	4,242,791	5,001,763	5,156,486	5,053,337	4,756,307	4,448,771
15-19	4,144,676	4,869,014	4,652,106	4,762,463	4,616,906	4,277,274
20-24	4,010,295	4,242,629	4,456,507	4,133,572	4,173,806	3,929,223
25-29	4,333,434	4,936,721	4,516,087	4,682,412	4,241,289	4,208,747
30-34	5,144,840	7,233,368	6,675,499	6,126,369	6,277,853	5,701,048
35-39	6,038,526	9,510,002	9,461,702	8,768,246	8,079,966	8,219,692
40-44	7,314,081	11,029,850	11,860,356	11,765,843	10,921,260	10,084,721
45-49	11,050,037	12,877,660	14,527,539	15,519,491	15,357,539	14,256,776
50-54	16,242,962	17,469,648	19,081,280	21,376,854	22,737,464	22,464,614
55-59	22,454,942	24,910,014	22,221,850	24,184,346	26,982,044	28,638,756
60-64	27,663,418	30,681,088	30,715,248	27,549,784	29,935,268	33,334,156
65-69	30,403,461	37,716,988	36,552,448	36,728,896	33,136,464	36,008,996
70-74	27,128,950	34,462,800	39,593,656	38,627,560	39,017,244	35,420,776
75-79	18,893,098	28,215,968	31,992,978	37,073,636	36,466,460	37,091,496
80-84	13,571,664	20,491,464	23,705,032	27,216,154	31,867,896	31,649,690
85+	8,604,170	12,051,816	15,650,804	19,197,506	22,909,778	27,284,336
	220,364,260	276,267,022	291,006,731	302,394,643	310,604,651	315,656,548

Demographic scenario - MEN						
	2015-2023	2030	2035	2040	2045	2050
0-4	5,056,551	6,708,663	6,376,499	6,029,950	5,752,711	5,442,779
5-9	4,091,898	4,122,673	4,058,182	3,832,465	3,599,670	3,407,772
10-14	4,224,719	4,962,308	5,115,811	5,013,476	4,718,789	4,413,678
15-19	3,988,533	4,705,098	4,495,492	4,602,133	4,461,477	4,133,278
20-24	3,777,090	4,043,949	4,247,812	3,940,000	3,978,350	3,745,220
25-29	4,288,146	4,955,702	4,533,451	4,700,416	4,257,597	4,224,930
30-34	4,906,590	6,924,343	6,390,307	5,864,637	6,009,650	5,457,487
35-39	5,875,508	9,209,639	9,162,865	8,491,311	7,824,769	7,960,082
40-44	7,230,288	10,974,921	11,801,292	11,707,250	10,866,873	10,034,500
45-49	10,701,161	12,739,141	14,371,273	15,352,555	15,192,346	14,103,423
50-54	15,938,436	17,414,244	19,020,764	21,309,058	22,665,352	22,393,368
55-59	21,725,397	24,235,562	21,620,182	23,529,542	26,251,492	27,863,346
60-64	27,390,169	29,829,870	29,863,082	26,785,440	29,104,742	32,409,332
65-69	30,584,687	37,413,580	36,258,408	36,433,432	32,869,902	35,719,328
70-74	27,258,728	33,929,524	38,980,988	38,029,840	38,413,496	34,872,676
75-79	20,018,198	28,658,462	32,494,706	37,655,044	37,038,344	37,673,180
80-84	13,159,531	19,758,714	22,857,370	26,242,938	30,728,338	30,517,936
85+	8,883,377	12,107,392	15,722,977	19,286,034	23,015,426	27,410,156
	219,099,007	272,693,784	287,371,460	298,805,519	306,749,322	311,782,470

