



MAMMOGRAPHY SCREENING SR

Assessment Report for 2023

Statistical outputs from anonymized data provided by certified mammography screening facilities and health insurance companies in 2023

National Oncology Institute

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LIST OF ABBREVIATIONS

CH	chart
MMG	mammography exam
MoH SR	Ministry of Health of the Slovak Republic
NHIC	National Health Information Center
NOI	National Oncology Institute established under National Cancer Institute
NOR	National Oncology Register
NUTS 2	Area (in European texts denoted as “region” (in a narrower sense of the word) or a group of regions) is a second order statistical territorial unit on a regional level (NUTS 2 in European terminology) in Slovakia
SR	Slovak Republic
T	table
HIC	health insurance company

FOREWORD

Breast cancer mammography screening program is a long-term, systematic, monitored, state-supported and guaranteed detection of early stages of breast cancer in asymptomatic women from the target population. Its main objective is to reduce mortality, prolong the lives of women and improve their quality of life thanks to a more effective treatment of early stages of the disease. After implementation of general mammography screening and increasing participation rate of women, there is a transitory period of higher incidence in the target female population followed by an increased detection of early stages and a long-term drop in mortality.

These indicators are influenced by other independent factors, such as risk factors of the participating population, development of diagnostic methods and their implementation, development of treatment methods, awareness and education of the population as well as, very importantly, the quality and up-to-dateness of the data collected in National Screening and Oncology Register. Precise impact of mammography screening on the population can be assessed only after these factors are quantified.

That is why long-term, regular statistical evaluation of changes in the spectrum of detected malignancies and screening outcomes validation are a crucial process in order to ensure quality of individual facilities as well as general mammography screening.

In Slovakia, screening mammography can be performed only in certified mammography screening facilities which work effectively, promptly and with a high level of professionalism, ensuring immediate and efficient management of detected malignancies according to requirements laid out in the valid *Standard Procedure for Medical Radiation and Prevention – Screening Mammography*.

It has also been possible for radiologists in certified mammography screening facilities to transform preventive mammography referrals to screening mammography since May 15, 2021 if the woman belongs to the age interval, i.e., 50 – 69 years, and fulfils all inclusion criteria.

Another part of mammography screening is the collection and evaluation of statistical results in a binding structure, which is not only a precondition of self-check of individual screening mammography facilities, but also a precondition of statistical data collection about screening participants and its evaluation.

From January 1, 2023, to December 31, 2023, statistical data was collected by National Oncology Institute (NOI) according to the approved design of data collection based on the valid *Standard Procedure for Medical Radiation and Prevention – Screening Mammography* (hereinafter referred to as standard procedure) in order to adhere to all legislation regarding data protection.

Mammography screening currently takes place in 22 certified mammography screening facilities which have fulfilled the conditions of participation in mammography screening according to the valid standard procedure. Their activities must be regularly checked and monitored according to transparent rules laid out in the standard procedure.

The course of the program, adherence to set rules as well as scientific development of the project are supervised by NOI and Cancer Screening Committee of the MoH SR whose working group for breast cancer screening unites radiologists – mammography diagnosticians, representatives of all medical specialties involved in diagnostics and treatment of breast diseases as well as representatives of other stakeholders including MoH SR, NOI, health insurance companies, National Health Information Center (NHIC) and Healthcare Surveillance Authority. The breast cancer screening program is supervised by the MoH SR and fully reimbursed by health insurance companies. The MoH SR also guides the methodology and legislation associated with the screening program. NOI coordinates and evaluates the program, which is important in order to determine the effectiveness of the mammography screening and adjust future processes.

Expert Working Group for Quality Assurance of Mammography Facilities of the MoH SR Committee for Quality Assurance in Radiodiagnostics, Radiation Oncology and Nuclear Medicine is an integral part of mutual cooperation in terms of quality assurance and increasing the number of certified mammography screening facilities, long-term regular checks and quality assurance of certified mammography screening facilities as well as precise collection of statistical data about performed examinations.

Data audit and statistical processing of data is in the authority of National Oncology Institute in close cooperation with MoH SR, Slovak Radiological Society and mainly health insurance companies with the objective to develop a

cooperation with NHIC in order to collect all necessary data from the screening program efficiently as well as adjust the flow of data between health insurance providers involved in the screening program, NHIC and NOI. A binding parametric structure of information about the participants in mammography screening and their examinations is in preparation to ensure the quality of data collection by NOI. This data will be a requirement and part of re-assessment of mammography screening facilities involved in the screening and, as such, a precondition for further participation in the mammography screening. The parametric structure of data collection by NOI will be regularly updated according to the development of the screening process.

Total participation rate of women in the mammography screening is still relatively low. This is due to several factors:

- a) The COVID-19 pandemic stopped or reduced the number of people coming to facilities in 2021.
 - b) There is no general system of targeted invitations in Slovakia. Health insurance companies envisage a preparation of targeted invitations sent to all screening participants, also repeatedly in case of non-participation. Another option to increase the participation rate of women throughout Slovakia is to consider using another, more active way of inviting the target population. Since May 15, 2021, repeated invitations have been sent by certified
- c) mammography screening facilities where the woman had undergone the screening.
 - c) An estimated 20% of women in Slovakia undergo preventive mammography examinations in other than certified diagnostic-preventive mammography facilities, which is called opportunistic screening. It is necessary to transfer these examinations to high-quality certified mammography screening facilities.
 - d) The network of 22 certified mammography screening facilities is insufficient and there are regional disparities regarding their availability, which is why it is necessary to ensure continuous activity of the Expert Working Group for Quality Assurance of Mammography Facilities in order to continue certifying other registered mammography facilities interested in the mammography screening. Continuous education of healthcare professionals about screening mammography is equally important. Another vital activity is increasing the possibilities of education in mammography diagnostics in radiology as a certified work activity.
 - e) It is also necessary to increase the participation rate of women in the mammography screening by educational campaigns repeated several times per year with unified communication from all stakeholders – MoH SR, NOI, health insurance companies, expert societies and patients' organizations.

