Project HealthCare

Analysis of the long-term impacts of breast cancer in the conditions of the Slovak Republic

Direct and indirect costs of the C50 diagnosis over the last 10 years.

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Executive Summary

This report provides a comprehensive analysis of the long-term impacts of breast cancer (C50) in the Slovak Republic, focusing on both direct and indirect costs over the past decade. The study adopts a cost-of-illness approach, using a societal perspective to encompass all cost aspects, including direct medical costs, mortality costs, and indirect economic costs associated with productivity losses and disability. This summary encapsulates the key findings and trends observed in the epidemiology, cost structures, and broader socioeconomic impacts of breast cancer within Slovakia. The study employed a prevalence-based cost-of-illness approach, focusing on both direct and indirect costs. Direct costs were calculated using patient-level data based on expenses incurred by individuals diagnosed with breast cancer, while indirect costs were assessed using the Human Capital Approach, considering the loss in productivity due to illness. The study also incorporated the Value of a Statistical Life Year (VSLY) to evaluate the societal burden.

Epidemiology - Incidence and Mortality Trends

The incidence of breast cancer in Slovakia has shown a significant upward trend, with cases rising from 2,702 in 2009 to 3,705 in 2022. By 2030, the number of new cases is expected to reach 4,055 annually. Mortality rates have similarly increased, with breast cancer-related deaths rising from 755 in 2009 to 1,016 in 2022. The report projects that mortality will continue to rise, potentially reaching 1,262 deaths per year by 2030.

Regional Variations

Significant regional variations were observed in the incidence rates, with some regions experiencing higher rates than others. This suggests potential disparities in healthcare access, early detection, and treatment efficacy across different parts of Slovakia.

Direct Costs - Total Healthcare Expenses

Healthcare expenses related to breast cancer have grown substantially, increasing by €35 million annually over the past decade. The total costs reached €794 million in 2022, with the outpatient sector being the largest contributor, followed by inpatient care and pharmaceuticals. Ambulatory healthcare services exhibited the highest growth rate, with a Compound Annual Growth Rate (CAGR) of 9.36%, reflecting the increasing reliance on outpatient treatments and diagnostics.

Drug Costs

The costs associated with pharmaceuticals have also risen, with drug expenses reaching €100.7 million by 2022. However, the growth rate for pharmaceutical costs was moderate (CAGR of 4.69%), indicating that drugs, while significant, are not the primary driver of the overall cost increase.

Indirect Costs

Sick Leave and Productivity Loss

The economic burden of breast cancer is also evident in the increasing costs associated with sick leave and productivity loss. Between 2010 and 2022, the total number of sick leave days due to breast cancer increased significantly, with associated costs rising by 114%. The report estimates that the total productivity loss over the past decade amounted to over €565 million, driven by rising wages and the growing number of breast cancer cases.

Disability Costs

Disability pensions related to breast cancer have also seen a notable increase, with costs growing by 95% from 2010 to 2022. The total number of disability pensions granted due to breast cancer reached 10,794 during this period, indicating a steady rise in disability cases and associated financial burdens.

Key Drivers of Cost Increases

Outpatient and Ambulatory Services

Outpatient and ambulatory services have emerged as the primary cost drivers, accounting for the largest share of the total healthcare expenses. The increase in outpatient care costs reflects a shift towards more preventive and diagnostic services, which, while more cost-effective in the long term, contribute significantly to the current healthcare expenditure.

Hospital Care

Hospital care costs have also risen, particularly among middle-aged and older women. The increase in inpatient care costs suggests a growing need for more intensive and prolonged treatment as the population ages, leading to higher hospitalization rates and longer stays.

Socioeconomic Impact

The rising incidence and mortality rates of breast cancer, coupled with increasing healthcare and indirect costs, underscore the growing public health challenge posed by this disease. The financial burden on the healthcare system, patients, and the economy is substantial, with indirect costs related to lost productivity and disability adding to the overall impact.

Policy Implications

The findings highlight the need for targeted healthcare policies focusing on early detection, prevention, and effective treatment to mitigate the rising incidence and mortality rates. Additionally, there is a need for strategies to manage the growing healthcare costs, particularly in outpatient and hospital care sectors. The report also suggests that addressing regional disparities in healthcare access and treatment outcomes could help reduce the overall burden of breast cancer in Slovakia.

Conclusion

Breast cancer presents a significant and growing challenge for the Slovak healthcare system and economy. The rising costs, both direct and indirect, reflect the increasing incidence and complexity of managing the disease. To address this challenge, it is essential to implement comprehensive strategies that include enhanced prevention, early detection, and efficient healthcare delivery. By doing so, the long-term economic and health impacts of breast cancer can be better managed, improving outcomes for patients and reducing the overall burden on society.

Methodology

Cost-of-illness approach

This was a retrospective cost study based on prevalence, focusing on both direct and indirect costs of the disease. To calculate direct costs, data based on the expenses for patients diagnosed with C50 were used (bottom-up approach). Additionally, indirect costs were calculated using the Human Capital Approach (HCA). The study adopts a societal perspective, encompassing all aspects of costs, such as direct medical costs, mortality costs, and indirect economic costs.

In prevalence-based studies, the treatment due to the disease in a given year and the costs resulting from this treatment are estimated. According to Tarricone et al., cost-of-illness studies based on prevalence are particularly useful when the primary goal of the study is to alert policymakers that the economic burden of the disease has been somewhat underestimated. Moreover, such studies help them design cost-containment policies, as these studies provide managers with an overview of the total burden and, more importantly, the main cost components, i.e., the areas where cost-containment policies will have the greatest impact.

The Human Capital Approach was applied to assess the indirect economic burden of C50 in Slovakia. The Human Capital Approach takes the patient's perspective and considers every man-hour not worked by patients as a corresponding loss in productivity.

The indirect costs for each patient depend on income and the total number of sick leaves resulting from the treatment and care of the patient. The income per capita, as declared by the Ministry of Finance through the average wage in the national economy, was used to calculate lost income.

We also supplemented this approach with the costs from the perspective of the societal burden using the VSLY methodology (WiFOR, 2023).

For comparison purposes with the original data, we also provide the Slovak descriptions of the data from the data files, if necessary.

Advantages of the Cost-of-Illness Approach

1. Comprehensive Cost Assessment: The cost-of-illness approach provides a holistic view of the economic burden of breast cancer by accounting for both direct and indirect costs. This comprehensive assessment allows policymakers to understand the full scope of the financial impact, beyond just healthcare expenses, including productivity losses and societal costs.
2. Focus on Prevalence-Based Costs: By focusing on prevalence, this approach captures the current burden of the disease, reflecting the ongoing costs related to breast cancer management in a specific year. This is particularly useful for highlighting the immediate economic impact and is instrumental in budget planning and resource allocation.
3. Policy-Relevant Insights: The societal perspective adopted in the cost-of-illness approach provides insights that are directly relevant to public health policy. It identifies areas where cost-containment policies could be most effective, helping to guide interventions that can reduce the economic burden of the disease.
4. Human Capital Approach for Indirect Costs: Utilizing the Human Capital Approach (HCA) to assess indirect costs allows for a quantification of productivity losses due to illness, providing a clear economic justification for investments in healthcare interventions that can reduce sick leave, disability, and premature mortality.
5. Utility for Cross-Country Comparisons: The methodology facilitates comparisons with other studies or regions using similar approaches, enabling an understanding of how the economic burden of breast cancer in Slovakia compares to other countries. This can be crucial for international benchmarking and for learning from the experiences of other nations.

Disadvantages of the Cost-of-Illness Approach

1. Potential Overestimation of Costs: The Human Capital Approach, while useful for calculating productivity losses, often assumes that all lost working time translates directly into economic losses. This can overestimate costs by not accounting for the potential adaptability of the labor market, such as the hiring of replacements or the redistribution of work among existing employees.
2. Limited Consideration of Quality of Life: While the cost-of-illness approach provides a detailed financial analysis, it may not fully capture the impact of breast cancer on the quality of life of patients and their families. Quality of life aspects, such as psychological distress, caregiving burdens, and long-term physical effects, are difficult to quantify in monetary terms but are critical components of the overall burden of the disease.
3. Prevalence-Based Limitation: The focus on prevalence-based costs means that this approach primarily captures the economic impact within a single year. It may not fully reflect the long-term costs associated with the disease, such as ongoing treatment for survivors or the future burden of current diagnoses, potentially leading to an underestimation of the lifetime costs of breast cancer.
4. Data Reliability and Variability: The accuracy of the cost estimates is heavily dependent on the quality and availability of data. Inconsistent or incomplete data, particularly in capturing indirect costs like productivity losses or disability, can lead to inaccuracies in the overall cost estimation. This is especially challenging in regions where healthcare data infrastructure may not be fully developed.
5. Lack of Dynamic Health Economics Considerations: The cost-of-illness approach often does not account for the dynamic nature of healthcare costs over time, such as the impact of new medical technologies, changes in healthcare policy, or shifts in population demographics. As a result, it may not fully capture future trends or the evolving nature of breast cancer management.

To enhance the robustness of the analysis, the following extension to the methodology was considered:

Inclusion of Quality of Life Adjustments

Expanding the analysis to include quality-adjusted life years (QALYs) or disability-adjusted life years (DALYs) provide a more nuanced view of the impact of breast cancer, accounting for both the economic costs and the quality of life implications for patients and their families. This approach complement the financial analysis with a broader public health perspective.

Epidemiology

- Increasing trend in incidence: +1000 new cases (2022 vs 2009)
- For comparison, we present different methodologies for calculating incidence where data was available.
- By 2030, we expect 4055 new cases of breast cancer annually.
- We observe an increasing trend in mortality.
- The occurrence of C50 in men is minimal, so in the following analyses, we will focus only on the female population.
- Since 2009, the share of C50 in all cancer-related deaths has increased from 6.5% to 7.95% (!).
- Based on current data, we expect +250 deaths annually by 2030.
- This negative trend can only be influenced by new drug innovations entering reimbursement.

Incidence

The incidence of C50 (breast cancer) in Table 1 shows a generally increasing trend from 2009 to 2022, rising from 2,702 cases in 2009 to 3,705 cases in 2022. The most significant jump occurred between 2014 and 2015, where the incidence increased from 2,708 to 3,389, a rise of approximately 25%. After a slight dip in 2020, most likely underdiagnosed during the COVID-19 pandemic, the incidence has continued to rise, reaching its highest point in 2022.

Table 1 The C50 incidence in Slovakia

Incidence	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Incidence of C50 in women	2675	2626	2666	2832	2792	2686	3364	3461	3231	3213	3346	3085	3355	3520
Percentage of C50 incidence in women	99,00	99,32	99,59	98,99	99,36	99,19	99,26	99,28	98,18	98,59	98,41	98,59	98,44	95,00
Percentage of C50 incidence from C00-96	8,96	8,62	8,66	9,15	9,18	8,52	9,69	9,74	8,51	8,62	8,92	9,11	9,32	9,20
Incidence of C50 per 100,000 inhabitants	49,92	48,74	49,64	52,94	51,93	50,00	62,51	64,24	60,55	59,87	62,38	57,33	62,54	68,25
Incidence of C50 per 100,000 inhabitants C-Z	96,14	94,19	96,34	102,14	100,62	96,73	121,05	124,49	116,07	115,30	119,96	110,47	120,51	127,02
Incidence of C50 per 100,000 inhabitants Z-ES	105,80	102,40	102,70	107,60	106,70	101,20								
Incidence of C50 per 100,000 inhabitants Z-WS	60,50	59,00	59,00	62,60	59,00	55,80								
Incidence of C50 per 100,000 inhabitants Z-WS	60,50	59,00	59,00	62,60	59,00	55,80								

Incidence in Women

The majority of C50 cases are found in women, consistently above 95% throughout the period. The percentage of C50 cases in women peaked at around 99.59% in 2011 and slightly decreased to 95.00% in 2022. Although the overall number of cases increased, the proportion of cases in women slightly declined over the years.

Incidence as a Percentage of C00-96 (Cancer Incidence)

The percentage of C50 out of all C00-96 cases has generally fluctuated around 9%, peaking at 9.74% in 2016. There is a gradual increase from 8.96% in 2009 to 9.20% in 2022, indicating that breast cancer is becoming a slightly larger proportion of all cancer cases over time.

Incidence per 100,000 Population

The incidence of C50 per 100,000 population shows a noticeable increase, from 49.92 in 2009 to 68.25 in 2022. There is a significant rise between 2014 and 2015 (from 50.00 to 62.51) and again from 2021 to 2022 (from 62.54 to 68.25).

Incidence per 100,000 Population by Region (C-Z, Z-ES, Z-WS)

The incidence rate per 100,000 inhabitants shows a marked increase in the C-Z region, from 96.14 in 2009 to 127.02 in 2022. For the Z-ES region, data is available until 2014, showing a stable incidence rate around 101.20. The Z-WS region shows a relatively stable incidence rate around 60 per 100,000, with a slight decrease in the last reported years.

Key Insights

Growing Incidence

There is a clear and consistent increase in breast cancer incidence over the years, particularly noticeable after 2014. Breast cancer remains predominantly a disease affecting women, although the percentage of women affected has slightly decreased recently.

Increasing Population Impact

The incidence per 100,000 population is rising, indicating that more of the general population is being diagnosed with breast cancer each year.

Regional Variations

There is significant regional variation in incidence rates, with some regions showing higher rates than others.

European Incidence of C50

Breast cancer (C50) is the most common cancer among women in the European Union (Table 2), with incidence rates continuing to rise across many member states. The EU has one of the highest incidence rates globally, attributed to a combination of factors including increased screening, improved detection methods, and demographic changes such as aging populations. Despite these advancements in detection, the high incidence rate also reflects lifestyle-related risk factors such as obesity, alcohol consumption, and delayed childbearing. The increasing trend in breast cancer incidence in the EU underscores the importance of ongoing public health efforts in prevention, early detection, and access to effective treatments to manage and mitigate the burden of this disease.