Demographic scenario - WOMEN						
	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	3,666,111	4,745,205	4,508,772	4,262,609	4,066,068	3,847,148
5-9	3,575,097	2,321,345	2,278,118	2,148,899	2,015,541	1,905,176
10-14	5,815,132	4,318,321	4,416,213	4,307,255	4,038,264	3,762,464
15-19	8,178,384	6,790,444	6,418,740	6,504,833	6,257,485	5,754,591
20-24	10,753,209	8,378,858	8,866,549	8,141,160	8,102,227	7,565,357
25-29	13,318,402	11,064,411	10,273,056	10,659,024	9,607,929	9,370,037
30-34	13,359,058	16,583,633	14,910,498	13,819,694	14,100,917	12,706,165
35-39	14,582,474	18,798,346	18,403,074	16,592,842	15,364,061	15,515,868
40-44	19,698,313	20,204,328	21,000,036	20,473,598	18,452,560	17,048,726
45-49	24,844,921	23,120,516	24,587,808	25,403,364	24,673,280	22,190,994
50-54	29,428,661	36,315,132	39,399,952	41,680,816	42,877,820	41,514,068
55-59	3,002,186	32,386,398	29,474,504	31,848,226	33,587,672	34,467,008
60-64	32,636,189	37,383,544	36,739,856	33,466,388	36,096,164	38,005,228
65-69	35,349,071	47,787,296	44,208,100	43,505,640	39,692,292	42,803,184
70-74	33,297,721	46,298,592	53,381,052	49,577,216	48,932,632	44,778,648
75-79	24,123,388	37,283,308	42,697,656	49,527,308	46,260,596	45,906,768
80-84	17,768,455	26,644,748	31,654,438	36,604,688	42,845,572	40,383,184
85+	16,064,743	21,540,676	27,169,152	33,576,204	40,526,640	48,677,388
	309,461,514	401,965,101	420,387,574	432,099,764	437,497,720	436,202,002

Demographic scenario - WOMEN						
	2015-2023	2030	2035	2040	2045	2050
0-4	3,828,036	5,055,851	4,803,939	4,541,661	4,332,254	4,099,002
5-9	3,593,384	2,365,995	2,321,937	2,190,233	2,054,310	1,941,822
10-14	5,818,623	4,339,463	4,437,834	4,328,342	4,058,035	3,780,884
15-19	7,870,586	6,806,840	6,434,238	6,520,539	6,272,594	5,768,485
20-24	10,736,856	8,189,648	8,666,326	7,957,317	7,919,263	7,394,517
25-29	12,972,976	11,308,721	10,499,892	10,894,382	9,820,078	9,576,933
30-34	13,476,670	16,465,007	14,803,841	13,720,839	14,000,051	12,615,275
35-39	14,382,172	19,007,850	18,608,172	16,777,766	15,535,290	15,688,789
40-44	19,220,535	20,143,628	20,936,946	20,412,088	18,397,122	16,997,506
45-49	24,365,396	23,072,088	24,536,306	25,350,154	24,621,600	22,144,514
50-54	28,768,348	35,943,124	38,996,344	41,253,844	42,438,584	41,088,804
55-59	3,036,647	32,024,952	29,145,558	31,492,786	33,212,822	34,082,340
60-64	34,030,301	37,982,212	37,328,212	34,002,324	36,674,216	38,613,852
65-69	35,824,606	47,927,688	44,337,976	43,633,452	39,808,900	42,928,932
70-74	33,228,071	45,528,748	52,493,440	48,752,852	48,118,988	44,034,076
75-79	25,684,147	38,155,592	43,696,616	50,686,052	47,342,912	46,980,808
80-84	17,894,274	26,856,652	31,906,182	36,895,804	43,186,320	40,704,348
85+	16,516,827	21,510,832	27,131,510	33,529,686	40,470,492	48,609,944
	311,248,456	402,684,889	421,085,268	432,940,121	438,263,830	437,050,830