METHODOLOGY

The presented data is based on the collection and processing of anonymized data provided by all health insurance companies (HICs) (based on NOI's request from March 27, 2024) and certified mammography screening facilities to the National Oncology Institute.

Mammography examinations all around Slovakia in 2023 were categorized as follows:

a) Screening mammography (organized mammography screening), i.e., mammography of asymptomatic women aged 50 – 69 + 364 days performed in a certified mammography screening facility.

The list of mammography facilities evaluated by the expert working group and recommended to be included in the mammography screening by the committee is regularly updated by the MoH SR and published at its website.¹

b) Preventive mammography (opportunistic mammography screening), i.e., mammography of asymptomatic women aged 40 – 69 performed in a preventive-diagnostic (i.e., other than certified screening) mammography facility. Preventive mammography is also a mammography exam of an asymptomatic woman aged 40 – 49 performed in a certified mammography screening facility.

c) Diagnostic mammography, i.e., mammography of women with symptoms of breast disease. Diagnostic mammography is performed in all mammography facilities regardless of whether it is a certified mammography screening facility or other, i.e. preventive-diagnostic mammography facility.

A specific type of mammography screening is **screening mammography in high-risk female population** for which a new standard procedure *Breast Cancer Screening in High-Risk Female Population* was approved in November 2022.² This

standard diagnostic procedure adjusts the course of breast cancer screening in case of asymptomatic women at high risk of development of the disease via complex radiology imaging diagnostics in order to detect suspect non-palpable breast lesions early. It is based on an SSLG methodical instruction *Standard Diagnostic Procedure for Complex Genetic Laboratory Diagnostics for Hereditary Breast, Ovarian and Pancreatic Cancer Syndrome* and *Standard Procedure for Medical Radiation and Prevention – Screening Mammography / Standard Procedure for Breast Cancer Prevention via Population-Based Screening Method – Screening Mammography*.³

However, we do not have any data regarding women in the high-risk population at the moment, which does not allow us to perform statistical evaluation of the group and consequently take it into consideration when assessing and updating mammography screening.

Given that the standard procedure for breast cancer screening in high-risk female population could not be fully implemented in clinical practice in 2023 due to legislative reasons and there are still no specific procedure codes or diagnosis codes for this group of women through which they could be identified, asymptomatic women aged 50 – 69 + 364 days with a positive family history of breast cancer were included in screening mammography in 2023.

Another specific group are women monitored for breast cancer or in situ breast cancer, or in long-term remission. Based on the 3rd revision of the *Standard Procedure for Medical Radiation and Prevention – Screening Mammography / Standard Procedure for Breast Cancer Prevention via Population-Based Screening Method – Screening Mammography*³ approved in November 2022, the indication for mammography screening covers also asymptomatic women with a personal history of breast cancer who have ended their 10-year follow-up care and currently do not show any signs of activity of the original oncological disease. However, since the standard procedure did not manage to be fully implemented in clinical practice in 2023, this group of women was reported under diagnostic mammography in 2023.

¹MoH SR. List of mammography facilities evaluated by the expert working group and recommended to be included in the mammography screening by the committee. 2024. Available online: <https://www.health.gov.sk/Clanok?dops-zamerana-na-zabezpecenie-kvality-namamografickych-preventivnych-a-diagnostickych-pracoviskach>

²Lehotská V, Rauová K, Lohajová, Behúlová R, Urbán V, Lauková T et al. 2022. Breast Cancer Screening in High-risk Female Population – Standard Procedure. [online]. Bratislava: Ministry of Health of the Slovak Republic, 2022. 11 pp. Available online: <https://www.noisk.sk/files/2022/2022-11-11-standardny-postup-pre-skrining-karcinomu-prsnika-vo-vysokorizikovej-populacii-zien.pdf>

³Horváthová M, Lehotská V, Nikodemová D, Kállayová A, Slobodníková A. 2021. Standard Procedure for Medical Radiation and Prevention – Screening Mammography. 3rd revision [online]. Bratislava: Ministry of Health of the Slovak Republic, 2021. 50 pp. Available online: <https://www.noisk.sk/files/2022/2022-11-11-skriningova-mamografia-3-revizia.pdf>

However, we strongly believe that it will be possible to evaluate the aforementioned statistical data regarding specific mammography screening groups properly thanks to an established MoH SR working group for data collection for all cancer screenings (including mammography screening) and thanks to a more intense cooperation with NHIC, including getting more up-to-date information from NOR, which would be one of the key components to help us define these groups.

The 3rd revision of the standard procedure³ brings other important changes based on recommendations of the European Commission regarding mammography screening, but it will only be possible to implement these in clinical practice in the upcoming period. One of important changes is an adjustment of age group for mammography screening which is now extended to 45 – 75 years. However, it has to be noted that this amendment proposed by NOI and MoH SR (from November 2022) did not enter into application in 2023 because it has not been approved by the parliament. This means that only asymptomatic women aged 50 – 69 + 364 days are considered mammography screening target group in the statistical processing of mammography screening data.

Screening mammography performed in certified mammography screening facilities in 2023 was reported by cumulative screening procedure codes 1301, 1301a, 1301b, 1301c, 1301d, 1301e, 1301f and diagnosis codes Z01.6; Z80.3; Z87.7^{4,5} regardless of whether the woman in question received an invitation from her HIC or not. In some specific cases in 2023, women who went to a certified mammography screening facility and underwent screening mammography were still reported by procedure codes 5092 or 5092p with diagnosis codes Z00 – Z80.^{4,5}

Demographic statistical data were taken from the Statistical Office of the SR.⁶ Data about women

with permanent residence in Slovakia as of July 31, 2023, were taken into account.

Relative quantity indicators are recalculated per number of women in the given area aged 50 – 69 who represent the target group of the mammography screening in the SR.