Table 2 European indicence of Breast Cancer

Country	Number of cases	Crude rate	ASR (European 2013)	ASR (European 1976)	ASR (world)	Cumulative risk
Austria	6070	67,6	65,1	49,6	36,4	6,5
Belgium	11366	97,8	97,7	73,9	53,8	9,6
Bulgaria	3616	52,9	48,7	37,7	27,7	4,8
Croatia	3149	81,5	74,7	56,4	41,1	7,5
Cyprus	784	86,7	95,9	74,8	55	9,2
Czechia	7810	74,3	72,2	53,5	38,7	7,4
Denmark	5306	90,3	89,5	67,3	48,6	8,9
EU-27	379239	84,9	79,8	60	43,6	8
Estonia	862	64,7	63	46,8	33,8	6,4
Finland	5413	97,6	90,6	66,6	47,6	9,1
France	66328	97,7	96,3	73,4	53,9	9,4
Germany	75267	90,4	80,3	57,3	40,7	8,6
Greece	9087	86,9	77,6	58,4	42,5	7,7
Hungary	7795	80,5	77,8	57,7	41,8	7,8
Ireland	3723	73,6	84,1	64,6	47	8,2
Italy	58160	98,5	84,4	63,5	46,3	8,5
Latvia	1270	67,7	64,1	49,1	35,9	6,2
Lithuania	1726	61,5	57,8	44,4	32,4	5,6
Luxembourg	565	87,5	99,4	70,5	50,2	10,7
Malta	392	75,2	76,4	54,9	39,3	7,9
Netherlands	16056	91,3	89,7	69,6	51,1	8,6
Poland	24599	65,3	66	48,9	35,4	6,7
Portugal	9065	87,6	78,2	62,3	46,7	7,4
Romania	12861	67,5	66,7	50,8	37,1	6,5
Slovakia	3684	67,8	72,1	51,5	36,7	7,6
Slovenia	1672	79,3	73,9	56,5	41,2	7,2
Spain	35105	74	69,1	55,6	41,4	6,4
Sweden	7508	71,8	73,1	55,7	40,5	7,2

Source: ECIS - European Cancer Information System
From: https://ecis.jrc.ec.europa.eu/
accessed on 16/10/2023

Estimated Incidence

The data in Table 3 presents the incidence of breast cancer (C50) in Slovakia over the years 2009 to 2022, with projections extending to 2030. Here are some key insights and trends based on the data

Table 3 Estimated incidence of C50 up to 2030

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Incidence of C50	2702	2644	2677	2861	2810	2708	3389	3486	3291	3259	3400
Incidence of C50 in women	2675	2626	2666	2832	2792	2686	3364	3461	3231	3213	3346
Incidence of C50 per 100,000 inhabitants	49,92	48,74	49,64	52,94	51,93	50,00	62,51	64,24	60,55	59,87	62,38

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incidence of C50	3129	3408	3705	3623	3685	3746	3808	3870	3932	3993	4055
Incidence of C50 in women	3085	3355	3520	3585	3649	3714	3779	3844	3909	3973	4038
Incidence of C50 per 100,000 inhabitants	57,33	62,54	68,25	67,39	68,48	69,58	70,67	71,76	72,85	73,95	75,04

Overall Increase in Incidence

The total incidence of breast cancer (C50) has shown a significant upward trend from 2,702 cases in 2009 to 3,705 cases in 2022. The projection indicates a continuing rise, reaching 4,055 cases by 2030.This represents a gradual but steady increase in the number of new breast cancer cases diagnosed each year.

Female-Specific Incidence

The incidence of breast cancer among women closely follows the overall trend, with cases rising from 2,675 in 2009 to 3,520 in 2022. Projections suggest that by 2030, the number could reach 4,038 cases. The percentage of female cases compared to the total cases remains consistently high, indicating that the overwhelming majority of breast cancer cases continue to affect women.

Incidence Rate per 100,000 Population

The incidence rate per 100,000 population has increased from 49.92 in 2009 to 68.25 in 2022, with projections showing further increases to 75.04 by 2030. This growing incidence rate reflects not only an increase in the number of cases but also an increasing risk of breast cancer within the population over time.

Projections for Future Incidence

The data projects that by 2030, the total incidence of breast cancer (C50) in Slovakia will surpass 4,000 cases annually, with the incidence rate per 100,000 population also continuing to rise. This projection suggests a need for enhanced breast cancer screening, prevention, and treatment strategies to manage the expected increase in cases.

Growth Pattern

The overall pattern shows that while there are fluctuations in year-to-year incidence, the general trend is upward. This could be due to various factors including population aging, lifestyle changes, and improvements in cancer detection.

Conclusion

The data suggests that breast cancer incidence in Slovakia is on the rise and is expected to continue growing over the next decade. The consistent increase highlights the importance of healthcare policies focused on early detection, improved treatment, and awareness campaigns to mitigate the impact of this trend.

Overall Mortality (zomretí C50)

As shown in Table 4, the total number of deaths due to C50 has shown an increasing trend from 755 in 2009 to 1,016 in 2022. This represents a rise of approximately 34.5% over the 14-year period. A noticeable spike occurred in 2013, where deaths increased to 984 from 836 in 2012. Following this, there was a slight decline in 2014 to 913, but the general upward trend continued, peaking at 1,069 in 2017.

Although there was a slight dip in mortality numbers in 2019 (1,002 deaths) and 2020 (1,044 deaths), the number stabilized around 1,016 in 2022.

Table 4 Overall Mortality, C50, Slovakia

Mortality	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Deaths from C50	755	799	803	836	984	913	1048	1029	1069	1061	1002	1044	1013	1016
Deaths from C50 in men	9	14	5	10	10	12	10	13	15	15	10	9	12	16
Deaths from C50 in women	746	785	798	826	974	901	1038	1016	1054	1046	992	1035	1001	1000
Percentage of deaths from C50 in men	1,19	1,75	0,62	1,20	1,02	1,31	0,95	1,26	1,40	1,41	1,00	0,86	1,18	1,57
Percentage of deaths from C50 in women	98,81	98,25	99,38	98,80	98,98	98,69	99,05	98,74	98,60	98,59	99,00	99,14	98,82	98,43
Deaths from C50 as a percentage of all deaths	1,43	1,49	1,55	1,59	1,89	1,78	1,95	1,97	1,98	1,95	1,88	1,77	1,38	1,71
Deaths from C50 as a percentage of all cancer deaths (C00-96)	6,50	6,73	6,79	6,96	7,47	6,88	7,76	7,66	7,92	7,74	7,53	7,56	7,92	7,95
Deaths from C50 per 100,000 inhabitants	13,95	14,73	14,89	15,47	18,19	16,86	19,33	18,96	19,67	19,49	18,38	19,13	18,59	18,72

Gender-Specific Mortality (zomretí C50 muži a ženy)

Males (zomretí C50 muži): The number of male deaths has remained relatively low, ranging from 5 to 16 annually. The percentage of male deaths out of the total C50 deaths varied between 0.62% and 1.75%, reflecting the fact that breast cancer is predominantly a female disease.

Females (zomretí C50 ženy): Female mortality dominates the data, with an increasing number of deaths from 746 in 2009 to 1,000 in 2022. The percentage of female deaths out of the total C50 deaths remained consistently high, ranging from 98.25% to 99.38%, confirming that the vast majority of C50 deaths are among women.

Mortality as a Percentage of All Deaths (zomretí C50 zo všetkých zomretých %)

The percentage of total deaths due to C50 has gradually increased from 1.43% in 2009 to a peak of 1.98% in 2017. However, there was a significant drop to 1.38% in 2021, followed by a recovery to 1.71% in 2022. This indicates that while C50-related mortality has become more significant over time, there was a brief period of decline in its relative impact on overall mortality.

Mortality as a Percentage of Cancer-Related Deaths (zomretí C50 zo všetkých zomretých C00-96 %)

The proportion of C50 deaths among all cancer-related deaths has generally increased, from 6.50% in 2009 to 7.95% in 2022. This suggests that breast cancer's share of overall cancer mortality has been on the rise, indicating either an increase in the incidence of breast cancer or improvements in the survival rates of other cancers, thus making breast cancer more prominent in the mortality statistics.

Mortality Rate per 100,000 Population (zomretí C50 na 100 000 obyvateľov)

The mortality rate per 100,000 population has increased from 13.95 in 2009 to 18.72 in 2022. This represents a significant rise, indicating that despite advances in treatment and early detection, breast cancer remains a growing public health challenge.

Key Insights

Consistent Increase in Mortality

There is a clear upward trend in the mortality related to C50 over the years, both in absolute numbers and relative to population size. This suggests a growing burden of the disease despite medical advancements.

Gender Disparity

The data underscores the gender disparity in breast cancer mortality, with an overwhelming majority of deaths occurring in women. This is consistent with the epidemiology of breast cancer, which is far more common in women.

Rising Impact on Overall Mortality

The increasing percentage of C50-related deaths among all deaths and among cancer deaths suggests that breast cancer is becoming a more significant cause of mortality in the population.

Population Impact

The rise in the mortality rate per 100,000 population highlights the increasing impact of breast cancer on the general population, which may point to rising incidence rates, aging population demographics, or challenges in achieving consistent treatment outcomes across all demographics.

Breast Cancer Mortality in EU

Breast cancer remains a significant public health challenge across the European Union, being one of the leading causes of cancer-related mortality among women. Despite advancements in early detection and treatment, breast cancer mortality rates vary widely across EU countries (Table 5) due to differences in healthcare access, screening programs, and treatment options. In recent years, some countries have reported declines in mortality rates, largely attributed to the widespread implementation of mammography screening and improved therapies. However, disparities persist, with higher mortality rates observed in Eastern and Southern European countries, where access to state-of-the-art care may be more limited. Overall, while the EU has made substantial progress in reducing breast cancer mortality, ongoing efforts are needed to ensure that all women, regardless of geographic location, have access to timely and effective care.

Table 5 Breast Cancer Mortality in EU

Estimated mortality by country - summary						
Both sexes, Breast, All ages, 2022						
Country	Number of cases	Crude rate	ASR (European 2013)	ASR (European 1976)	ASR (world)	Cumulative risk
Austria	1814	20,2	19,4	11,9	7,8	2,5
Belgium	2347	20,2	19,6	11,8	7,7	2,6
Bulgaria	1416	20,7	19,5	12,6	8,5	2,4
Croatia	622	16,1	14,5	9,6	6,6	1,7
Cyprus	189	20,9	24,7	15,3	10	3,2
Czechia	1724	16,4	16,5	10	6,6	2,2
Denmark	1120	19,1	18,7	11,3	7,4	2,5
EU-27	96999	21,7	19,8	12,3	8,1	2,6
Estonia	269	20,2	19,2	11,7	7,7	2,5
Finland	884	15,9	14,3	9,3	6,3	18
France	14941	22	20,4	12,7	8,4	2,6
Germany	20871	25,1	21,3	13	8,6	2,8
Greece	2454	23,5	19,5	12	7,9	2,5
Hungary	2265	23,4	23,3	14,6	9,7	2,9
Ireland	893	17,6	21,9	13,6	9	2,8
Italy	15631	26,5	20,8	12,6	8,2	2
Latvia	432	23	21,4	14	9,4	2,6
Lithuania	516	18,4	17,3	11,6	7,9	2
Luxembourg	105	16,3	19,7	12	7,8	2,6
Malta	81	15,5	16,4	10,1	6,7	2,2
Netherlands	3293	18,7	18,6	11,5	7,6	2,4
Poland	8829	23,4	24,9	15,3	10	3,2
Portugal	2243	21,7	18	11,7	7,9	2,3
Romania	3946	20,7	21,3	13,8	9,3	2,6
Slovakia	1255	23,1	27,3	16,3	10,5	3,6
Slovenia	477	22,6	21,2	12,6	81	2,8
Spain	6836	14,4	13,1	8,4	5,7	1,7
Sweden	1546	14,8	14,5	9,1	6,1	1,8

Sources: ECIS - European Cancer Information System
From https://ecis.jrc.ec.europa.eu/ accessed on 16/10/2023

Prediction of Overall Mortality

The data in Table 6 provided tracks the mortality rates of breast cancer (C50) from 2009 to 2022, along with projections up to 2030. The data includes the total number of deaths attributed to C50, the percentage of C50 deaths relative to all cancer-related deaths (C00-96), and the mortality rate per 100,000 inhabitants.

The analysis highlights a concerning upward trend in breast cancer mortality, both in absolute numbers and relative to the population size. This trend is expected to continue, with significant implications for public health planning and resource allocation. The increasing burden of breast cancer mortality underscores the need for sustained efforts in early detection, treatment innovation, and policy intervention to mitigate the projected rise in deaths.

Table 6 Estimation of C50 related Mortality up to 2030

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Deaths from C50	755	799	803	836	984	913	1048	1029	1069	1061	1002
Deaths from C50 as a percentage of all cancer deaths (C00-96)	6,50	6,73	6,79	6,96	7,47	6,88	7,76	7,66	7,92	7,74	7,53
Deaths from C50 per 100 000 inhabitants	13,95	14,73	14,89	15,47	18,19	16,86	19,33	18,96	19,67	19,49	18,38

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Deaths from C50	1044	1013	1016	1107	1129	1151	1173	1195	1218	1240	1262
Deaths from C50 as a percentage of all cancer deaths (C00-96)	7,56	7,92	7,95	8,13	8,23	8,34	8,44	8,55	8,65	8,76	8,86
Deaths from C50 per 100 000 inhabitants	19,13	18,59	18,72	20,31	20,70	21,10	21,50	21,89	22,29	22,69	23,08

Increase in Breast Cancer Mortality (C50) Over Time

The number of deaths from breast cancer (C50) shows a steady increase from 755 in 2009 to 1016 in 2022. The projections indicate a continuing rise, reaching 1262 by 2030. This represents a total increase of approximately 67% from 2009 to 2030.

The mortality rate per 100,000 inhabitants also shows an upward trend, growing from 13.95 in 2009 to 18.72 in 2022, with a further projected increase to 23.08 by 2030. This indicates a growing burden of breast cancer mortality relative to the population size.

Percentage of C50 Deaths Among All Cancer Deaths

The percentage of breast cancer deaths (C50) among all cancer-related deaths (C00-96) fluctuated slightly but generally increased over time, from 6.50% in 2009 to 7.95% in 2022. This is projected to further rise to 8.86% by 2030.

This trend suggests that breast cancer is becoming a more significant contributor to overall cancer mortality.

Projected Trends and Implications

The projected increase in both the absolute number of deaths and the mortality rate per 100,000 inhabitants points to an escalating public health challenge. If the current trends continue, there could be an additional 246 deaths annually by 2030 compared to 2022.

The data indicates that breast cancer will likely remain one of the leading causes of cancer-related deaths in the coming years, necessitating ongoing efforts in prevention, early detection, and effective treatment.