Demographic scenario - Population						
	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	8,575,654	11,057,328	10,508,365	9,936,137	9,478,744	8,968,212
5-9	7,788,469	6,575,452	6,465,679	6,103,547	5,729,972	5,421,591
10-14	10,057,923	9,320,084	9,572,699	9,360,592	8,794,571	8,211,234
15-19	12,323,059	11,659,458	11,070,846	11,267,296	10,874,391	10,031,864
20-24	14,763,503	12,621,487	13,323,056	12,274,732	12,276,033	11,494,580
25-29	17,651,836	16,001,132	14,789,143	15,341,436	13,849,218	13,578,784
30-34	18,503,898	23,817,001	21,585,997	19,946,063	20,378,770	18,407,213
35-39	20,621,000	28,308,348	27,864,776	25,361,088	23,444,027	23,735,560
40-44	27,012,394	31,234,178	32,860,392	32,239,441	29,373,820	27,133,447
45-49	35,894,958	35,998,176	39,115,347	40,922,855	40,030,819	36,447,770
50-54	45,671,623	53,784,780	58,481,232	63,057,670	65,615,284	63,978,682
55-59	25,457,128	57,296,412	51,696,354	56,032,572	60,569,716	63,105,764
60-64	60,299,607	68,064,632	67,455,104	61,016,172	66,031,432	71,339,384
65-69	65,752,532	85,504,284	80,760,548	80,234,536	72,828,756	78,812,180
70-74	60,426,671	80,761,392	92,974,708	88,204,776	87,949,876	80,199,424
75-79	43,016,486	65,499,276	74,690,634	86,600,944	82,727,056	82,998,264
80-84	31,340,119	47,136,212	55,359,470	63,820,842	74,713,468	72,032,874
85+	24,668,912	33,592,492	42,819,956	52,773,710	63,436,418	75,961,724
	529,825,773	678,232,122	711,394,305	734,494,408	748,102,371	751,858,550

Demographic scenario - Population						
	2015-2023	2030	2035	2040	2045	2050
0-4	8,884,587	11,764,513	11,180,438	10,571,611	10,084,964	9,541,781
5-9	7,685,283	6,488,668	6,380,119	6,022,698	5,653,980	5,349,594
10-14	10,043,342	9,301,771	9,553,645	9,341,818	8,776,823	8,194,562
15-19	11,859,119	11,511,937	10,929,729	11,122,672	10,734,071	9,901,763
20-24	14,513,946	12,233,597	12,914,138	11,897,317	11,897,613	11,139,736
25-29	17,261,122	16,264,423	15,033,343	15,594,798	14,077,675	13,801,863
30-34	18,383,260	23,389,350	21,194,148	19,585,476	20,009,701	18,072,762
35-39	20,257,680	28,217,489	27,771,037	25,269,077	23,360,059	23,648,871
40-44	26,450,822	31,118,549	32,738,238	32,119,338	29,263,995	27,032,006
45-49	35,066,557	35,811,229	38,907,579	40,702,709	39,813,946	36,247,937
50-54	44,706,784	53,357,368	58,017,108	62,562,902	65,103,936	63,482,172
55-59	24,762,044	56,260,514	50,765,740	55,022,328	59,464,314	61,945,686
60-64	61,420,470	67,812,082	67,191,294	60,787,764	65,778,958	71,023,184
65-69	66,409,293	85,341,268	80,596,384	80,066,884	72,678,802	78,648,260
70-74	60,486,799	79,458,272	91,474,428	86,782,692	86,532,484	78,906,752
75-79	45,702,346	66,814,054	76,191,322	88,341,096	84,381,256	84,653,988
80-84	31,053,805	46,615,366	54,763,552	63,138,742	73,914,658	71,222,284
85+	25,400,204	33,618,224	42,854,487	52,815,720	63,485,918	76,020,100
	530,347,463	675,378,673	708,456,728	731,745,640	745,013,152	748,833,300