The mammography screening coverage was calculated as a ratio of mammography exams actually carried out (i.e., mammography exams performed in a mammography facility according to its territorial activity) and the number of women entitled to screening mammography (i.e., women entitled to a screening mammography in the given region) while adhering to a 2-year screening interval. All women diagnosed with breast cancer or in palliative care should be subtracted. We should also subtract women at high risk of breast cancer given that a specific screening procedure is indicated for this group (different age, imaging methods and intervals) and these should be evaluated separately. However, due to lack of statistical data regarding the number of women diagnosed with breast cancer as well as lack of data about the number of women in the high-risk group it was not possible to do a precise analysis and use the methodical procedure to evaluate mammography screening statistical data from 2023.

Statistical data about the population incidence of women with breast cancer (C50) including information about the clinical stage on a population-wide level were taken from the most up-to-date available data from the NOR which were published by NHIC in 2024. More specifically, the following sections were used: Reported oncological diseases, selected benign tumors and tumors of uncertain malignant potential in Slovak women according to age group and disease location in 2014; clinical stages of reported oncological diseases in Slovak women according to disease location in 2014.⁷ Statistical data about the population mortality of women with breast cancer (C50) were taken from the most up-to-date available data from the Statistical Office of the SR which were published by NHIC in 2024.⁸

Discrepancies between statistical data from mammography screening provided by certified

⁴NOI. Mammography Screening SR: Addendum. Statistical outputs from anonymized data provided by MoH SR and health insurance companies in 2021. 2022. Available online: <https://www.noisk.sk/files/2022/2022-11-08-hodnotiaci-sprava-mamograficky-skrining-2021-doplno-sk.pdf>

⁵NOI, Behúňová Z. Methodical instruction for procedure and diagnosis code reporting for healthcare providers and their subsequent reimbursement in relation to population-based breast cancer screening implementation [proposal in preparation].

⁶Statistical Office of the SR. STATdat. Demographics and social statistics. 2023. Available at: http://statdat.statistics.sk/cognosext/cgi-bin/cognos.cgi?b_action=cognosViewer&ui.action=run&ui.object=storeID%28%22i40A03AF2150C41DE8BE98D0C0C41A764%22%29&ui.name=Vekov%20a9%20zlo%20c5%20beenie%20-%20SR%20c%20oblasti%20c%20kraje%20c%20okresy%20c%20mesto%20c%20vidiek%20c%20bom7009rr%20d&run.outputFormat=&run.prompt=true&cv.header=false&ui.backURL=%20cognosext%20fcps4%20fportlets%20common%20close.html&run.outputLocale=sk

⁷ NHIC. Outputs from the National Oncology Register of the SR. Incidence of Malignant Tumors in Slovakia 2014. Available online: https://www.nczisk.sk/Statisticke_vystupy/Tematicke_statisticke_vystupy/Onkologia/Vystupy_NOR_SR/Pages/Incidencia-zhubnych-nadorov.aspx

⁸ NHIC. Mortality of Oncological Diseases in Slovakia 2022. Available online: <https://app.powerbi.com/view?r=eyJrIjoiMjA3MG10MTMtOGE4OS00NTFhLTlkMmEtYzFhN2ZhYjMwOTdiIiwidCI6IjMxMGJhNtk1LTAxM2MtNDAYZC05ZWYyLW11N2Q1ZjFkYzQ2MyIsImMiOiJ9>

mammography screening facilities and health insurance companies were calculated as the difference in percentage between these data.

Due to rounding to one decimal place, the sum of percentages does not have to equal one hundred.

1. NUMBER OF CERTIFIED MAMMOGRAPHY SCREENING FACILITIES IN THE SR

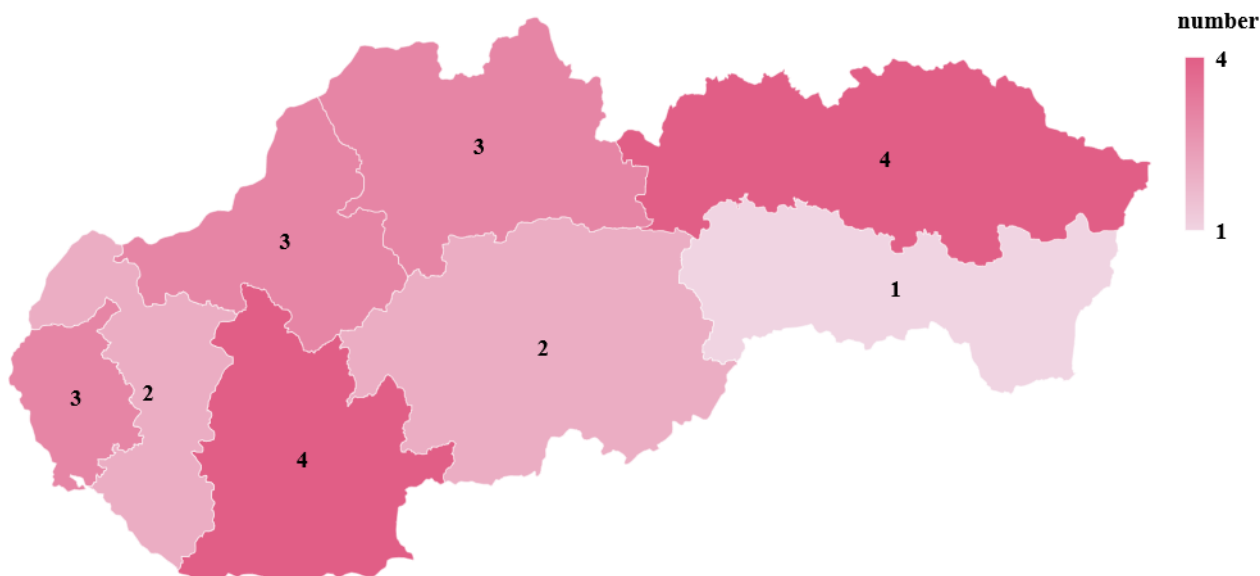
From January 1, 2023, to December 31, 2023, the Expert Working Group for Quality Assurance of Mammography Facilities of the MoH SR Committee for Quality Assurance in Radiodiagnostics, Radiation Oncology and Nuclear Medicine listed 23 certified mammography screening facilities in the List of Mammography Facilities with **22 certified mammography screening facilities in the SR as of December 31, 2023** (CH 1, T 1).