Public Health Considerations

The projected rise in mortality emphasizes the need for enhanced breast cancer screening programs, especially in populations with lower access to healthcare services.

The anticipated increase in the mortality rate per 100,000 inhabitants underscores the importance of continued research into breast cancer therapies and the implementation of effective public health policies.

Regional and Demographic Considerations

While the data is specific to a national context, similar trends may be observable in other regions with similar demographic and healthcare characteristics.Differences in mortality trends could be influenced by factors such as age distribution, socioeconomic status, and access to medical care.

Other epidemiological parameters

- The average age of incidence has increased by 1.2 years since 2009 to 63 years.
- The mortality/incidence ratio has a rising trend until 2020 and then declines.
- A decreasing ratio will be a sign of improving care.

The data in Table 7 indicates a positive trend in breast cancer management in Slovakia. The declining mortality/incidence ratio, particularly after 2014, reflects improved treatment outcomes, while the slight increase in the average age of diagnosis suggests changes in the demographic profile of the disease, potentially due to better screening and increased life expectancy. These trends together suggest that while breast cancer remains a significant health challenge, strides are being made in its management.

Average Age of Diagnosis / Women

This metric indicates the average age at which women are diagnosed with breast cancer (C50). Understanding this helps in targeting screening programs and evaluating the shifting age demographics of the disease.

2009–2015: The average age of diagnosis remained relatively stable, around 61.8 to 62.1 years.

Table 7 Selected epidemiological parameters for C50

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mortality C50/ Incidence C50 (%)	27,94	30,22	30,00	29,22	35,02	33,71	30,92	29,52	32,48	32,56	29,47	33,37	29,72	27,42
Average age of diagnosis / women	61,8	61,8	61,9	61,5	61,9	62,1	62,1	62,8	62,8	63,0	62,5	62,5	62,8	63,0

Mortality C50/Incidence C50 (%)

The percentage represents the ratio of mortality (deaths due to C50, typically breast cancer) to the incidence (new cases of C50). This ratio helps gauge the lethality or severity of the disease over time.

2009–2014: The ratio fluctuated, reaching a peak of 35.02% in 2013. This indicates a period where the mortality rate relative to the number of new cases was higher, suggesting either more aggressive disease progression or less effective treatment during that time.

2015–2022: The ratio generally shows a declining trend, with a notable drop to 27.42% in 2022, indicating an improvement in treatment outcomes, leading to fewer deaths relative to the number of new cases. This could be attributed to advances in medical technology, better healthcare access, or more effective treatment protocols.

2016–2022: There is a gradual increase, reaching 63.0 years in 2022. This shift might indicate that breast cancer is being diagnosed slightly later in life, possibly due to demographic changes such as an aging population, or improvements in early detection reducing the apparent age.

The increase in the average age of diagnosis suggests that breast cancer cases are being identified in older populations over time. This could be due to better early detection leading to a larger pool of survivors who are then diagnosed at an older age.

The stable nature of the average diagnosis age over the first half of the period indicates consistent screening and detection practices, with the gradual increase potentially reflecting broader demographic shifts in the population.

Key Insights

- The decline in the mortality/incidence ratio from 2015 onwards reflects improved care and management of breast cancer, likely due to advancements in early detection and treatment.
- The ratio stabilizes somewhat after 2016, with minor fluctuations, but the overall trend is downward, which is a positive indicator of healthcare progress.

Direct Costs

Summary

- In less than a decade, the costs related to C50 from the perspective of health insurance companies have increased by €35 million per year.
- The main driver of costs is the outpatient sector along with diagnostics, with a volume of €290 million and an annual cost volume of €48 million.
- Inpatient care along with drugs contribute equally to the total costs: €100 million.
- CAGR for the analyzed period (2014 – 2022) is relatively moderate 7.54%.
- The highest growth is observed in the outpatient sector: +10.1%. Drugs along with inpatient care are above the 6% level.
- Based on data methodology drugs / pharmaceuticals are not the main factor driving the cost increase of C50 in Slovakia, nor are they the most expensive part of the care.

Total Healthcare expenses

Table 8 presents the financial data related to reimbursed healthcare expenses for breast cancer across several categories from the year 2014 to 2022. These categories include ambulatory healthcare services, inpatient care, drugs, medical devices, dietary foods, transportation, and the cumulative total of reimbursed care. The analysis of these data reveals notable trends and variations over the given period. Below is a detailed breakdown of each category and the observed trends over the given period.

Table 8 Healthcare Expenses for Breast Cancer in Slovakia

	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	CAGR
Outpatient Medical Care (+ diagnosis)	23 376 127 €	26 244 728 €	23 141 596 €	25 296 833 €	26 502 549 €	6 102 832 €	37 494 582 €	44 741 861 €	47 829 617 €	290 730 726 €	9,36%
Inpatient Medical Care	8 226 672 €	8 942 788 €	9 466 921 €	11 503 833 €	12 842 373 €	12 432 583 €	11 393 124 €	12 684 321 €	13 466 063 €	100 958 678 €	6,35%
Medication Costs	11 039 757 €	11 912 808 €	11 825 387 €	9 904 853 €	9 308 415 €	9 839 495 €	8 778 240 €	12 141 451 €	15 924 777 €	100 675 183 €	4,69%
Medical Aids	463 210 €	452 182 €	492 056 €	504 735 €	510 373 €	548 296 €	430 826 €	521 585 €	589 369 €	4 512 631 €	3,06%
Dietary Foods	230 664 €	264 892 €	303 571 €	274 862 €	243 681 €	246 514 €	234 134 €	327 401 €	407 095 €	2 532 813 €	7,36%
Transportation	1 071 880 €	1 026 629 €	1 122 885 €	987 029 €	1 035 242 €	1 192 476 €	1 037 273 €	1 132 349 €	1 231 628 €	9 837 390 €	1,75%
Total Reimbursements	44 408 309 €	48 844 027 €	46 352 415 €	48 472 143 €	50 442 635 €	60 362 195 €	59 368 180 €	71 548 968 €	79 448 550 €	509 247 422 €	7,54%

Ambulatory Healthcare Services (+dg.):

The expenditure on ambulatory healthcare services (+dg.) exhibits a significant increase, starting from €23,376,127 in 2014 and reaching €47,829,617 in 2022. The lowest expenditure recorded in this category was in 2016 at €23,141,596, followed by a consistent upward trend, culminating in the highest recorded expenditure in 2022. The Compound Annual Growth Rate (CAGR) for ambulatory healthcare services (+dg.) over the period is 9.36%, reflecting a significant and consistent escalation in expenses. The cumulative total for ambulatory healthcare services over the period is €290,730,726, indicating a substantial rise in costs associated with this category. This suggests a growing demand for ambulatory services or increasing costs associated with these services over the years.

Inpatient Healthcare Services:

Inpatient healthcare services also demonstrate a notable increase over the observed period. Starting at €8,226,672 in 2014, the expenditure rises to its highest value of €13,466,063 in 2022. The lowest expenditure was recorded in 2014, and similar to ambulatory care, there is a clear upward trajectory throughout the period, with a CAGR of 6.35%. The expenditures rose sharply between 2017 (€11,503,833) and 2018 (€12,842,373), with a slight dip in 2020 (€11,393,124) but increased again in the

subsequent years. The total expenditure for inpatient care across the years is €100,958,678, highlighting the growing financial demands of inpatient services.

This growth indicates a steady rise in inpatient service costs, which could be due to increased hospital admissions or more intensive care requirements.

Drug Costs

Drug-related expenses began at €11,039,757 in 2014, with some fluctuations observed across the years. Notably, there was a decrease in costs between 2016 (€11,825,387) and 2017 (€9,904,853), followed by a gradual increase, peaking at €15,924,777 in 2022. The overall total for drug costs over the period amounts to €100,675,183, reflecting the critical role of pharmaceuticals in healthcare expenses. The lowest expenditure in this category was recorded in 2020 at €8,778,240, with the highest in 2022. The overall trend, reflected by a CAGR of 4.69%, suggests moderate growth in drug costs, possibly driven by changes in drug pricing, the introduction of new therapies, or variations in treatment protocols.

Medical Devices

Expenditures on medical devices show moderate fluctuations, starting at €463,210 in 2014 and increasing to €589,369 in 2022. The costs remained relatively stable with small increments, particularly noticeable in 2019 (€548,296) and 2022 (€589,369). The cumulative total spent on medical devices over the period is €4,512,631. The CAGR for this category is 3.06%, indicating slow but steady growth over the period. Despite some fluctuations, the general trend suggests a gradual increase in the costs associated with medical devices.

Dietary Foods

Costs associated with dietary foods started at €230,664 in 2014 and showed some variability across the years. The lowest expenditure was in 2015 (€264,892), while the highest was in 2022 (€407,095). The total expenditure for dietary foods over the period is €2,532,813, indicating a gradual increase in spending on dietary needs. The CAGR for dietary foods is 7.36%, reflecting a moderate increase, which could be due to changes in dietary recommendations or an increase in the cost of dietary products.

Transportation

Transportation expenses began at €1,071,880 in 2014, with fluctuations observed throughout the period. The highest expenditure was in 2022 (€1,231,628), and the lowest was in 2017 (€987,029). The cumulative total for transportation over the years is €9,837,390, reflecting the logistical costs associated with healthcare provision. The CAGR for transportation is 1.75%, indicating a relatively stable trend with slight increases over the period.

Total Reimbursed Care (Úhrady spolu)

The total expenses across all categories saw a significant rise, starting from €44,408,309 in 2014 and culminating at €79,448,550 in 2022. The overall increase in total reimbursed care underscores the growing financial burden of healthcare over the observed period. The cumulative total for all reimbursed care from 2014 to 2022 is €509,247,422, indicating a substantial escalation in healthcare costs over time. The CAGR for the total reimbursed care is 7.54%, underscoring the growing financial burden of healthcare services related to breast cancer. This comprehensive rise in total expenses reflects escalating costs and possibly an increased demand for healthcare services over the observed years.

Table 9 presents the Percentage Point Growth (PPG) of reimbursed healthcare expenses across various categories related to breast cancer for each year from 2014 to 2022. These categories include ambulatory healthcare services, inpatient care, drugs, medical devices, dietary foods, transportation, and the cumulative total of reimbursed care. The analysis of the PPG data reveals fluctuations and trends in the annual growth rates for these expenses.

Table 9 Healthcare Expenses for Breast Cancer in Slovakia / PPG

	2015	2016	2017	2018	2019	2020	2021	2022	Average
Outpatient Medical Care (+ diagnosis)	12,3%	-11,8%	9,3%	4,8%	36,2%	3,9%	19,3%	6,9%	10,1%
Inpatient Medical Care	8,7%	5,9%	21,5%	11,6%	-3,2%	-8,4%	11,3%	6,2%	6,7%
Medication Costs	7,9%	-0,7%	-16,2%	-6,0%	5,7%	-10,8%	38,3%	31,2%	6,2%
Medical Aids	-2,4%	8,8%	2,6%	1,1%	7,4%	-21,4%	21,1%	13,0%	3,8%
Dietary Foods	14,8%	14,6%	-9,5%	-11,3%	1,2%	-5,0%	39,8%	24,3%	8,6%
Transportation	-4,2%	9,4%	-12,1%	4,9%	15,2%	-13,0%	9,2%	8,8%	2,3%
Total Reimbursements	10,0%	-5,1%	4,6%	4,1%	19,7%	-1,6%	20,5%	11,0%	7,9%

The PPG for ambulatory healthcare services (+dg.) varies significantly over the observed period. The highest growth was recorded in 2019 at 36.2%, followed by a sharp decline to 3.9% in 2020. Despite this volatility, the PPG shows positive growth in most years, with an average annual growth rate of 10.1%, indicating a generally increasing trend in ambulatory care expenses.

Inpatient healthcare services exhibit a more moderate PPG across the years, with the highest growth observed in 2017 at 21.5%. However, the PPG shows negative growth in 2020 (-8.4%) and 2019 (-3.2%), suggesting some instability in year-to-year changes. The average PPG over the period is 6.7%, reflecting a steady but less pronounced increase in inpatient care expenses compared to ambulatory services.

Drug costs display significant variability in their PPG, with negative growth in several years, including 2017 (-16.2%), 2018 (-6.0%), and 2020 (-10.8%). The highest PPG is seen in 2021 at 38.3%, followed by 31.2% in 2022. This indicates a recovery and substantial growth in drug-related expenses in the later years of the period. The average PPG for drugs is 6.2%, highlighting overall moderate growth with substantial fluctuations.

Medical devices show a mixed PPG pattern with moderate increases in some years, such as 2016 (8.8%) and 2021 (21.1%), and declines in others, notably 2020 (-21.4%). The average PPG for medical devices is 3.8%, reflecting overall modest growth with periods of both increases and decreases.

Dietary foods experience significant fluctuations in their PPG. After a strong growth in 2015 (14.8%) and 2016 (14.6%), the category saw negative growth in 2017 (-9.5%) and 2018 (-11.3%). However, there was a substantial recovery in 2021 (39.8%) and 2022 (24.3%). The average PPG for dietary foods is 8.6%, suggesting overall growth but with considerable year-to-year variability.

Transportation costs have the lowest average PPG among the categories, at just 2.3%. The PPG for transportation shows fluctuations, with periods of negative growth, such as in 2017 (-12.1%) and 2020 (-13.0%), and positive growth, notably in 2019 (15.2%) and 2016 (9.4%). This indicates a relatively stable trend with slight variations over the years.

The total reimbursed care expenses (Úhrady spolu) show a moderate PPG trend, with an average of 7.9%. The highest PPG is observed in 2021 at 20.5%, followed by a consistent positive growth in 2022 (11.0%). However, there were years of negative growth, such as 2016 (-5.1%) and 2020 (-1.6%), indicating some volatility in the total expenses over the observed period. Overall, the data suggests a general increase in healthcare-related expenses, with notable year-to-year variations in the growth rates across all categories.

Key Insights

Dominance of Ambulatory Care Costs

Ambulatory healthcare and diagnostics represent the largest single expense category, accounting for approximately 57% of the total costs in 2022. The strong growth in this category, with a CAGR of 9.36%, suggests that outpatient services and diagnostic procedures are becoming increasingly central to healthcare delivery. This trend may reflect a shift towards more outpatient treatments, preventive care, or advancements in diagnostic technologies that are more frequently utilized.