Appendix 5: Projection Results - Demographic and price scenario

Demographic + price scenario - MEN

	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	4,909,544	7,250,646	7,608,935	7,944,309	8,367,888	8,741,074
5-9	4,213,372	4,886,632	5,310,839	5,537,462	5,742,435	6,002,121
10-14	4,242,791	5,745,453	6,539,671	7,075,892	7,353,153	7,593,547
15-19	4,144,676	5,592,967	5,899,995	6,668,597	7,137,643	7,300,821
20-24	4,010,295	4,873,447	5,651,928	5,787,998	6,452,619	6,706,737
25-29	4,333,434	5,670,740	5,727,490	6,556,507	6,556,946	7,183,854
30-34	5,144,840	8,308,867	8,466,146	8,578,395	9,705,432	9,731,042
35-39	6,038,526	10,924,004	11,999,726	12,277,661	12,491,462	14,030,081
40-44	7,314,081	12,669,830	15,041,799	16,475,020	16,884,046	17,213,474
45-49	11,050,037	14,792,384	18,424,432	21,731,032	23,742,442	24,334,700
50-54	16,242,962	20,067,134	24,199,676	29,932,754	35,151,656	38,344,548
55-59	22,454,942	28,613,776	28,182,678	33,863,924	41,713,692	48,883,108
60-64	27,663,418	35,242,928	38,954,360	38,576,348	46,279,312	56,897,620
65-69	30,403,461	43,324,964	46,357,344	51,429,316	51,228,300	61,463,272
70-74	27,128,950	39,586,924	50,214,328	54,087,908	60,319,868	60,459,244
75-79	18,893,098	32,411,278	40,574,832	51,912,040	56,376,404	63,310,976
80-84	13,571,664	23,538,252	30,063,712	38,109,188	49,267,116	54,022,432
85+	8,604,170	13,843,748	19,849,002	26,881,142	35,418,052	46,571,264
	220,364,260	317,343,972	369,066,893	423,425,492	480,188,465	538,789,914

Demographic + price scenario - MEN

	2015-2023	2030	2035	2040	2045	2050
0-4	5,056,551	7,706,145	8,086,942	8,443,385	8,893,573	9,290,205
5-9	4,091,898	4,735,655	5,146,756	5,366,377	5,565,017	5,816,680
10-14	4,224,719	5,700,133	6,488,085	7,020,076	7,295,151	7,533,648
15-19	3,988,533	5,404,678	5,701,370	6,444,097	6,897,352	7,055,037
20-24	3,777,090	4,645,227	5,387,253	5,516,951	6,150,448	6,392,666
25-29	4,288,146	5,692,544	5,749,512	6,581,717	6,582,158	7,211,476
30-34	4,906,590	7,953,894	8,104,455	8,211,908	9,290,796	9,315,311
35-39	5,875,508	10,578,981	11,620,728	11,889,885	12,096,933	13,586,957
40-44	7,230,288	12,606,735	14,966,891	16,392,975	16,799,964	17,127,752
45-49	10,701,161	14,633,269	18,226,248	21,497,282	23,487,056	24,072,944
50-54	15,938,436	20,003,492	24,122,926	29,837,824	35,040,172	38,222,936
55-59	21,725,397	27,839,042	27,419,616	32,947,038	40,584,272	47,559,572
60-64	27,390,169	34,265,144	37,873,608	37,506,084	44,995,340	55,319,052
65-69	30,584,687	42,976,444	45,984,424	51,015,600	50,816,196	60,968,836
70-74	27,258,728	38,974,360	49,437,316	53,250,956	59,386,484	59,523,704
75-79	20,018,198	32,919,566	41,211,144	52,726,148	57,260,524	64,303,848
80-84	13,159,531	22,696,552	28,988,670	36,746,448	47,505,384	52,090,652
85+	8,883,377	13,907,589	19,940,536	27,005,104	35,581,380	46,786,028
	219,099,007	313,239,449	364,456,479	418,399,853	474,228,199	532,177,302