In 2023, three new mammography facilities were added to the List of Mammography Facilities certified by the Expert Working Group for Quality Assurance of Mammography Facilities of the MoH SR Committee for Quality Assurance in Radiodiagnostics, Radiation Oncology and Nuclear Medicine. On the other hand, one certified mammography screening facility which was included in the certified mammography screening facility network in 2019 was excluded from the network in 2023. This happened because the facility did not comply with the criteria for the performance of screening mammography according to the Standard Procedure for Breast Cancer Prevention via

Population-Based Screening Method – Screening Mammography (3rd review).

Given that one facility was excluded from the screening mammography facilities network and new screening mammography facilities were only certified in the second half of the calendar year, the statistical processing took into account data in the following manner:

- January – June 2023: data from 20 facilities
- July – August 2023: data from 19 facilities (*note: one facility was excluded*)
- September 2023: data from 20 facilities (*note: one facility was newly certified*)
- October – December 2023: data from 21 facilities (*note: second facility was newly certified*)
- Given that the third facility was included in the screening mammography facility network only at the end of November 2023, i.e., started functioning as a certified mammography screening facility only in 2024, the statistical processing did not include data from this facility.



CH 1. Number of certified mammography screening facilities in regions of the SR as of December 31, 2023.

T 1. Number of certified mammography screening facilities in the SR as of December 31, 2023.

Location	Name of the facility	Address of the facility
Banská Bystrica	AGEL Mammacenter of St. Agatha (Mammacentrum sv. Agáty a.s.)	Tibora Andrašovana 46, 974 01 Banská Bystrica
Bardejov	St. Jacob Hospital with Policlinic, n.o. (NsP Sv. Jakuba, n.o.)	Sv. Jakuba 21, 085 01 Bardejov
Bratislava	2 nd Radiology Clinic of the Faculty of Medicine of Comenius University and Saint Elizabeth Cancer Institute	Heydukova 10, 812 50 Bratislava
	Ružinov Policlinic (Ružinovská poliklinika, a.s.)	Ružinovská 10, 820 07 Bratislava
Dolný Kubín	Dr. L. Nádaši Jégé Lower Orava Hospital with Policlinic	Nemocničná 1944/10 026 01 Dolný Kubín
Košice	Mammography Diagnostic Center; AGEL Hospital Košice-Šaca a.s.	Lúčna 57 040 15 Košice-Šaca
Liptovský Hrádok	SVALZY, s.r.o.	Ul. J.D. Matejovie 542, 033 80 Liptovský Hrádok
Lučenec	SOMATO s.r.o.	Mammography Facility Q Policlinic Rúbanisko II/77 984 03 Lučenec
Malacky	Nemocničná a.s.	Duklianskych hrdinov 34, 901 22 Malacky
Nové Zámky	Teaching Hospital with Policlinic Nové Zámky	Slovenská 11/A 940 34 Nové Zámky
Nitra	Jessenius – Diagnostic Center a.s.	Špitálska 6, 949 01 Nitra
Poprad	Hospital Poprad a. s.	Banicka 803/28, 058 45 Poprad
Prešov	J. A. Reiman Teaching Hospital with Policlinic Prešov	Hollého 14, 081 81 Prešov
Prievidza	St. Vincent – Radiology, s.r.o.	Hviezdoslavova 3, 971 01 Prievidza
Ružomberok	SNP Central Military Hospital Ružomberok Teaching Hospital	Ul. Generála Miloša Vesela 21, 034 01 Ružomberok
Stará Ľubovňa	Ľubovňa Hospital (Ľubovnianska nemocnica n.o.)	Obrancov mieru 3, 064 01 Stará Ľubovňa
Topoľčany	Mammography and Ultrasound Office Topoľčany, Lisánska, M.D.	Moyzesova 1333/1A, 955 01 Topoľčany
	PentaHospitals Hospital Topoľčany a.s.	Pavlovova 17, 955 20 Topoľčany
Trenčín	Radiology Clinic s.r.o.	K dolnej stanici 18, 911 01 Trenčín
	Teaching Hospital Trenčín	Legionárska 594/28, 911 01 Trenčín
Trnava	MRI, s.r.o. Imaging Diagnostics Institute (Inštitút zobrazovacej diagnostiky)	Družba Policlinic Starohájska 2, 917 01 Trnava
	Teaching Hospital Trnava	A. Žarnova 11, 917 75 Trnava

2. DEMOGRAPHICS AND PARTICIPATION RATE OF WOMEN INVITED BY HEALTH INSURANCE COMPANIES IN 2023

Based on data from the Statistical Office of the Slovak Republic, there were 720,618 women aged 50 to 69 in Slovakia as of July 1, 2023. When taking into account a 2-year screening interval and inclusion and exclusion criteria, **360,309 women should have attended the mammography screening in 2023** (all women diagnosed with breast cancer or in palliative care at that time should be subtracted).

Within mammography screening implementation in Slovakia, health insurance companies (VšZP, Union, Dôvera) send invitations to women aged 50 – 69 who have not attended a mammography exam in more than 2 years and fulfill the precise inclusion and exclusion criteria. The total number of invited women from January to December 2023 was 137,997, i.e., **the invitation coverage was 38.3%** when taking into account the 2-year screening interval (T 2, T 3).