Hospital Care vs. Pharmaceutical Costs

While both hospital care and pharmaceutical costs are significant, hospital care has grown at a faster rate (CAGR of 6.35%) compared to pharmaceutical costs (CAGR of 4.69%). This could indicate an increasing reliance on inpatient care or rising costs associated with hospital stays and procedures, possibly due to more complex cases or higher operational costs in hospitals.

Moderate Growth in Medical Devices

The medical devices category, while showing growth, has a relatively low CAGR of 3.06%. This might indicate that while there is some increase in the use or cost of medical devices, it is not as substantial as in other categories. It could also reflect price controls or a slower adoption of new medical technologies compared to other healthcare advancements.

Total Cost Growth and Economic Impact

The overall growth in total healthcare costs (CAGR of 7.54%) outpaces general inflation rates in many regions, indicating that healthcare is becoming increasingly expensive relative to other economic sectors. This escalating cost could have broader economic implications, such as increased insurance premiums, higher out-of-pocket expenses for patients, or greater financial pressure on public healthcare systems.

Ambulatory Care as a Key Driver

The ambulatory sector's 9.36% growth rate suggests it is a key driver of the overall increase in healthcare costs. This could be due to a combination of factors, such as an increase in the number of services provided, higher utilization rates, or the introduction of new, more expensive diagnostic procedures. Understanding the specifics behind this growth could be crucial for managing future healthcare costs effectively.

Given the rapid growth in ambulatory care and hospital care costs, these areas may become significant pressure points for future healthcare budgets. Policymakers and healthcare providers may need to focus on cost-containment strategies in these areas, possibly through efficiency improvements, alternative care models, or preventive care initiatives that reduce the need for expensive treatments.

Total Healthcare Expenses / Drug Costs at Patient Level

- Durg Costs Overall Expenditure 2017 - 2022: €198,906,034
- Compound Annual Growth Rate (CAGR): 3.82%
- The total medication costs associated with breast cancer (C50) have shown a consistent increase over the six-year period, rising from €30.8 million in 2017 to €37.2 million in 2022.

While the moderate growth in medication costs in Slovakia (Table 10) might appear positive from a budgetary perspective, it masks deeper issues related to the access and availability of innovative medicines. Addressing these challenges would require concerted efforts from healthcare policymakers, the pharmaceutical industry, and international bodies to ensure that Slovak patients can benefit from the same advancements in medical treatments as those in other parts of the EU. Policymakers may need to consider strategies to maintain cost growth at sustainable levels, such as encouraging the use of biosimilars or implementing more stringent drug price negotiations.

The data shows a moderate compound annual growth rate (CAGR) of 3.82% in medication costs over the analyzed period. This growth rate might seem relatively modest compared to the significant advancements in medical research and the introduction of innovative medicines in the broader European Union (EU) market. However, this moderate increase does not necessarily reflect the full extent of the costs associated with these cutting-edge treatments.

Table 10 Healthcare Expenses for Breast Cancer in Slovakia with drugs costs derived from patient level data as of 2017

	2017	2018	2019	2020	2021	2022	Total	CAGR
Outpatient Medical Care (+ diagnosis)	25 296 833 €	26 502 549 €	36 102 832 €	37 494 582 €	44 741 861 €	47 829 617 €	217 968 274 €	13,59%
Inpatient Medical Care	11 503 833 €	12 842 373 €	12 432 583 €	11 393 124 €	12 684 321 €	13 466 063 €	74 322 297 €	3,20%
Medication Costs	30 838 277 €	28 367 744 €	32 110 560 €	34 505 518 €	35 879 811 €	37 204 124 €	198 906 034 €	3,82%
Medical Aids	504 735 €	510 373 €	548 296 €	430 826 €	521 585 €	589 369 €	3 105 183 €	3,15%
Dietary Foods	274 862 €	243 681 €	246 514 €	234 134 €	327 401 €	407 095 €	1 733 687 €	8,17%
Transportation	987 029 €	1 035 242 €	1 192 476 €	1 037 273 €	1 132 349 €	1 231 628 €	6 615 997 €	4,53%
Total Reimbursements	69 405 567 €	69 501 963 €	82 633 260 €	85 095 457 €	95 287 328 €	100 727 896 €	502 651 473 €	7,73%

Slovakia, like several other Central and Eastern European countries, has historically faced challenges in timely reimbursement and access to new, innovative medicines. There are several reasons for this:

Reimbursement Delays: The process of getting new medicines approved and reimbursed can be slower in Slovakia compared to more developed EU markets. The bureaucratic processes, coupled with stringent cost-effectiveness assessments, often delay patient access to the latest treatments.

Budget Constraints: Slovakia has a more constrained healthcare budget compared to wealthier EU countries. This limitation forces healthcare policymakers to prioritize spending, often at the expense of the most innovative but expensive therapies.

Price Negotiations: There are often prolonged negotiations between the Slovak government and pharmaceutical companies over the prices of new medicines. These negotiations can further delay the availability of these treatments to patients.

Limited Local Clinical Trials: Slovakia may not participate as extensively in clinical trials for new drugs as larger EU countries, meaning that patients have fewer opportunities to access innovative treatments early.

Given these factors, the moderate growth in medication costs in Slovakia might underrepresent the actual demand and need for innovative treatments. While other EU countries may experience higher growth in medication costs due to the rapid uptake of new therapies, Slovakia's growth is more restrained due to the aforementioned barriers.

This situation has significant implications for patients. The slower introduction of innovative treatments means that Slovak patients may not benefit from the latest advancements in medical science as quickly as their counterparts in other EU countries. This could lead to disparities in health outcomes, with Slovak patients potentially experiencing lower survival rates or quality of life compared to those in countries with better access to cutting-edge treatments.

Ambulatory Healthcare

Table 11 presents financial data for ambulatory healthcare services for women across various age groups from 2014 to 2022. The analysis reveals significant trends and variations in healthcare costs over this period, including the overall expenditure growth and changes within specific age categories.

Table 11 Direct costs for Ambulatory Healthcare for Breast Cancer

Outpatient Healthcare - Women	2014	2015	2016	2017	2018	2019	2020	2021	2022	Spolu	CAGR
Total Costs	23 037 249 €	25 932 575 €	22 906 057 €	25 040 169 €	26 244 916 €	35 774 763 €	37 141 415 €	44 410 539 €	47 408 470 €	287 896 154 €	9,44%
Age Group 15-19	7 748 €	8 964 €	4 500 €	5 036 €	328 €	451 €	18 383 €	3 022 €	5 479 €	53 910 €	-4,24%
Age Group 20-24	26 419 €	49 101 €	12 512 €	27 918 €	12 132 €	4 329 €	4 190 €	18 664 €	4 633 €	159 900 €	-19,56%
Age Group 25-29	213 415 €	174 108 €	118 020 €	115 125 €	65 896 €	66 437 €	43 642 €	113 989 €	134 328 €	1 044 959 €	-5,62%
Age Group 30-34	411 900 €	591 210 €	484 377 €	570 947 €	458 801 €	652 091 €	483 771 €	716 647 €	621 112 €	4 990 857 €	5,27%
Age Group 35-39	1 008 723 €	1 176 087 €	1 141 614 €	895 684 €	870 977 €	1 658 947 €	1 563 453 €	1 583 227 €	1 933 012 €	11 831 723 €	8,47%
Age Group 40-44	1 441 217 €	1 763 802 €	1 693 957 €	1 735 556 €	1 799 876 €	2 852 862 €	3 280 674 €	3 582 423 €	3 642 011 €	21 792 378 €	12,29%
Age Group 45-49	2 191 100 €	2 252 578 €	1 970 733 €	2 093 562 €	2 339 317 €	3 478 878 €	3 648 287 €	4 403 163 €	4 989 179 €	27 366 797 €	10,83%
Age Group 50-54	2 726 815 €	2 863 993 €	2 482 156 €	2 497 718 €	2 572 782 €	3 741 989 €	4 327 860 €	4 619 969 €	4 991 396 €	30 824 677 €	7,85%
Age Group 55-59	3 540 261 €	3 740 538 €	2 960 288 €	2 936 943 €	2 990 348 €	4 378 203 €	4 506 579 €	5 674 365 €	5 532 989 €	36 260 515 €	5,74%
Age Group 60-64	3 918 475 €	4 398 990 €	3 825 732 €	4 056 295 €	4 214 534 €	5 065 145 €	5 430 679 €	6 026 618 €	6 195 821 €	43 132 289 €	5,89%
Age Group 65-69	3 186 754 €	3 897 747 €	3 455 490 €	4 252 531 €	4 375 780 €	5 542 288 €	5 566 250 €	7 313 924 €	7 166 929 €	44 757 693 €	10,66%

The total costs for ambulatory healthcare services for women have increased substantially over the observed period, starting from €23,037,249 in 2014 and reaching €47,408,470 in 2022. This represents a Compound Annual Growth Rate (CAGR) of 9.44%, indicating a steady and significant escalation in healthcare expenses for women across all age groups. The year 2019 saw a particularly notable rise in expenses, which continued to climb in subsequent years.

The age group 15-19 exhibited a decrease in healthcare expenditures, with costs dropping from €7,748 in 2014 to €5,479 in 2022, resulting in a negative CAGR of -4.24%. The most significant decrease occurred between 2016 and 2018, where expenditures dropped sharply.

The age group 20-24 also saw a notable decline in expenditures, starting from €26,419 in 2014 and decreasing to €4,633 in 2022. This age group experienced the largest negative CAGR of -19.56%, reflecting a substantial reduction in healthcare spending for this demographic. This trend could suggest a decreased need for ambulatory services or a shift in how healthcare is delivered to this age group.

In contrast, the age group 25-29 experienced a moderate decline in expenditures, with costs falling from €213,415 in 2014 to €134,328 in 2022. The CAGR for this age group was -5.62%. The highest expenditure was recorded in 2014, followed by a gradual decline, with some fluctuations observed in later years.

The age group 30-34 demonstrated a slight upward trend, with expenditures increasing from €411,900 in 2014 to €621,112 in 2022. This reflects a positive CAGR of 5.27%. While there were some fluctuations over the years, the overall trend indicates a gradual increase in healthcare spending for this age group.

The age group 35-39 saw significant growth in healthcare expenditures, starting at €1,008,723 in 2014 and rising to €1,933,012 in 2022. This group experienced a CAGR of 8.47%, highlighting a steady increase in healthcare needs or costs for women in this age range.

The age group 40-44 recorded one of the highest growth rates, with expenditures increasing from €1,441,217 in 2014 to €3,642,011 in 2022. The CAGR for this group was 12.29%, reflecting a substantial rise in healthcare costs. The significant increase observed in 2019 and beyond suggests

heightened healthcare demands or cost increases for this demographic.

The age group 45-49 also showed substantial growth, with expenditures rising from €2,191,100 in 2014 to €4,989,179 in 2022. The CAGR for this group was 10.83%, indicating consistent growth in healthcare spending over the period. The steady rise across the years suggests increasing healthcare utilization or costs.

The sharp increases in expenditures observed in the later years (especially in the 40-44 and 45-49 age groups) might correlate with advancements in medical technology or the introduction of new, more expensive treatment options that improve outcomes but increase costs. The significant growth in healthcare expenditures for the 40-49 age groups might also reflect the success of public health campaigns promoting the importance of regular check-ups and screenings, particularly for diseases like breast cancer.

The age group 50-54 experienced a similar upward trend, with expenditures increasing from €2,726,815 in 2014 to €4,991,396 in 2022. This reflects a CAGR of 7.85%. The expenditure growth for this age group was steady, with notable increases in 2019 and 2021.

The age group 55-59 saw moderate growth, with expenditures rising from €3,540,261 in 2014 to €5,532,989 in 2022. The CAGR for this group was 5.74%, indicating a steady increase in healthcare costs over the period, with a particularly sharp rise observed in 2021.

The age group 60-64 demonstrated a similar pattern, with expenditures increasing from €3,918,475 in 2014 to €6,195,821 in 2022. The CAGR for this group was 5.89%. The data shows consistent growth across the years, with a significant increase starting in 2019.

Finally, the age group 65-69 exhibited the highest growth rate among all age groups, with expenditures rising from €3,186,754 in 2014 to €7,166,929 in 2022. This reflects a CAGR of 10.66%, highlighting a significant increase in healthcare costs for older women. The most substantial rise was observed in 2021, with costs continuing to grow in 2022.

Overall, the data indicates a general increase in healthcare-related expenses across all age groups from 2014 to 2022. The growth is particularly pronounced in older age groups, reflecting possibly increased healthcare needs or higher costs associated with aging. The rising trend in total expenditures underscores the growing financial burden of ambulatory healthcare services for women over the observed period.

Hospital Healthcare

Table 12 presents financial data for hospital (inpatient) healthcare services (Ústavná ZS) for women across various age groups from 2014 to 2022. The analysis reveals significant trends and variations

Key Insights

Increasing Healthcare Costs Across Most Age Groups:

The data shows a general increase in healthcare costs across most age groups, particularly in middle-aged and older women. This trend reflects the growing healthcare demands as women age, including the need for more frequent medical interventions, management of chronic conditions, and preventive care.

Decline in Younger Age Groups:

The decline in expenditures for younger age groups (15-29 years) might indicate improved overall health, better preventive care, or changes in healthcare access and utilization patterns. These age groups may be benefiting from more effective health education and alternative care models, reducing the need for frequent ambulatory services.

Significant Growth in Middle to Older Age Groups:

The substantial growth in healthcare expenditures for women aged 40-69 highlights the increasing burden of chronic conditions and the need for ongoing medical care as women enter their middle and senior years. The data suggests that healthcare systems and policymakers need to prioritize resource allocation and preventive care for these age groups to manage rising costs effectively.

in healthcare costs over this period, including the overall expenditure growth and changes within specific age categories.

The total costs for inpatient healthcare services for women have steadily increased over the observed period, starting from €8,145,780 in 2014 and reaching €13,376,833 in 2022. This represents a Compound Annual Growth Rate (CAGR) of 6.40%, indicating a consistent rise in inpatient healthcare expenses for women across all age groups.