Demographic + price scenario - Women

	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	3,666,111	5,450,750	5,718,213	5,968,682	6,286,058	6,566,646
5-9	3,575,097	2,666,495	2,889,205	3,008,978	3,115,986	3,251,920
10-14	5,815,132	4,960,394	5,600,826	6,031,197	6,243,075	6,422,099
15-19	8,178,384	7,800,086	8,140,514	9,108,336	9,673,945	9,822,433
20-24	10,753,209	9,624,674	11,244,928	11,399,589	12,525,877	12,913,206
25-29	13,318,402	12,709,531	13,028,719	14,925,206	14,853,662	15,993,590
30-34	13,359,058	19,049,382	18,910,116	19,350,908	21,799,730	21,687,982
35-39	14,582,474	21,593,392	23,339,548	23,233,984	23,752,526	26,483,826
40-44	19,698,313	23,208,422	26,633,122	28,667,980	28,527,282	29,100,240
45-49	24,844,921	26,558,206	31,183,284	35,570,844	38,144,388	37,877,508
50-54	29,428,661	41,714,672	49,968,668	58,363,204	66,288,236	70,859,800
55-59	3,002,186	37,201,792	37,380,800	44,595,204	51,925,860	58,831,272
60-64	32,636,189	42,941,944	46,595,020	46,861,020	55,803,936	64,870,612
65-69	35,349,071	54,892,584	56,066,560	60,918,400	61,363,472	73,060,176
70-74	33,297,721	53,182,532	67,700,080	69,420,064	75,648,848	76,432,072
75-79	24,123,388	42,826,800	54,150,952	69,350,184	71,517,936	78,357,648
80-84	17,768,455	30,606,442	40,145,480	51,255,400	66,238,380	68,929,512
85+	16,064,743	24,743,466	34,457,052	47,014,792	62,653,360	83,086,776
	309,461,514	461,731,563	533,153,086	605,043,971	676,362,557	744,547,317

Demographic + price scenario - Women

	2015-2023	2030	2035	2040	2045	2050
0-4	3,828,036	5,807,583	6,092,557	6,359,422	6,697,576	6,996,532
5-9	3,593,384	2,717,785	2,944,778	3,066,854	3,175,921	3,314,470
10-14	5,818,623	4,984,678	5,628,246	6,060,724	6,273,639	6,453,540
15-19	7,870,586	7,818,920	8,160,169	9,130,328	9,697,302	9,846,149
20-24	10,736,856	9,407,331	10,990,996	11,142,165	12,243,019	12,621,601
25-29	12,972,976	12,990,166	13,316,401	15,254,764	15,181,641	16,346,738
30-34	13,476,670	18,913,118	18,774,850	19,212,486	21,643,792	21,532,844
35-39	14,382,172	21,834,046	23,599,662	23,492,922	24,017,242	26,778,982
40-44	19,220,535	23,138,698	26,553,108	28,581,852	28,441,576	29,012,814
45-49	24,365,396	26,502,578	31,117,968	35,496,336	38,064,492	37,798,172
50-54	28,768,348	41,287,352	49,456,792	57,765,336	65,609,188	70,133,928
55-59	3,036,647	36,786,604	36,963,612	44,097,504	51,346,344	58,174,688
60-64	34,030,301	43,629,624	47,341,200	47,611,460	56,697,588	65,909,464
65-69	35,824,606	55,053,852	56,231,272	61,097,368	61,543,748	73,274,816
70-74	33,228,071	52,298,220	66,574,376	68,265,760	74,390,976	75,161,176
75-79	25,684,147	43,828,780	55,417,872	70,972,704	73,191,176	80,190,912
80-84	17,894,274	30,849,852	40,464,752	51,663,028	66,765,168	69,477,704
85+	16,516,827	24,709,186	34,409,312	46,949,652	62,566,556	82,971,664
	311,248,456	462,558,372	534,037,922	606,220,665	677,546,943	745,996,193