In 2023, 31,915 women underwent the mammography screening based on an invitation from their HIC by 365 days from the invitation (i.e., women who received an invitation from HIC in 2022 – 2023 and subsequently underwent a mammography exam in 2023). Of this number, 25,406 underwent mammography screening based on an invitation from HIC received in 2023 and the rest, i.e., 6,509 women, underwent mammography screening based on an invitation received in the

previous year, i.e., in 2022. **The participation rate of women who underwent the mammography screening in 2023 based on an invitation from their HIC by 365 days from the invitation was 23.1%.**

The participation rate of women aged 50 – 69 who received an invitation from their HIC in 2023 and then underwent the mammography exam the same year was **18.4%**. This means that out of the total number of invited women who received an invitation that year, 25,406 underwent screening mammography, which corresponds to **7.1% of the target female population**. Of the total number, 15,870 women were examined based on an invitation from their HIC in other than certified mammography screening facility, i.e., **11.5% of the invited women**, which corresponds to 4.4% of the target female population (**opportunistic mammography screening**). 9,536 women were examined by screening mammography in a certified mammography screening facility, i.e., **6.9% of the invited women**, which corresponds to 2.6% of the target female population (**organized mammography screening**).

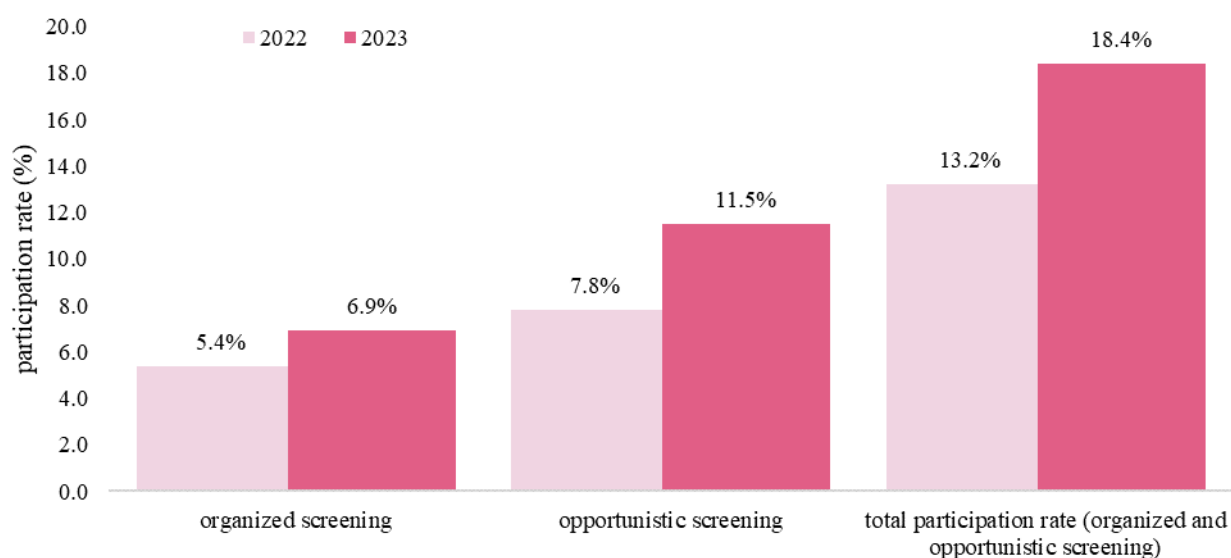
Compared to 2022, we can see an increase of 5.2% of the participation rate of women in mammography screening based on an invitation from HIC received in the same year (CH 2).

T 2. Number of women invited to screening mammography exam by health insurance companies in 2023.

Health insurance company	Number of invited women aged 50 – 69
VšZP	57,600
Dôvera	62,847
Union	17,550
Total invited women	137,997
Invitation coverage	38.3%

T 3. Share of women aged 50 – 69 who underwent a mammography exam in 2023 based on an invitation from their HIC received that same year.

Participation in mammography screening	Number of women who underwent mammography screening based on HIC invitation	Participation rate of women based on an invitation from HIC
In a certified mammography screening facility (organized screening)	9,536	6.9%
In other than certified mammography screening facility (opportunistic screening)	15,870	11.5%
Total participation rate of women based on an invitation from HIC	25,406	18.4%



CH 2. Comparison of the participation rate of women aged 50 – 69 who received an invitation from their HIC in 2023 and then underwent the mammography exam.

3. STATE OF ORGANIZED AND OPPORTUNISTIC MAMMOGRAPHY SCREENING IN THE SR ACCORDING TO ANONYMIZED DATA FROM HEALTH INSURANCE COMPANIES IN 2023

297,186 mammography exams (including preventive, screening and diagnostic mammography in all age groups) were performed in 295,632 women at radiology (mammography) facilities in 2023. Of this number, 63% corresponded to mammography exams of asymptomatic women (i.e., 188,300 mammography exams) and 37% represented mammography exams of women with breast disease symptoms (i.e., 108,886 mammography exams).

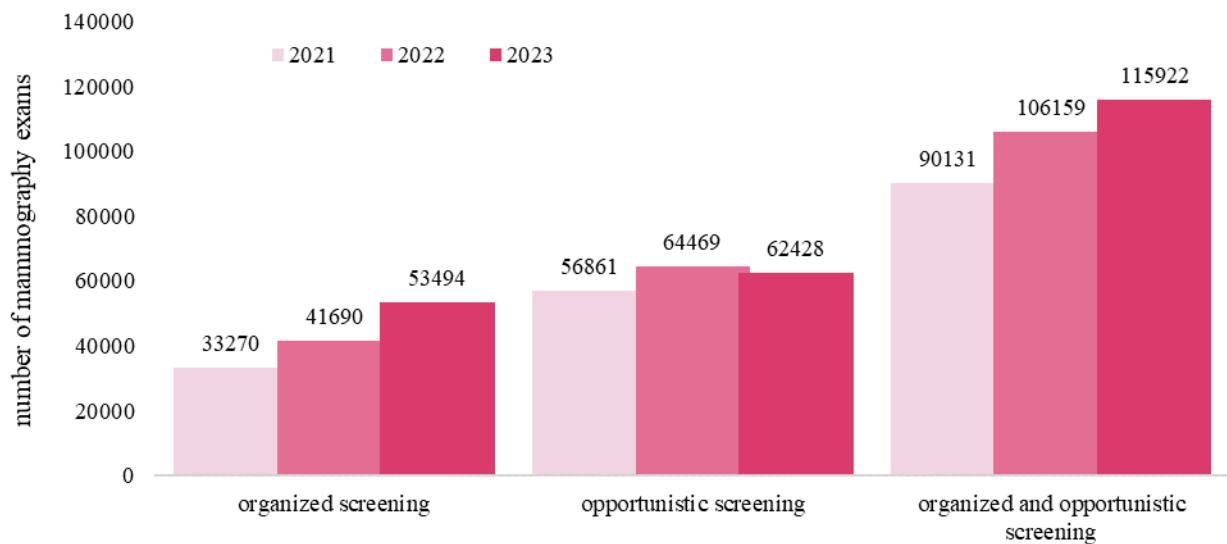
Regarding age structure, 165,772 mammography exams were performed in 164,484 women (with or without breast disease symptoms) **aged 50 – 69** (mammography screening target group in the SR) in 2023, which corresponds to mammography exam coverage of 45.7% (including preventive, screening, diagnostic mammography). Of this number, 49,850 mammography exams were performed in women with breast disease symptoms (30% of all mammography exams in women aged 50