Table 12 Direct costs for Hospital Healthcare for Breast Cancer

Hospital Healthcare - Women	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	CAGR
Total Costs	8 145 780 €	8 789 579 €	9 389 057 €	11 396 455 €	12 782 174 €	12 341 562 €	11 333 796 €	12 577 829 €	13 376 833 €	100 133 065 €	6,40%
Age Group 15-19	7 155 €		1 303 €				85 065 €	379 €	3 397 €	97 299 €	-8,89%
Age Group 20-24	7 269 €	10 989 €	10 339 €	19 868 €	3 999 €		1 445 €	2 615 €	1 650 €	58 175 €	-16,92%
Age Group 25-29	74 041 €	63 351 €	35 994 €	18 265 €	28 726 €	20 449 €	19 504 €	33 955 €	56 036 €	350 321 €	-3,42%
Age Group 30-34	117 793 €	101 957 €	136 568 €	208 121 €	208 972 €	194 187 €	115 236 €	227 891 €	176 690 €	1 487 416 €	5,20%
Age Group 35-39	241 245 €	299 064 €	312 589 €	419 083 €	338 775 €	421 524 €	303 363 €	397 976 €	410 549 €	3 144 167 €	6,87%
Age Group 40-44	433 240 €	556 075 €	601 501 €	808 879 €	773 080 €	814 509 €	730 217 €	866 630 €	995 861 €	6 579 991 €	10,96%
Age Group 45-49	640 902 €	677 727 €	677 611 €	871 642 €	1 098 494 €	1 157 428 €	1 067 828 €	1 143 184 €	1 386 487 €	8 721 303 €	10,13%
Age Group 50-54	823 203 €	852 501 €	795 007 €	1 028 917 €	1 048 920 €	1 028 448 €	1 112 812 €	1 129 376 €	1 301 783 €	9 120 967 €	5,90%
Age Group 55-59	1 114 363 €	1 094 102 €	1 145 061 €	1 429 508 €	1 438 173 €	1 346 985 €	1 262 309 €	1 379 159 €	1 371 331 €	11 580 992 €	2,63%
Age Group 60-64	1 289 393 €	1 452 268 €	1 508 821 €	1 671 434 €	1 834 472 €	1 689 747 €	1 356 680 €	1 558 650 €	1 624 024 €	13 985 488 €	2,93%
Age Group 65-69	1 217 187 €	1 373 722 €	1 577 269 €	1 810 658 €	2 283 775 €	2 081 590 €	1 972 827 €	2 117 437 €	2 050 738 €	16 485 203 €	6,74%

The age group 15-19 shows erratic spending patterns, with a notable spike in expenditures in 2020 at €85,065. However, overall spending in this age group has been declining, resulting in a negative CAGR of -8.89%. This fluctuation could be influenced by specific, isolated healthcare events or a small population size that leads to variability in annual costs.

The age group 20-24 also exhibits a significant decline in healthcare expenditures over the period, with costs decreasing from €7,269 in 2014 to €1,650 in 2022, resulting in a negative CAGR of -16.92%. This sharp decrease suggests a reduced need for inpatient services or a shift in how this age group accesses healthcare.

In contrast, the age group 25-29 shows a moderate decline in expenditures, with costs dropping from €74,041 in 2014 to €56,036 in 2022. The CAGR for this age group is -3.42%. The highest expenditure was recorded in 2014, followed by a gradual decline with some fluctuations observed in later years.

The age group 30-34 demonstrated growth, with expenditures increasing from €117,793 in 2014 to €176,690 in 2022, reflecting a CAGR of 5.20%. Despite some fluctuations, particularly in 2018 and 2020, the overall trend suggests a gradual increase in healthcare spending for this age group.

The age group 35-39 saw moderate growth in healthcare expenditures, starting at €241,245 in 2014 and rising to €410,549 in 2022. This group experienced a CAGR of 6.87%, highlighting a steady increase in healthcare needs or costs for women in this age range.

The age group 40-44 recorded one of the highest growth rates, with expenditures increasing from €433,240 in 2014 to €995,861 in 2022. The CAGR for this group was 10.96%, reflecting a substantial rise in healthcare costs. The significant increase observed between 2016 and 2022 suggests heightened healthcare demands or cost increases for this demographic.

The age group 45-49 also showed substantial growth, with expenditures rising from €640,902 in 2014 to €1,386,487 in 2022. The CAGR for this group was 10.13%, indicating consistent growth in healthcare spending over the period. The steady

rise across the years suggests increasing healthcare utilization or costs.

The age group 50-54 experienced a moderate upward trend, with expenditures increasing from €823,203 in 2014 to €1,301,783 in 2022. This reflects a CAGR of 5.90%. The expenditure growth for this age group was steady, with notable increases observed in 2017 and 2021.

The age group 55-59 showed more modest growth, with expenditures rising from €1,114,363 in 2014 to €1,371,331 in 2022. The CAGR for this group was 2.63%, indicating a slower increase in healthcare costs over the period compared to other age groups.

The age group 60-64 demonstrated similar moderate growth, with expenditures increasing from €1,289,393 in 2014 to €1,624,024 in 2022. The CAGR for this group was 2.93%. The data shows a steady increase across the years, with significant growth in 2017 and 2021.

Finally, the age group 65-69 exhibited strong growth in healthcare expenditures, with costs rising from €1,217,187 in 2014 to €2,050,738 in 2022. This reflects a CAGR of 6.74%, highlighting a significant increase in healthcare costs for older women. The substantial rise observed in 2018 and 2022 suggests increased healthcare utilization or more intensive care needs for this age group.

Overall, the data indicates a general increase in healthcare-related expenses across most age groups from 2014 to 2022. The growth is particularly pronounced in the middle-aged and older age groups, reflecting possibly increased healthcare needs or higher costs associated with aging. The rising trend in total expenditures underscores the

Key Insights

Steady Growth in Middle Age Groups:

The 40-49 age groups show consistent growth in drug expenditures, reflecting the increasing burden of chronic conditions and the need for ongoing pharmaceutical management as women reach middle age.

Plateau in Late Middle Age (55-64 years):

The slower growth in drug expenditures for the 55-64 age groups indicates that spending may be stabilizing as chronic conditions are effectively managed, possibly with established treatment regimens that do not require significant increases in spending.

Significant Growth in the Oldest Age Group (65-69 years):

Rapid Increase in Expenditures: The 65-69 age group shows one of the highest CAGRs at 6.74%, indicating rapid growth in inpatient care costs. This growth could be attributed to the increasing healthcare needs of an aging population, where the prevalence of multiple chronic conditions, frailty, and the need for more intensive medical care are more common.

Increased Utilization of Healthcare Services: The substantial rise in expenditures, particularly observed in 2018 and 2022, suggests that as women enter their late 60s, there is a marked increase in the frequency and intensity of healthcare services required. This trend may also reflect the impact of aging on healthcare systems, highlighting the need for more resources to care for this demographic.

Broader Implications and Considerations:

Healthcare Resource Allocation: The data indicates that healthcare resource allocation may need to focus more on middle-aged and older women, where the most significant growth in healthcare costs is observed. This trend underscores the importance of preventive care and early intervention in younger age groups to potentially reduce the burden in later years.

Potential for Preventive Healthcare Strategies: The decline in younger age groups' expenditures might suggest successful preventive healthcare strategies or changes in healthcare delivery models. However, as the population ages, the rising costs in older age groups may call for enhanced preventive measures and more efficient management of chronic conditions to mitigate the financial impact on healthcare systems.

growing financial burden of inpatient healthcare services for women over the observed period.

Costs of Pharmaceuticals

As Table 13 shows, the total expenditures for drug costs for women have increased from €10,850,038 in 2014 to €15,754,704 in 2022, with a Compound Annual Growth Rate (CAGR) of 4.77%. This moderate growth reflects the rising demand for pharmaceuticals among women across different age groups, likely driven by increased access to healthcare, the introduction of new therapies, and possibly the growing prevalence of chronic conditions.

Ages 15-19: Expenditures for the 15-19 age group show a significant increase from €78 in 2014 to €634 in 2022, with a high CAGR of 29.94%. Although the absolute amounts are small, the sharp rise suggests increased prescription drug use among adolescents, possibly due to changes in healthcare practices, improved access to medications, or specific public health initiatives targeting this age group.

Ages 20-24: This age group experienced the steepest decline in drug expenditures, with costs dropping from €3,876 in 2014 to €68 in 2022, resulting in a negative CAGR of -39.66%. The drastic reduction could be attributed to a shift away from traditional prescription drugs towards alternative therapies, lifestyle changes, or improved health outcomes that reduce the need for medications in this demographic.

Table 13 Total expenditures for drug costs for women with Breast Cancer

Lieky - ženy	2014	2015	2016	2017	2018	2019	2020	2021	2022	Spolu	CAGR
Spolu náklady	10 850 038 €	11 779 638 €	11 700 105 €	9 824 927 €	9 242 994 €	9 736 759 €	8 661 981 €	12 029 429 €	15 754 704 €	99 580 573 €	4,77%
veková skupina 15 - 19	78 €	14 €	87 €	50 €	22 €	9 €	946 €	3 136 €	634 €	4 976 €	29,94%
veková skupina 20 - 24	3 876 €	1 200 €	383 €	2 925 €	765 €	76 €	35 €	535 €	68 €	9 862 €	-39,66%
veková skupina 25 - 29	24 764 €	33 636 €	37 457 €	32 525 €	11 606 €	11 289 €	25 596 €	45 003 €	47 180 €	269 056 €	8,39%
veková skupina 30 - 34	108 507 €	151 594 €	144 902 €	104 855 €	133 840 €	124 677 €	142 598 €	174 848 €	198 676 €	1 284 497 €	7,85%
veková skupina 35 - 39	329 089 €	363 371 €	410 030 €	275 663 €	238 997 €	252 166 €	224 353 €	314 201 €	392 853 €	2 800 724 €	2,24%
veková skupina 40 - 44	552 774 €	695 004 €	572 153 €	527 940 €	433 362 €	539 644 €	713 236 €	777 523 €	948 896 €	5 760 532 €	6,99%
veková skupina 45 - 49	895 947 €	866 799 €	861 166 €	685 905 €	709 385 €	730 746 €	722 917 €	1 185 314 €	1 444 139 €	8 102 319 €	6,15%
veková skupina 50 - 54	1 040 508 €	1 162 967 €	1 128 295 €	877 011 €	877 746 €	1 050 363 €	914 587 €	1 052 558 €	1 459 683 €	9 563 718 €	4,32%
veková skupina 55 - 59	1 476 583 €	1 614 738 €	1 541 937 €	1 303 117 €	1 217 975 €	1 024 458 €	1 033 969 €	1 487 984 €	1 652 603 €	12 353 364 €	1,42%
veková skupina 60 - 64	1 987 271 €	2 253 251 €	2 278 504 €	1 725 826 €	1 366 915 €	1 573 898 €	1 204 758 €	1 521 971 €	2 190 490 €	16 102 886 €	1,22%
veková skupina 65 - 69	1 665 690 €	1 671 989 €	1 848 002 €	1 841 341 €	1 925 794 €	1 890 003 €	1 527 235 €	1 943 982 €	2 415 501 €	16 729 538 €	4,76%

Ages 25-29: The 25-29 age group saw a positive growth in expenditures, increasing from €24,764 in 2014 to €47,180 in 2022, with a CAGR of 8.39%. This rise may reflect the growing healthcare needs of young adults, including treatments related to reproductive health, chronic conditions, or preventive care.

Ages 30-34: Expenditures for the 30-34 age group increased from €108,507 in 2014 to €198,676 in 2022, reflecting a CAGR of 7.85%. The consistent growth suggests an ongoing need for pharmaceuticals, possibly linked to family planning, pregnancy, and early management of chronic conditions as women move into their 30s.

Ages 35-39: The 35-39 age group exhibited more modest growth, with a CAGR of 2.24%, as expenditures increased from €329,089 in 2014 to €392,853 in 2022. This slower growth may indicate a stabilization in drug use as healthcare needs become more consistent, focusing on maintenance and management of existing conditions.

Ages 40-44: This age group saw steady growth in drug expenditures, increasing from €552,774 in 2014 to €948,896 in 2022, resulting in a CAGR of 6.99%. The rising costs could be associated with the management of chronic conditions, such as cardiovascular disease or diabetes, which become more prevalent in this age group.

Ages 45-49: Expenditures in the 45-49 age group grew from €895,947 in 2014 to €1,444,139 in 2022, reflecting a CAGR of 6.15%. This growth likely corresponds to increased healthcare needs as women enter middle age, including more frequent prescriptions and higher utilization of medications for chronic conditions.

Ages 50-54: The 50-54 age group experienced a moderate CAGR of 4.32%, with expenditures rising from €1,040,508 in 2014 to €1,459,683 in 2022. This growth reflects the continuing demand for medications to manage chronic health issues that become more prominent in this age group.

Ages 55-59: This age group showed minimal growth, with a CAGR of 1.42%, as expenditures increased from €1,476,583 in 2014 to €1,652,603 in 2022. The relatively slow growth suggests that drug expenditures in this group may have plateaued, possibly due to effective management of chronic conditions or shifts towards alternative therapies.

Ages 60-64: Expenditures for the 60-64 age group saw a similar pattern of slow growth, with a CAGR of 1.22%, as costs increased from €1,987,271 in 2014 to €2,190,490 in 2022. The data indicates stable drug use, with spending driven by the management of age-related conditions and chronic diseases.

Ages 65-69: The 65-69 age group experienced a steady increase in drug expenditures, growing from €1,665,690 in 2014 to €2,415,501 in 2022, with a CAGR of 4.76%. The rising costs reflect the increasing healthcare needs of older women, particularly for medications to manage multiple chronic conditions and maintain quality of life.

The remaining costs were for men with the C50 diagnosis or unclassified.

Key Insights for Drug Costs

Growth in Younger and Older Age Groups:

Significant growth is observed in the 15-19 and 65-69 age groups, indicating an increase in drug use at both ends of the age spectrum. This could reflect targeted health interventions for adolescents and a higher demand for medications as women age.

Decline in Young Adults (20-24 years):

The steep decline in drug expenditures for the 20-24 age group suggests a shift in healthcare behaviors or a reduction in prescription drug use, possibly due to lifestyle changes, better health outcomes, or alternative treatments.

Steady Growth in Middle Age Groups:

The 40-49 age groups show consistent growth in drug expenditures, reflecting the increasing burden of chronic conditions and the need for ongoing pharmaceutical management as women reach middle age.

Plateau in Late Middle Age (55-64 years):

The slower growth in drug expenditures for the 55-64 age groups indicates that spending may be stabilizing as chronic conditions are effectively managed, possibly with established treatment regimens that do not require significant increases in spending.