Demographic + price scenario - Population

	2016-2019, 2023	2030	2035	2040	2045	2050
0-4	8,575,654	12,701,395	13,327,148	13,912,991	14,653,946	15,307,720
5-9	7,788,469	7,553,127	8,200,044	8,546,439	8,858,421	9,254,041
10-14	10,057,923	10,705,847	12,140,497	13,107,088	13,596,228	14,015,645
15-19	12,323,059	13,393,053	14,040,509	15,776,933	16,811,588	17,123,254
20-24	14,763,503	14,498,121	16,896,856	17,187,587	18,978,496	19,619,943
25-29	17,651,836	18,380,271	18,756,209	21,481,713	21,410,608	23,177,444
30-34	18,503,898	27,358,249	27,376,262	27,929,303	31,505,162	31,419,024
35-39	20,621,000	32,517,396	35,339,274	35,511,645	36,243,988	40,513,907
40-44	27,012,394	35,878,252	41,674,921	45,143,000	45,411,328	46,313,714
45-49	35,894,958	41,350,590	49,607,716	57,301,876	61,886,830	62,212,208
50-54	45,671,623	61,781,806	74,168,344	88,295,958	101,439,892	109,204,348
55-59	25,457,128	65,815,568	65,563,478	78,459,128	93,639,552	107,714,380
60-64	60,299,607	78,184,872	85,549,380	85,437,368	102,083,248	121,768,232
65-69	65,752,532	98,217,548	102,423,904	112,347,716	112,591,772	134,523,448
70-74	60,426,671	92,769,456	117,914,408	123,507,972	135,968,716	136,891,316
75-79	43,016,486	75,238,078	94,725,784	121,262,224	127,894,340	141,668,624
80-84	31,340,119	54,144,694	70,209,192	89,364,588	115,505,496	122,951,944
85+	24,668,912	38,587,214	54,306,054	73,895,934	98,071,412	129,658,040
	529,825,773	779,075,535	902,219,979	1,028,469,463	1,156,551,021	1,283,337,231

Demographic + price scenario - Population

	2015-2023	2030	2035	2040	2045	2050
0-4	8,884,587	13,513,728	14,179,498	14,802,807	15,591,149	16,286,737
5-9	7,685,283	7,453,440	8,091,534	8,433,231	8,740,938	9,131,149
10-14	10,043,342	10,684,811	12,116,331	13,080,800	13,568,789	13,987,187
15-19	11,859,119	13,223,598	13,861,539	15,574,425	16,594,654	16,901,186
20-24	14,513,946	14,052,558	16,378,249	16,659,116	18,393,467	19,014,267
25-29	17,261,122	18,682,710	19,065,913	21,836,481	21,763,799	23,558,214
30-34	18,383,260	26,867,012	26,879,305	27,424,394	30,934,588	30,848,155
35-39	20,257,680	32,413,027	35,220,390	35,382,807	36,114,175	40,365,939
40-44	26,450,822	35,745,433	41,519,999	44,974,827	45,241,540	46,140,566
45-49	35,066,557	41,135,847	49,344,216	56,993,618	61,551,548	61,871,116
50-54	44,706,784	61,290,844	73,579,718	87,603,160	100,649,360	108,356,864
55-59	24,762,044	64,625,646	64,383,228	77,044,542	91,930,616	105,734,260
60-64	61,420,470	77,894,768	85,214,808	85,117,544	101,692,928	121,228,516
65-69	66,409,293	98,030,296	102,215,696	112,112,968	112,359,944	134,243,652
70-74	60,486,799	91,272,580	116,011,692	121,516,716	133,777,460	134,684,880
75-79	45,702,346	76,748,346	96,629,016	123,698,852	130,451,700	144,494,760
80-84	31,053,805	53,546,404	69,453,422	88,409,476	114,270,552	121,568,356
85+	25,400,204	38,616,775	54,349,848	73,954,756	98,147,936	129,757,692
	530,347,463	775,797,821	898,494,400	1,024,620,518	1,151,775,142	1,278,173,494

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