– 69) and **115,922 mammography exams in asymptomatic women** (70% of all mammography exams in women aged 50 – 69). Of this number, **53,494 women** were examined by screening mammography within the **organized mammography screening**, which represents **46% of all mammography exams performed in asymptomatic women**. The historically obsolete preventive mammography (i.e., **opportunistic screening**) was undergone by **62,428 asymptomatic women**, which corresponds to **54% of all mammography exams performed in asymptomatic women**.

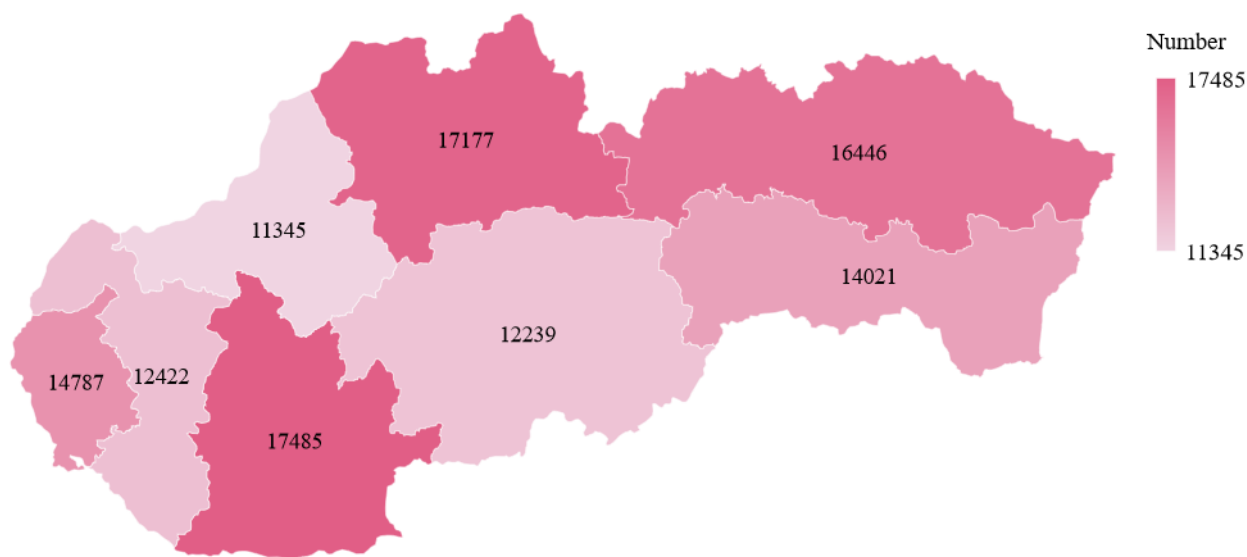
With time, we can see an increase not only in the number of asymptomatic women examined by screening mammography but also an increasing percentage of women examined by screening mammography in certified mammography screening facilities (T 4, T 5, CH 3, CH 4).

T 4. Comparison of the number of mammography exams in asymptomatic women performed in certified mammography screening facilities and other facilities in 2021 – 2023.

Number of mammography exams in asymptomatic women aged 50 – 69			
Mammography screening	2021	2022	2023
Organized screening	33,270 (37%)	41,690 (39%)	53,494 (46%)
Opportunistic screening	56,861 (63%)	64,469 (61%)	62,428 (54%)
Organized and opportunistic mammography screening	90,131 (100%)	106,159 (100%)	115,922 (100%)



CH 3. Comparison of the number of mammography exams in asymptomatic women performed in certified mammography screening facilities (organized screening) and other facilities (opportunistic screening) in 2021 – 2023.



CH 4. Number of all mammography exams of asymptomatic women aged 50 – 69 (organized, opportunistic screening) in the SR in 2023 per region of the mammography facility in which the mammography was performed.

T 5. Number of mammography exams in asymptomatic women aged 50 – 69 performed in certified mammography screening facilities (organized screening) and other facilities (opportunistic screening) in 2023.

Territory of activity of mammography facility	Number of all mammography exams of asymptomatic women aged 50 – 69	Number of mammography exams in asymptomatic women aged 50 – 69	
		in a certified mammography screening facility	in other than certified mammography screening facility
Banská Bystrica region	12,239	6,433	5,806
Bratislava region	14,787	9,311	5,476
Košice region	14,021	1,486	12,535
Nitra region	17,485	10,110	7,375
Prešov region	16,446	7,940	8,506
Trenčín region	11,345	5,551	5,794
Trnava region	12,422	7,558	4,864
Žilina region	17,177	5,105	12,072
SLOVAK REPUBLIC	115,922	53,494	62,428

The total mammography screening coverage (i.e., mammography exams of asymptomatic women aged 50 – 69) in 2023 was **32.2%**. Of this number, the **organized mammography screening coverage** (i.e., mammography exams of asymptomatic women aged 50 – 69 performed in a certified mammography screening facility) was **14.8%** and **opportunistic mammography screening coverage** (i.e.,

mammography exams of asymptomatic women aged 50 – 69 performed in other than certified mammography screening facility) was **17.3%** (T 6, T 7, CH 5).