Costs of Pharmaceuticals / Patient level Data

Comparison of Data Sources

Due to inconsistencies in the reported pharmaceutical expenses related to C50 from NCZI, we are also providing data derived from NCZI's available reports at the patient and diagnosis level, albeit only available from 2017 onwards. We have adjusted these figures based on our estimations, accounting for known central procurements (centrálne nákupy) and by applying an estimated 30% discount on drugs reimbursed under §88 of Act 363/2011. The data overview is presented in Table 14.

Table 14 C50 related pharmaceutical expenses from various sources

C50 drug related expenses	2017	2018	2019	2020	2021	2022	CAGR
NCZI patient level data	30 838 277 €	28 367 744 €	32 110 560 €	34 505 518 €	35 879 811 €	37 204 124 €	3,82%
NCZI provided data	9 824 927 €	9 242 994 €	9 736 759 €	8 661 981 €	12 029 429 €	15 754 704 €	9,90%
NCZI adjusted data	28 806 312 €	27 162 860 €	33 149 039 €	39 636 391 €	41 956 099 €	44 606 350 €	9,14%

Expense Levels: The Patient Level Data / Adjusted dataset consistently reports the highest expenses, followed by the NCZI Adjusted Data, with the NCZI Provided Data being the lowest.

Growth Trends: The NCZI Provided Data shows the highest CAGR at 9.90%, indicating a significant increase in expenses over the years, especially from 2020 onwards.

Data Variability: The significant differences between the datasets suggest that the methodology and adjustments applied significantly impact the reported expenses. The provided data might reflect a different aspect of drug-related expenses or be less comprehensive than the adjusted datasets. We believe that the data provided as of 2017 might more accurately reflect the expenses related to pharmaceutical for the treatment of C50.

The data in Table 15 show the percentage of medication costs relative to total costs for C50-related treatments, as reported by two different data sources: NCZI base report data and NCZI patient-level data, over the period from 2017 to 2022.

The data indicates a significant discrepancy between different methodologies for calculating medication costs as a percentage of total costs. The NCZI patient-level data consistently shows higher percentages, suggesting that more detailed or specific expenses are being captured, or different methodology used. The trend within each data set remains relatively stable, though the overall difference highlights the importance of understanding the context and methodology behind each data source.

The NCZI base report data consistently shows a lower percentage of medication costs as a portion of total costs, ranging from 15% to 20% over the years.

The NCZI patient-level data reports significantly higher percentages, ranging from 37% to 44%. There is a consistent decrease from 2017 (44%) to 2019 (39%), followed by slight fluctuations, with a minor increase in 2020 (41%), then a decrease again towards 2022 (37%).

Table 15 Percentage of medication costs relative to total costs for C50

Medication costs as % of total costs	2017	2018	2019	2020	2021	2022
NCZI base report data	20%	18%	16%	15%	17%	20%
NCZI patient level data	44%	41%	39%	41%	38%	37%

Drug Costs Data at Patient Level

The Table 16 outlines the total expenditure on pharmaceuticals for Breast Cancer (C50) from 2017 to 2022. The table also breaks down this expenditure into two categories: the top 12 drugs in 2022 and the remaining pharmaceuticals from 2022.

Table 16 Estimation of C50 related drug expenses from 2017 to 2022

Parameter	2017	2018	2019	2020	2021	2022
Total pharmaceuticals for C50	€30 838 277	€28 367 744	€32 110 560	€34 505 518	€35 879 811	€37 204 124
% vs PY		-8,01%	13,19%	7,46%	3,98%	3,69%
Top 12 drugs in 2022*	€23 571 661	€21 998 673	€24 558 584	€27 734 942	€29 112 586	€30 692 463
vs PY		-6,67%	11,64%	12,93%	4,97%	5,43%
% from Total	76,44%	77,55%	76,48%	80,38%	81,14%	82,50%
Others (*in 2022)	€7 266 616	€6 369 070	€7 551 976	€6 770 576	€6 767 225	€6 511 660
% vs PY		-12,35%	18,57%	-10,35%	-0,05%	-3,78%
% from Total	23,56%	22,45%	23,52%	19,62%	18,86%	17,50%

Total Pharmaceuticals for C50

General Trend: There has been a consistent increase in total pharmaceutical expenditures for C50 from 2018 to 2022. The spending rose from €28,367,744 in 2018 to €37,204,124 in 2022.

Growth Rate: The percentage increase year-over-year (% vs PY) shows a steady, albeit slowing, growth in spending. After a significant jump of 13.2% in 2019, the growth rate slowed down to 3.7% in 2022.

Implication: This suggests a growing investment in pharmaceuticals for C50, potentially driven by the rising costs of treatment, introduction of new drugs, or increased patient numbers.

Top 12 Pharmaceuticals in 2022

The data in Table 17 reflects an overall increase in the total expenditure on pharmaceuticals for C50 over the six-year period. The most significant insight is the growing dominance of the top 12 drugs, which have steadily increased their share of the total pharmaceutical spending. This suggests that a small number of high-cost drugs are driving the majority of the expenditure. In contrast, spending on the remaining pharmaceuticals is declining, both in absolute terms and as a proportion of the total, indicating a concentration of costs in the most effective or widely used treatments. This trend could have implications for healthcare budgeting and drug pricing strategies in the future.

Table 17 Estimation of C50 related drug expenses by selected Brands

ATC / Name	2017	2018	2019	2020	2021	2022
L01FD01 - TRASTUZUMAB	€ 11 429 994	€ 10 314 728	€ 9 013 973	€ 9 423 518	€ 8 421 020	€ 8 100 489
L01EF02 - RIBOCIKLIB			€ 353 033	€ 2 285 216	€ 3 404 638	€ 4 894 734
L01FD02 - PERTUZUMAB	€ 559 530	€ 505 258	€ 2 845 509	€ 4 201 824	€ 5 223 258	€ 6 521 715
L01FD03 - TRASTUZUMAB EMTANSÍN	€ 47 140	€ 47 218	€ 1 187 128	€ 2 364 190	€ 2 675 272	€ 2 834 596
M05BX04 - DENOSUMAB	€ 1 454 570	€ 1 562 185	€ 1 716 460	€ 1 816 519	€ 2 139 175	€ 2 206 461
L03AA13 - PEGFILGRASTIM	€ 1 245 156	€ 1 279 801	€ 1 251 453	€ 1 318 652	€ 1 671 709	€ 1 451 642
L02BA03 - FULVESTRANT	€ 1 877 218	€ 1 820 817	€ 1 816 293	€ 1 866 356	€ 1 431 450	€ 1 105 575
L01EF01 - PALBOCICLIB		€ 16 651	€ 45 082	€ 21 192	€ 640 023	€ 758 988
L02BG04 - LETROZOL	€ 818 135	€ 808 590	€ 805 350	€ 800 379	€ 906 474	€ 960 887
L01EG02 - EVEROLIMUS	€ 2 505 529	€ 2 363 801	€ 2 579 689	€ 1 500 965	€ 1 142 411	€ 821 922
L01EH01 - LAPATINIB	€ 868 297	€ 748 881	€ 491 660	€ 374 541	€ 551 546	€ 540 786
L01FG01 - BEVACIZUMAB	€ 2 766 093	€ 2 530 744	€ 2 452 955	€ 1 761 590	€ 905 610	€ 494 668
Others	€ 7 266 616	€ 6 369 070	€ 7 551 976	€ 6 770 576	€ 6 767 225	€ 6 511 660
Others vs PY		-12,35%	18,57%	-10,35%	-0,05%	-3,78%
Total pharmaceuticals / C50	**€ 30 838 277**	**€ 28 367 744**	**€ 32 110 560**	**€ 34 505 518**	**€ 35 879 811**	**€ 37 204 124**
Total vs PY		-8,01%	13,19%	7,46%	3,98%	3,69%

Dominance in Spending: The top 12 drugs have consistently made up a significant portion of the total pharmaceutical expenditure, ranging from 76% in 2017 to 82% in 2022.

Increasing Share: The share of the top 12 drugs increased steadily, indicating that a few high-cost drugs dominate the market, like i.e. ciclibs or HER2+ targeted therapies. This concentration suggests that the most effective or widely used treatments are becoming more expensive or more prevalent.

Growth Rate: The year-over-year growth for the top 12 drugs shows variability, with the highest growth recorded in 2020 (12.9%). The 5.4% growth in 2022 indicates a continued, albeit slower, increase in the costs associated with these top drugs.

Other Pharmaceuticals

Decreasing Contribution: The remaining pharmaceuticals (those not in the top 12) represent a shrinking portion of the total pharmaceutical costs, decreasing from 24% in 2017 to 18% in 2022. This decrease suggests that the remaining drugs are either becoming less expensive or less used compared to the top 12 drugs.

Volatility in Growth: The growth rate of these remaining pharmaceuticals is more volatile compared to the top 12 drugs. For instance, there was a significant decline of -12.4% in 2018 followed by an 18.6% increase in 2019. However, the subsequent years saw declines or stagnation, with -3.8% in 2022.

Implication: The volatility could reflect changes in drug usage patterns, such as shifts to newer, more effective medications included in the top 12 or possibly reductions in the use of older, less effective drugs.

Indirect costs of Breast Cancer – Sick Leave

- The costs for sick leave (PN) increased by €5 million in 2022 compared to 2010, which is a 114% increase.
- Due to C50, women spent a total of 14,411 years / 5.26 million days on sick leave, with an increasing trend until 2020.
- The average growth in sick leave costs from 2010 to 2022 was +7% per year.
- The financial impact of sick leave due to C50 has been rising more rapidly (CAGR of 6.56%) than the number of sick leave days (CAGR 1,97%).

The data in Table 18 reflects the average duration of sick leave (PN) in days, total sick leave days, calculated sick leave years, and the costs associated with sick leave for breast cancer (C50) from 2010 to 2022. Over this period, there is a clear upward trend in both the number of sick leave days and the costs associated with breast cancer-related sick leave, indicating an increasing burden on the healthcare system and employers.

Table 18 Sick Leave Data for C50

	2010	2011	2012	2013	2014	2015	2016
Average duration of sick leave in days	223,5	182,15	165,3	206,7	205,6	241,65	238
Total sick leave days for C50	309 034	312 052	312 119	338 747	342 294	363 113	423 583
Sick leave years for C50 (calculated from days)	847	855	855	928	938	995	1 161
Costs of sick leave due to C50	4 296 853 €	4 434 747 €	4 543 115 €	5 046 866 €	5 310 151 €	5 797 334 €	6 984 843 €

	2017	2018	2019	2020	2021	2022	TOTAL
Average duration of sick leave in days	214,4	237,65	253,3	192,6	228,05	209,9	215,3
Total sick leave days for C50	441 499	462 772	511 692	538 439	514 304	390 414	5 260 062
Sick leave years for C50 (calculated from days)	1 210	1 268	1 402	1 475	1 409	1 070	14 411
Costs of sick leave due to C50	7 615 531 €	8 476 280 €	10 103 187 €	11 030 461 €	11 261 954 €	9 205 617 €	94 106 939 €

Average Duration of Sick Leave (Priemerné trvanie PN v dňoch):

The average duration of sick leave per case fluctuates over the years, starting at 223.5 days in 2010 and peaking at 253.3 days in 2019, before dropping to 209.9 days in 2022. The average over the entire period is 215.3 days.

The fluctuations in the duration could be linked to variations in treatment regimens, recovery times, or changes in workplace policies regarding sick leave. The peak in 2019 might suggest longer recovery periods or more complex treatment plans during that year.

Total Sick Leave Days (PN dni spolu C50):

The total number of sick leave days has shown a consistent upward trend, growing from 309,034 days in 2010 to a peak of 538,439 days in 2020, before slightly decreasing to 390,414 days in 2022. The total sick leave days over the period amount to 5,260,062.

This increase reflects a growing number of sick leave cases, potentially driven by rising breast cancer incidence, improved reporting and documentation, or longer sick leave durations due to more intensive treatment protocols.

Sick Leave Years (PN roky C50):

When converted to years, the total sick leave time also shows an increasing trend, from 847 years in 2010 to 1,475 years in 2020. By 2022, this figure slightly decreases to 1,070 years. The cumulative sick leave years over the period amount to 14,411 years.

This rise mirrors the trend in total sick leave days and highlights the significant time impact that breast cancer has on the workforce, with a substantial number of work years lost due to illness.

Costs of Sick Leave (Náklady na PN kvôli C50):

The financial costs associated with sick leave due to breast cancer have increased significantly, from €4,296,853 in 2010 to €11,261,954 in 2021, with a slight decrease to €9,205,617 in 2022. The total costs over the period amount to €94,106,939.

The cost increases align with the growth in total sick leave days, indicating that not only are more days being taken for sick leave, but the cost per day is also likely increasing, potentially due to wage inflation or changes in compensation policies.

Percentage Change Analysis:

The percentage change in total sick leave days (PN dni spolu C50) fluctuates yearly, with significant increases in 2016 (16.7%) and 2019 (10.6%). However, there are also notable decreases, particularly in 2022 (-24.1%). On average, the total sick leave days increased by 2.5% annually over the period.

The percentage change in sick leave costs follows a similar pattern, with major increases in 2016 (20.5%) and 2019 (19.2%), and a sharp decrease in 2022 (-18.3%). On average, the costs increased by 7.0% annually.

The fluctuations in percentage changes suggest that certain years experienced significant shifts in either the number of cases, the severity of cases, or policy changes affecting sick leave durations and compensation.

Key Insights

Steady Increase in Sick Leave Burden:

The overall increase in both the duration and total number of sick leave days highlights the growing burden of breast cancer on the workforce. This trend underscores the importance of effective management and support systems for patients to potentially reduce the time needed for recovery.

Rising Costs:

The significant rise in the costs associated with sick leave indicates not only more cases and longer durations but also higher financial implications for employers and the healthcare system. This could be due to factors like wage growth, more generous sick leave policies, or increased healthcare costs.

Yearly Fluctuations:

The data shows considerable year-to-year variability, particularly in the percentage changes in sick leave days and costs. These fluctuations could be influenced by external factors such as changes in healthcare policies, economic conditions, or advances in breast cancer treatment that affect recovery times.

Recent Decline in Sick Leave Days and Costs:

The decline in both sick leave days and costs in 2022 might indicate improvements in treatment efficacy, faster recovery times, or changes in sick leave policies that encourage a quicker return to work. However, this could also reflect underreporting or other anomalies in that specific year.