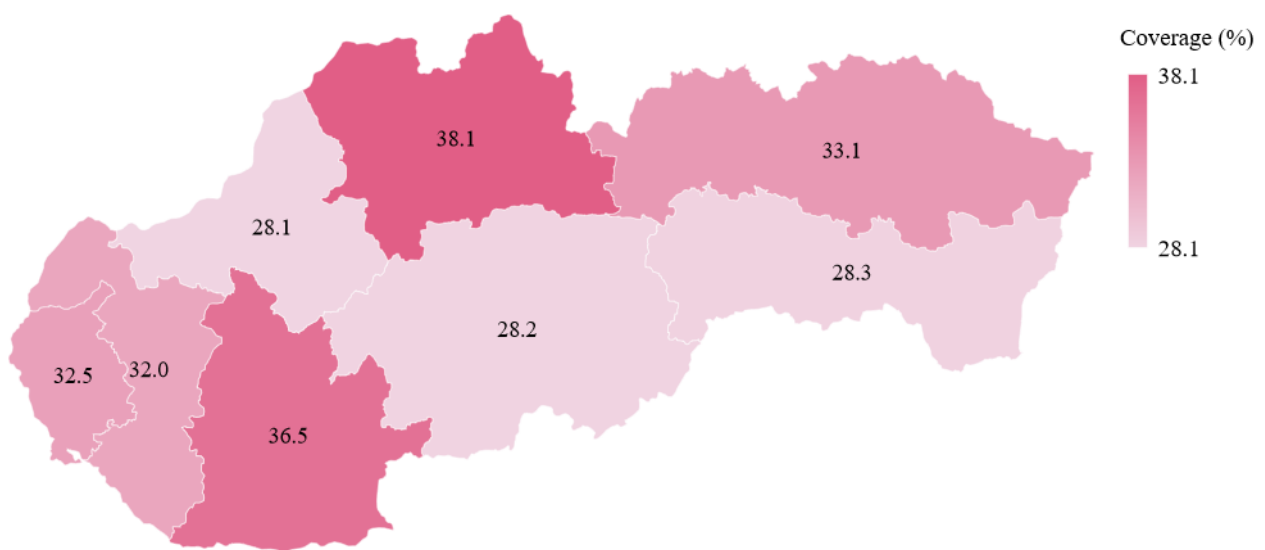
Compared to previous years, we can see a slight increase in the participation rate of women in the mammography screening and a related increase in the total mammography screening coverage in the SR (CH 6, CH 7).

T 6. Coverage based on exam (organized, opportunistic screening) in 2023 per territory of activity and type of mammography facility.

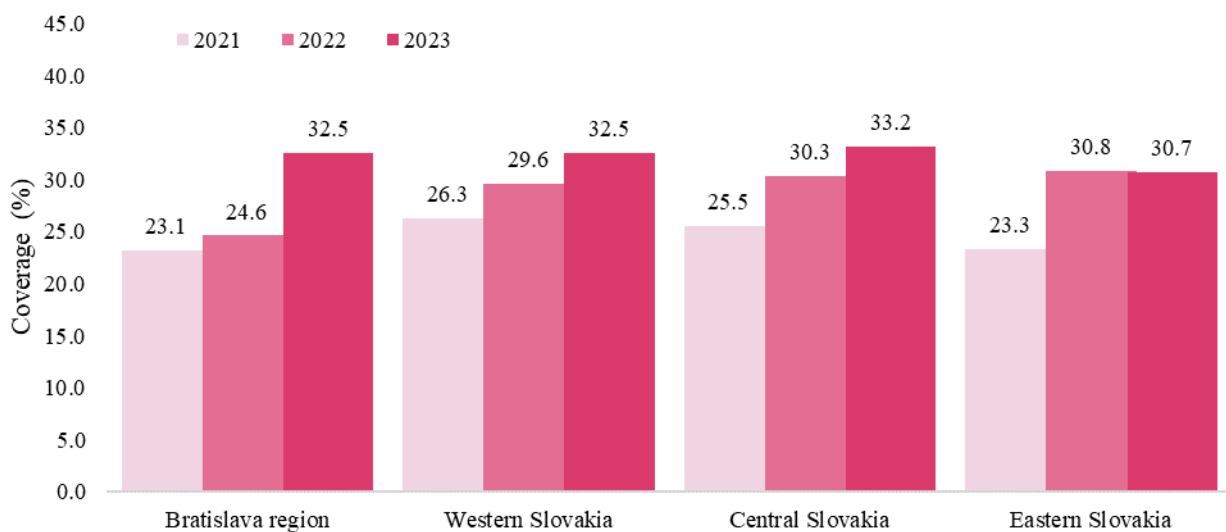
Territory of activity of mammography facility	Coverage based on exam when adhering to screening interval (%)		Total coverage based on exam when adhering to screening interval (%)
	in a certified mammography screening facility	in other than certified mammography screening facility	
Banská Bystrica region	14.8%	13.4%	28.2%
Bratislava region	20.5%	12.0%	32.5%
Košice region	3.0%	25.3%	28.3%
Nitra region	21.1%	15.4%	36.5%
Prešov region	16.0%	17.1%	33.1%
Trenčín region	13.8%	14.4%	28.1%
Trnava region	19.5%	12.5%	32.0%
Žilina region	11.3%	26.8%	38.1%
SLOVAK REPUBLIC	14.8%	17.3%	32.2%

T 7. Coverage based on exam (organized, opportunistic screening) in 2023 per territory of activity of mammography facility according to region (NUTS 2).