Dynamics of Sick Leave

The costs associated with sick leave due to C50 have been increasing at a higher rate than the number of sick leave days. This suggests rising economic pressure on employers or the healthcare system related to sick leave for C50. The data in Table 19 indicates that while the burden of sick leave days due to C50 has fluctuated, the financial impact has been steadily increasing, potentially pointing to rising costs per individual or changes in how sick leave is managed.

Table 19 Changes in selected Sick Leave parameters over time

PPG	2010	2011	2012	2013	2014	2015	2016	2017
Total sick leave days for C50		1,0%	0,0%	8,5%	1,0%	6,1%	16,7%	4,2%
Costs of sick leave due to C50		3,2%	2,4%	11,1%	5,2%	9,2%	20,5%	9,0%

PPG	2018	2019	2020	2021	2022	Average	CAGR
Total sick leave days for C50	4,8%	10,6%	5,2%	-4,5%	-24,1%	2,5%	1,97%
Costs of sick leave due to C50	11,3%	19,2%	9,2%	2,1%	-18,3%	7,0%	6,56%

The costs associated with sick leave due to C50 have generally been increasing, with an average growth rate of 7.0% and a CAGR of 6.56%. This indicates that the financial impact of sick leave due to C50 has been rising more rapidly than the number of sick leave days (CAGR 1,97%).

Cost Increases

Major increases in costs were observed in 2013 (+11.1%), 2015 (+9.2%), 2016 (+20.5%), 2018 (+19.2%), and 2019 (+9.2%). These years correlate with some of the years where sick leave days increased significantly, but the cost increases were generally larger, indicating rising costs per sick leave day.

Cost Declines

A significant decline occurred in 2022 (-18.3%), which mirrors the decline in sick leave days in the same year. This suggests that the reduction in sick leave days directly impacted the associated costs.

Higher Costs Over Time

The consistent increase in costs, even in years where sick leave days did not rise as much, suggests that the cost per day of sick leave may have increased. This could be due to inflation, higher wages, or increased healthcare costs related to C50.

Sick Leave Days

There is a general upward trend in sick leave days over the years, albeit with fluctuations. The most recent years (2021 and 2022) saw a decline, which could indicate improvements in disease management or other mitigating factors.

Indirect costs of Breast Cancer – Disability Costs

- The costs for disability pensions (ID) increased by €2.2 million in 2022 compared to 2010, which is a 95% increase.
- Due to C50, a total of 10,794 disability pensions have been granted since 2010, with a continuous annual growth trend of +2.6%.
- The average annual growth rate for costs is 6.0%, with a CAGR of 5.73%, indicating a stronger upward trend in costs compared to the number of disability cases (CAGR 2,43%).

The data in Table 20 reflects the number of disability cases due to breast cancer (C50), differentiated by severity (up to 70% and over 70%), gender, and the associated costs from 2010 to 2022. Over this period, there has been a general increase in both the number of disability cases and the costs associated with them, indicating a growing burden on social insurance due to breast cancer-related disabilities.

Table 20 Disability costs associated with diagnosis C50

	2010	2011	2012	2013	2014	2015	2016
Disability count C50 (up to 70% inclusive)	248	237	226	236	240	280	265
Disability count C50 (over 70%)	520	510	463	512	542	515	544
Total disability count C50	768	747	689	748	782	795	809
Disability count C50 men	15	5	4	3	5	5	7
up to 70% inclusive	5	0	0	1	0	3	0
over 70%	10	5	4	2	5	2	7
Disability count C50 women	753	742	685	745	777	790	802
up to 70% inclusive	243	237	226	235	240	277	265
over 70%	510	505	459	510	537	513	537
Costs of disability due to C50	2 348 145 €	2 291 467 €	2 157 121 €	2 409 966 €	2 502 150 €	2 842 022 €	2 932 146 €

	2017	2018	2019	2020	2021	2022	TOTAL
Disability count C50 (up to 70% inclusive)	273	288	254	278	263	243	**3331**
Disability count C50 (over 70%)	583	598	632	643	619	782	**7463**
Total disability count C50	856	886	886	921	882	1025	**10794**
Disability count C50 men	3	5	5	8	2	11	**78**
up to 70% inclusive	0	3	2	3	0	3	**20**
over 70%	3	2	3	5	2	8	**58**
Disability count C50 women	853	881	881	913	880	1014	**10716**
up to 70% inclusive	273	285	252	275	263	240	**3311**
over 70%	580	596	629	638	617	774	**7405**
Costs of disability due to C50	3 173 084 €	3 344 936 €	3 521 164 €	3 756 463 €	3 730 267 €	4 580 854 €	**39 589 786 €**

Total Disability Cases (Invalidita počet C50):

The total number of disability cases due to breast cancer has increased from 768 in 2010 to 1,025 in 2022, with a total of 10,794 cases over the entire period. The average annual growth rate is 2.6%, indicating a steady rise in disability cases, with notable increases in 2012 (8.6%) and 2022 (16.2%).

The fluctuations in disability cases, particularly the drop in 2021 (-4.2%) and the subsequent rise in 2022 (16.2%), may be influenced by external factors such as changes in healthcare policies, economic conditions, or variations in the progression and treatment of breast cancer.

Disability Cases by Severity:

Up to 70% Disability (do 70% vrátane):

The number of cases with up to 70% disability has fluctuated over the years, with a total of 3,331 cases from 2010 to 2022. The numbers show some variability, with a decline in 2022 to 243 cases from a high of 288 cases in 2018.

Over 70% Disability (nad 70%):

More severe disability cases (over 70%) have shown a steady increase, with a total of 7,463 cases over the period. The number of these cases rose from 520 in 2010 to 782 in 2022, indicating a growing trend of more severe disability outcomes.

Disability Cases by Gender:

Men:

Disability cases among men are significantly lower, with only 78 cases reported over the period. The number of cases fluctuated, peaking at 11 in 2022, with a notable increase in severe disability cases (58 out of 78 total cases).

Women:

The majority of disability cases are among women, with 10,716 cases reported from 2010 to 2022. The number of cases has generally increased, with a total of 7,405 cases involving severe disability (over 70%).

Costs Associated with Disability (Náklady na invaliditu kvôli C50):

The costs associated with disability due to breast cancer have increased significantly from €2,348,145 in 2010 to €4,580,854 in 2022, totaling €39,589,786 over the period. The average annual growth rate in costs is 6.0%, reflecting a substantial increase in financial burden.

The costs have shown considerable year-to-year variability, with notable increases in 2015 (13.6%) and 2022 (22.8%). The drop in 2021 (-0.7%) followed by a sharp rise in 2022 may reflect changes in disability management policies, economic conditions, or healthcare practices.

Key Insights

Increasing Disability Burden:

The steady increase in both the number of disability cases and the associated costs highlights the growing burden of breast cancer-related disabilities on social insurance. The data suggests that as the population ages and cancer treatments improve, there may be more survivors but with lingering disabilities that require long-term support.

The increasing number of severe disability cases (over 70%) suggests that while more patients may be surviving breast cancer, many are left with significant disabilities. This trend underscores the importance of post-treatment care and rehabilitation to improve the quality of life for survivors.

Rising Costs:

The substantial increase in disability-related costs underscores the growing financial impact of breast cancer on social insurance systems. The variability in costs, particularly the sharp increases in certain years, may be influenced by factors such as changes in healthcare costs, wage inflation, or the introduction of new treatments that extend survival but with increased disability.

Recent Trends:

The data from 2021 and 2022 suggests a potential shift in trends, with a decline in 2021 followed by a significant increase in both the number of cases and costs in 2022. This could indicate changes in the management of breast cancer disabilities, possibly due to external factors like the COVID-19 pandemic, which may have delayed diagnoses or treatments, leading to more severe outcomes in 2022.

Dynamics of disability

The data in Table 21 shows a generally increasing trend in both the number of disability cases and the associated costs, with some significant fluctuations. The increases in recent years, particularly in 2022, suggest that both the prevalence and the financial impact of disability related to C50 are rising.

The costs associated with disability are growing at a faster rate than the number of disability cases themselves. This indicates that each case is becoming more expensive to manage, pointing to rising healthcare costs, increased treatment intensity, or other factors that are driving up the cost per case of disability.

Table 21 Changes of selected disability parameters over time

	2010	2011	2012	2013	2014	2015	2016	2017
Total disability C50		-2,7%	-7,8%	8,6%	4,5%	1,7%	1,8%	5,8%
Costs of disability due to C50		-2,4%	-5,9%	11,7%	3,8%	13,6%	3,2%	8,2%

	2018	2019	2020	2021	2022	Average	CAGR
Total disability C50	3,5%	0,0%	4,0%	-4,2%	16,2%	2,6%	2,43%
Costs of disability due to C50	5,4%	5,3%	6,7%	-0,7%	22,8%	6,0%	5,73%

Total Disability C50

The percentage change in total disability related to C50 shows significant year-to-year variability, with both increases and decreases observed. The average annual growth rate over the period is 2.6%, with a Compound Annual Growth Rate (CAGR) of 2.43%.

The data in Table 21 reflects periods of decline, such as in 2011 (-7.8%) and 2012 (-7.8%), followed by significant increases, particularlty in 2013 (+8.6%), 2017 (+5.8%), and 2022 (+16.2%). The variability suggests that the prevalence or recognition of disability due to C50 may have been influenced by external factors like policy changes, diagnostic criteria, or treatment improvements.

Costs of Disability Due to C50

The costs associated with disability due to C50 have generally increased more consistently than the total disability cases themselves (Table 21). The average annual growth rate for costs is 6.0%, with a CAGR of 5.73%, indicating a stronger upward trend in costs compared to the number of disability cases.

Significant increases in costs were observed in 2013 (+11.7%), 2015 (+13.6%), and particularly in 2022 (+22.8%). These spikes in costs could be attributed to increased healthcare costs, inflation, or more intensive management of disabilities related to C50. The consistent rise in costs, especially in years where the growth in total disability cases was moderate, suggests an increasing economic burden per disability case. This could be due to higher medical costs

Productivity Loss

Table 22 presents data on the estimated productivity loss due to breast cancer in Slovakia from 2010 to 2022, calculated using three different economic measures: average wage, gross wage, and GDP per capita. The total estimated productivity loss over this period is significant, amounting to over €565 million.

Table 22 Productivity Loss Related to C50 in Slovakia

Productivity Loss	2010	2011	2012	2013	2014	2015	2016
Based on the average wage	26 022 631 €	30 603 653 €	30 291 014 €	33 423 342 €	31 936 912 €	37 487 345 €	36 540 658 €
Based on the gross wage	35 182 437 €	41 375 952 €	40 953 265 €	45 188 154 €	43 178 510 €	50 682 661 €	49 402 746 €
Based on GDP per capita	35 475 509 €	40 828 904 €	39 418 090 €	42 499 962 €	39 679 114 €	45 207 480 €	42 768 659 €
Average productivity lossdue to C50	32 226 859 €	37 602 836 €	36 887 456 €	40 370 486 €	38 264 845 €	44 459 162 €	42 904 021 €

Productivity Loss	2017	2018	2019	2020	2021	2022	TOTAL
Based on the average wage	43 362 653 €	42 182 690 €	42 683 748 €	40 837 312 €	44 821 295 €	43 476 656 €	483 669 910 €
Based on the gross wage	58 626 041 €	57 030 738 €	57 708 165 €	55 211 795 €	60 598 116 €	58 780 173 €	653 918 751 €
Based on GDP per capita	49 215 759 €	46 445 149 €	45 581 307 €	42 482 090 €	45 324 732 €	42 605 248 €	557 532 004 €
Average productivity lossdue to C50	50 401 484 €	48 552 859 €	48 657 740 €	46 177 066 €	50 248 048 €	48 287 359 €	565 040 222 €

Analysis based on Average Wage (Na podklade priemernej mzdy):

Productivity loss calculated based on the average wage starts at €26,022,631 in 2010 and gradually increases to €43,476,656 in 2022. The total loss over the 13-year period amounts to €483,669,910.

There is a noticeable upward trend, particularly between 2016 and 2021, where the losses consistently remain above €40 million annually, peaking at €44,821,295 in 2021. This suggests that the economic impact of breast cancer on productivity, when measured by average wages, has been increasing, likely due to rising average wages over the years and the growing number of cases.

Analyses based on Gross Wage (Na podklade superhrubej mzdy):

When considering gross wages, which include taxes and contributions, the productivity loss is higher, starting at €35,182,437 in 2010 and increasing to €58,780,173 in 2022. The total loss over the period is €653,918,751.

The losses show a similar trend to the average wage, with a steady increase over time. The peak is observed in 2021 at €60,598,116. This higher figure compared to the average wage reflects the broader economic impact, including the cost of taxes and social contributions lost due to reduced productivity.

Analyses based on GDP per Capita (Na podklade HDP na 1 obyvateľa):

The productivity loss calculated using GDP per capita starts at €35,475,509 in 2010 and ends at €42,605,248 in 2022, with a total loss of €557,532,004 over the period.

The trend here is slightly less pronounced than with wages, with some fluctuations, particularly a noticeable drop in 2020 and 2022 compared to previous years. This measure provides a broader economic perspective, reflecting the overall economic output lost due to breast cancer-related productivity losses.

Analyses average Productivity Loss (Priemer straty produktivity):

The average productivity loss, combining the three measures, shows a steady increase from €32,226,859 in 2010 to €48,287,359 in 2022, with a total loss of €565,040,222 over the period.

The data suggests a growing economic burden over time, with the largest increases observed between 2015 and 2017, and again from 2020 to 2021. The steady rise in productivity loss reflects the combined effect of increasing breast cancer incidence, rising economic values (wages and GDP), and the societal impact of reduced workforce participation due to illness.

Key Insights

Steady Increase in Economic Burden:

The overall trend shows a significant increase in productivity loss due to breast cancer, regardless of the economic measure used. This increase is particularly notable in the latter half of the period, reflecting both higher wages and a growing recognition of the economic impact of cancer-related work absences.

Impact of Economic Measures:

The differences between the productivity loss calculations based on average wage, gross wage, and GDP per capita highlight the varying perspectives on economic impact. Gross wage and GDP per capita provide a broader understanding of the total economic cost, including social contributions and overall economic output, while the average wage offers a more direct view of lost earnings.

Economic Resilience and Fluctuations:

The fluctuations in GDP-based calculations, particularly the drops in 2020 and 2022, may reflect broader economic conditions, such as the effects of the COVID-19 pandemic, which could have temporarily reduced GDP growth and altered productivity loss patterns.

Long-term Implications:

The continuous increase in productivity loss underscores the long-term economic implications of breast cancer. This trend suggests a need for targeted interventions, such as workplace accommodations, cancer prevention programs, and early detection efforts, to mitigate the economic impact on both individuals and the broader economy.

Summary of Indirect Costs

Table 23 summarizes the costs associated with sick leave (práceneschopnosť), disability (invalidita), productivity loss (strata produktivity), and the Value of a Statistical Life Year (VSLY) in Slovakia from 2013 to 2022. The total costs over this period highlight the significant economic impact of breast cancer on the country.

Table 23 Indirect costs associated with diagnosis C50

	2013	2014	2015	2016	2017	2018
Sick Leave	€ 5 046 866	€ 5 310 151	€ 5 797 334	€ 6 984 843	€ 7 615 531	€ 8 476 280
Disability	€ 2 409 966	€ 2 502 150	€ 2 842 022	€ 2 932 146	€ 3 173 084	€ 3 344 936
Productivity Loss	€ 40 370 486	€ 38 264 845	€ 44 459 162	€ 42 904 021	€ 50 401 484	€ 48 552 859
Total	€ 47 827 318	€ 46 077 146	€ 53 098 518	€ 52 821 010	€ 61 190 100	€ 60 374 075

	2019	2020	2021	2022	SPOLU
Sick Leave	€ 10 103 187	€ 11 030 461	€ 11 261 954	€ 9 205 617	€ 80 832 224
Disability	€ 3 521 164	€ 3 756 463	€ 3 730 267	€ 4 580 854	€ 32 793 052
Productivity Loss	€ 48 657 740	€ 46 177 066	€ 50 248 048	€ 48 287 359	€ 458 323 071
Total	€ 62 282 091	€ 60 963 990	€ 65 240 269	€ 62 073 831	€ 571 948 348

Key Insights

Rising Economic Impact:

Across all categories, there is a clear trend of increasing costs, indicating a growing economic burden associated with breast cancer in Slovakia. This trend is consistent with broader global patterns, where healthcare costs and the economic impact of diseases like cancer continue to rise.

Impact of External Factors:

The slight declines observed in some categories in 2022, particularly in sick leave and productivity loss, may reflect external factors such as economic conditions, changes in healthcare policy, or the long-term effects of the COVID-19 pandemic. These fluctuations highlight the complex interplay between disease burden and economic factors.

Significant VSLY Growth:

The substantial increase in VSLY underscores the increasing societal value placed on life years, which could be driving more investment in healthcare and interventions aimed at extending life. This growth also reflects rising incomes and healthcare costs, making each life year more economically valuable.

Focus on Disability and Sick Leave:

The steady rise in disability and sick leave costs points to an ongoing need for effective management and support for breast cancer patients, particularly in the workplace. As survival rates improve, the challenge shifts to managing the long-term health and economic consequences, including productivity loss and disability.

Future Projections:

If current trends continue, the economic burden of breast cancer in Slovakia is likely to increase further, necessitating targeted policies to manage costs and support affected individuals. This includes potential investments in early detection, treatment innovations, and workplace accommodations to mitigate the economic impact.

Indirect Costs Associated with Disability and VSLY

Methodology

YPLL = YLL (Years of Life Lost)

Years of Life Lost (YLL) measures the impact of premature mortality within a population by calculating the difference between the age at death and the expected remaining life expectancy for that age. The methodology involves summing the years of life lost across all individuals who die prematurely due to a specific disease or condition. This measure emphasizes the loss of potential years that could have been lived if the disease had not occurred, providing an indicator of the public health burden related to mortality.

YPLL = YPL (Years of Productive Life Lost)

Years of Productive Life Lost (YPL) focuses on the economic impact of premature mortality by estimating the years of life lost specifically during a person's working or productive years, typically defined as ages 15 to 64. This measure calculates the loss in economic productivity due to early death, which can result from diseases like cancer. The methodology is similar to YLL but with an emphasis on the working-age population, providing insights into the economic burden on society.

DALY (Disability-Adjusted Life Years)

Disability-Adjusted Life Years (DALY) is a comprehensive measure that combines the burden of mortality and morbidity into a single figure. It sums the Years of Life Lost (YLL) due to premature death with the Years Lived with Disability (YLD) due to illness or injury. The methodology involves estimating the number of years lost due to death (YLL) and the number of years lived with a disease or condition (YLD), adjusted for the severity of disability. DALYs are widely used in public health to assess the overall burden of disease, with a higher DALY indicating a greater impact on a population's health.

DALY in Oncology

In oncology, DALY quantifies the combined impact of cancer-related mortality (through YLL) and morbidity (through YLD). It provides a comprehensive assessment of the cancer burden by accounting for both the years of life lost due to cancer-related deaths and the years lived with cancer, adjusted for the severity of its effects on quality of life. This helps in understanding the full impact of cancer on population health and is used for prioritizing healthcare interventions and resource allocation.

Results

The data in Table 24 represents the years of potential life lost (YPLL), years of potential productive life lost (YPPLL), years lived with disability (YLD), and disability-adjusted life years (DALY) related to the diagnosis of C50 (breast cancer) from 2009 to 2022. Here's a detailed analysis of these data:

Table 24 Disability related indirect costs associated with diagnosis C50

Diagnosis C50	2009	2010	2011	2012	2013	2014	2015	2016
Years of potential life lost (YPLL)	12 650	12 724	13 689	13 931	15 626	14 560	16 224	16 600
Years of potential productive life lost (YPPLL)	3 426	3 193	3 604	3 378	3 602	3 261	3 625	3 388
Years Lived with Disability (YLD)		10 949	11 069	10 487	11 270	11 920	11 749	12 080
Disability-Adjusted Life Year (DALY)		24 519	25 613	25 272	27 824	27 418	28 967	29 840

Diagnosis C50	2017	2018	2019	2020	2021	2022	TOTAL
Years of potential life lost (YPLL)	17 208	16 748	16 501	15 450	14 404	16 161	212 474
Years of potential productive life lost (YPPLL)	3 875	3 560	3 436	3 155	3 282	3 483	48 268
Years Lived with Disability (YLD)	12 800	13 024	13 960	13 911	11 504	13 613	158 335
Disability-Adjusted Life Year (DALY)	31 218	31 040	31 863	30 836	27 317	31 457	373 183

Years of Potential Life Lost (YPLL)

The YPLL measures the number of years lost due to premature death. From 2009 to 2022, the YPLL due to breast cancer diagnosis fluctuates, showing a general upward trend until 2017, where it peaks at 17,208 years. After 2017, the YPLL shows a slight decline, reaching its lowest point in 2021 at 14,404 years before rising again to 16,161 years in 2022. The total YPLL over the period is 212,474 years, indicating a significant impact of breast cancer on premature mortality in Slovakia.

Years of Potential Productive Life Lost (YPPLL)

The YPPLL focuses on the loss of productive years due to premature death within the working-age population. The data shows relatively stable YPPLL values with minor fluctuations throughout the years. The YPPLL was highest in 2017 at 3,875 years and lowest in 2010 at 3,193 years. The overall trend remains consistent, indicating a steady loss of productive life years, with a total YPPLL of 48,268 years across the 14-year span.

Years Lived with Disability (YLD)

The YLD reflects the number of years lived with a disability due to breast cancer. The data shows an increasing trend in YLD, with a notable rise from 10,949 years in 2009 to a peak of 13,960 years in 2019. The years following show slight fluctuations, with a dip in 2021 to 11,504 years before rising again in 2022 to 13,613 years. The total YLD over the period is 158,335 years, indicating the substantial burden of living with breast cancer and its associated disabilities.

Disability-Adjusted Life Years (DALY)

The DALY combines both premature mortality (YPLL) and disability (YLD) to provide an overall measure of the disease burden. The data shows a clear upward trend in DALYs over the years, starting from 24,519 years in 2009 and reaching a peak of 31,863 years in 2019. There is a slight decline in 2020 and 2021, but the DALY value rises again to 31,457 years in 2022. The total DALY for the entire period is 373,183 years, underscoring the significant impact of breast cancer on both mortality and morbidity.

Key Insights

Upward Trend

Both YLD and DALY show an upward trend, indicating an increasing burden of breast cancer over time, both in terms of mortality and the number of years lived with the disease.

Stability in YPPLL

The relative stability of YPPLL suggests a consistent impact on the working-age population's productivity.

Peaks and Dips

Notable peaks in YPLL and DALY in certain years, such as 2017 and 2019, may indicate years with higher mortality or greater disability impacts, potentially due to factors such as access to treatment or changes in disease prevalence.

Overall, this data highlights the substantial and growing burden of breast cancer in terms of both lost life years and the years spent living with the disease's impact. The trend suggests a need for continuous improvements in early detection, treatment, and supportive care to reduce both mortality and disability associated with breast cancer.

DALY & VSLY

- The social loss caused by C50 since 2010 is: **€21.9 billion.**
- Over the last 10 years, the social loss due to C50 is: **€17.9 billion.**

Table 25 represents data for GDP per capita (HDP na 1 obyvateľa), Disability-Adjusted Life Years (DALY), and Value of Statistical Life Year (VSLY) over the years 2010 to 2022.

Table 25 DALY and VSLY for C50 in Slovakia

	2010	2011	2012	2013	2014	2015	2016
GDP per capita	12 660 €	13 080 €	13 230 €	13 300 €	13 640 €	14 340 €	14 590 €
DALY	24 519	25 613	25 272	27 824	27 418	28 967	29 840
VSLY (4xGDP) in mio €	1 242 €	1 340 €	1 337 €	1 480 €	1 496 €	1 662 €	1 741 €

	2017	2018	2019	2020	2021	2022	TOTAL
GDP per capita	15 000 €	15 580 €	15 960 €	15 400 €	16 200 €	16 340 €	
DALY	31 218	31 040	31 863	30 836	27 317	31 457	
VSLY (4xGDP) in mio €	1 873 €	1 934 €	2 034 €	1 900 €	1 770 €	2 056 €	**21 866 €**

GDP per Capita (HDP na 1 obyvateľa)

The GDP per capita shows a consistent upward trend from 2010 (€12,660) to 2022 (€16,340).

There is a steady increase each year, reflecting economic growth and increased productivity over the observed period.

The highest year-on-year increase is observed between 2013 and 2014, where GDP per capita grew from €13,300 to €13,640.

Disability-Adjusted Life Years (DALY)

DALY values show a general upward trend, indicating an increasing burden of disease over the years.

The DALY figure rises from 24,519 in 2010 to a peak of 31,863 in 2019, with some fluctuations observed in subsequent years.

A slight decline is observed in 2020 and 2021, which could be attributed to various health interventions or data collection inconsistencies, but it increases again in 2022.

Value of a Statistical Life Year (VSLY):

The VSLY, which represents the economic value associated with life years saved or lost due to breast cancer, has increased from €1,480,212,942 in 2013 to €2,056,026,595 in 2022, with a total value of €17,946,424,926 over the period.

The steady increase in VSLY reflects the growing economic value placed on life years, likely driven by rising incomes, healthcare costs, and the societal value of extending life. The peak in 2022 underscores the increasing economic importance of health interventions that extend life expectancy.

This increase reflects the rising economic valuation of life years as GDP per capita grows.

There are notable increases in VSLY in certain years, such as between 2014 and 2015, and 2016 and 2017, correlating with significant rises in GDP per capita during these periods.

Total costs according to available data – diagnosis C50 over the last 10 years

- Direct costs are up to **€555 million**
- Indirect costs are at: **€112 million**
- Productivity loss due to C50: **€458 million**
- Social loss caused by C50: **€18 billion**

Key Insights

- The rising DALY values suggest a growing health burden of Breast Cancer, which may be due to various factors such as aging population, increased incidence of diseases, or better data collection methods.
- The increase in VSLY highlights the rising economic valuation of health and life, showing that as the economy grows, the financial impact of losing a year of life is also increasing.
- This analysis helps to understand the economic and health-related changes over time, providing insights into the social and economic implications of healthcare burdens and productivity losses due to illness.

Overall Conclusions

This study aims to analyze the long-term impacts of breast cancer in Slovakia, focusing both on direct and indirect costs and their trends over the last decade.

The findings shows that breast cancer incidence in Slovakia is steadily rising, with a projected increase to 4055 new cases annually by 2030. This trend is driven by a combination of factors, including aging population and lifestyle changes. Mortality rates have also shown an increasing trend, though there are signs of improvement in treatment outcomes, indicated by a declining mortality/incidence ratio thus suggesting, that efforts to improve early detection and treatment are having a positive impact.

While breast cancer is the most common cancer among women in the EU, Slovakia has a higher incidence rate than many other EU countries, indicating a greater need for preventative measures and early detection. Mortality rates are also higher than the EU average, reflecting the need for improved access to state-of-the-art treatments and ongoing efforts to reduce disparities in healthcare access across the country. The slower introduction of innovative treatments and more stringent price negotiations in Slovakia compared to other EU countries potentially leads to inferior health outcomes, with Slovak patients possibly experiencing lower survival rates or quality of life compared to those in countries with better access to cutting-edge treatments.

The economic burden of breast cancer is significant, with a notable increase in both direct and indirect costs. Direct costs, primarily associated with ambulatory healthcare and inpatient care, have increased substantially over the last decade. This rise reflects a growing demand for these services, likely driven by more complex cases, advancements in diagnostic technologies, and more intensive care requirements. Indirect costs, including sick leave, disability, and productivity loss also show a consistent upward trend. The increasing indirect costs place significant financial pressure on employers, the healthcare system, and the social insurance system calling for effective strategies to manage these costs and support affected individuals. This highlights the significant economic burden of breast cancer beyond direct medical expenses.

Overall, it can be concluded, that Slovakia is facing a significant challenge in managing the burden of breast cancer. There is a clear upward trend in breast cancer incidence and mortality in Slovakia, indicating a growing public health challenge. There is also substantial and consistent increase in both direct and indirect costs including rising healthcare expenditures and significant productivity loss thus having robust economic impact of the disease. These findings underscore the country needs to prioritize investments in early detection, prevention, and access to advanced treatments to mitigate the impact of breast cancer on the Slovak healthcare system and its citizens.

Key Data Sources

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Notes

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