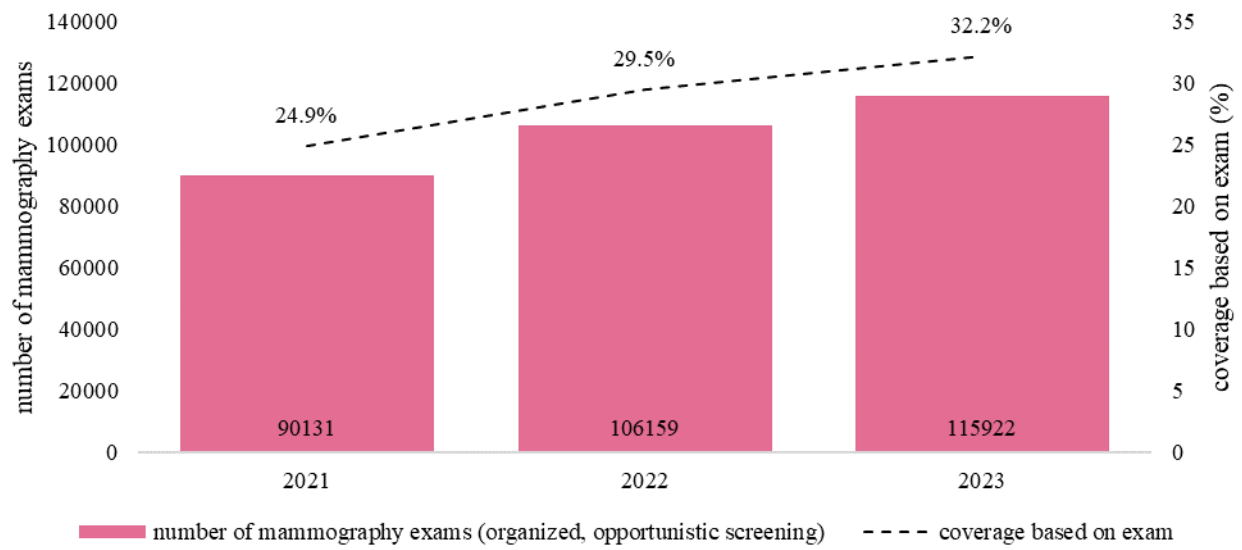
Territory of activity of mammography facility per region (NUTS 2)	Coverage based on exam (%)		
	Organized mammography screening	Opportunistic mammography screening	Organized and opportunistic mammography screening
Bratislava region	20.5%	12.0%	32.5%
Western Slovakia	18.3%	14.2%	32.5%
Central Slovakia	13.0%	20.2%	33.2%
Eastern Slovakia	9.5%	21.2%	30.7%
SLOVAK REPUBLIC	14.8%	17.3%	32.2%



CH 5. Coverage based on exam (organized and opportunistic screening) in the SR in 2023 per region of the mammography facility in which the mammography was performed.



CH 6. Comparison of coverage based on exam (organized, opportunistic screening) in 2021 – 2023 per territory of activity of mammography facility according to region (NUTS 2).



CH 7. Comparison of the coverage based on exam trends (organized, opportunistic screening) in 2021 – 2023.

4. STATE OF ORGANIZED MAMMOGRAPHY SCREENING IN THE SR ACCORDING TO DATA FROM CERTIFIED MAMMOGRAPHY SCREENING FACILITIES

15.5% of the target female population were examined by screening mammography in a certified mammography screening facility in 2023, i.e., **55,874 women participated in the mammography screening**. Compared to 2022, there was an increase in the number of performed screening mammography exams by 18%. We can

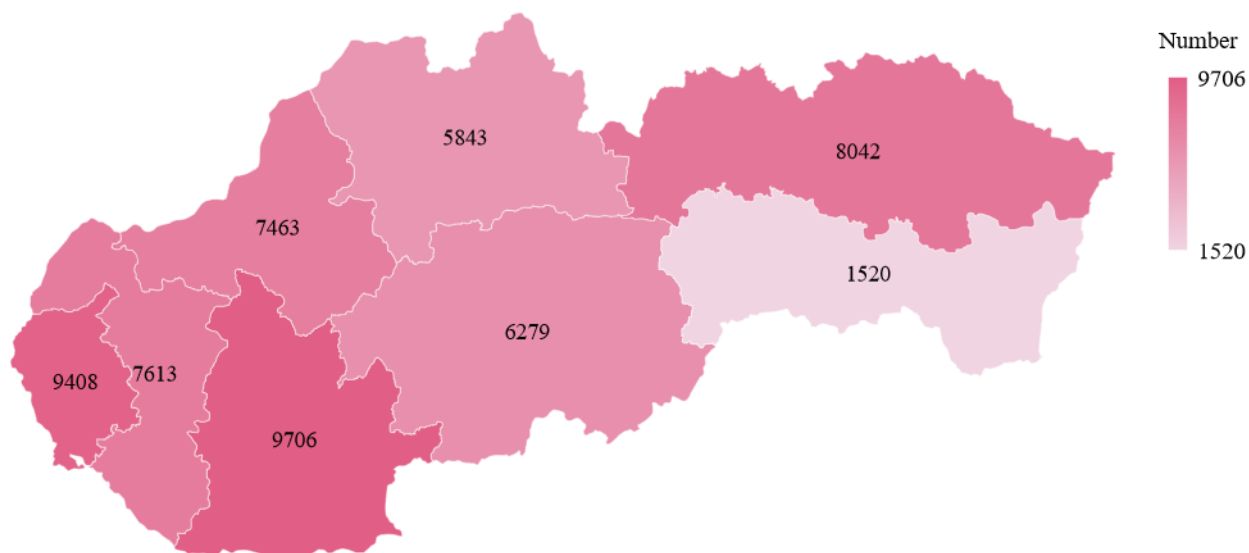
also see a slight increase in organized mammography screening coverage by 2.8% (T 8, T 9, CH 8, CH 9, CH 10, CH 11, CH 12, CH 13). This group included 261 diagnosed cancers, which corresponds to a malignancy rate of **5 cases per 1,000 women**.

T 8. Organized mammography screening coverage in 2023 per territory of activity of certified mammography screening facility according to region (NUTS 2).

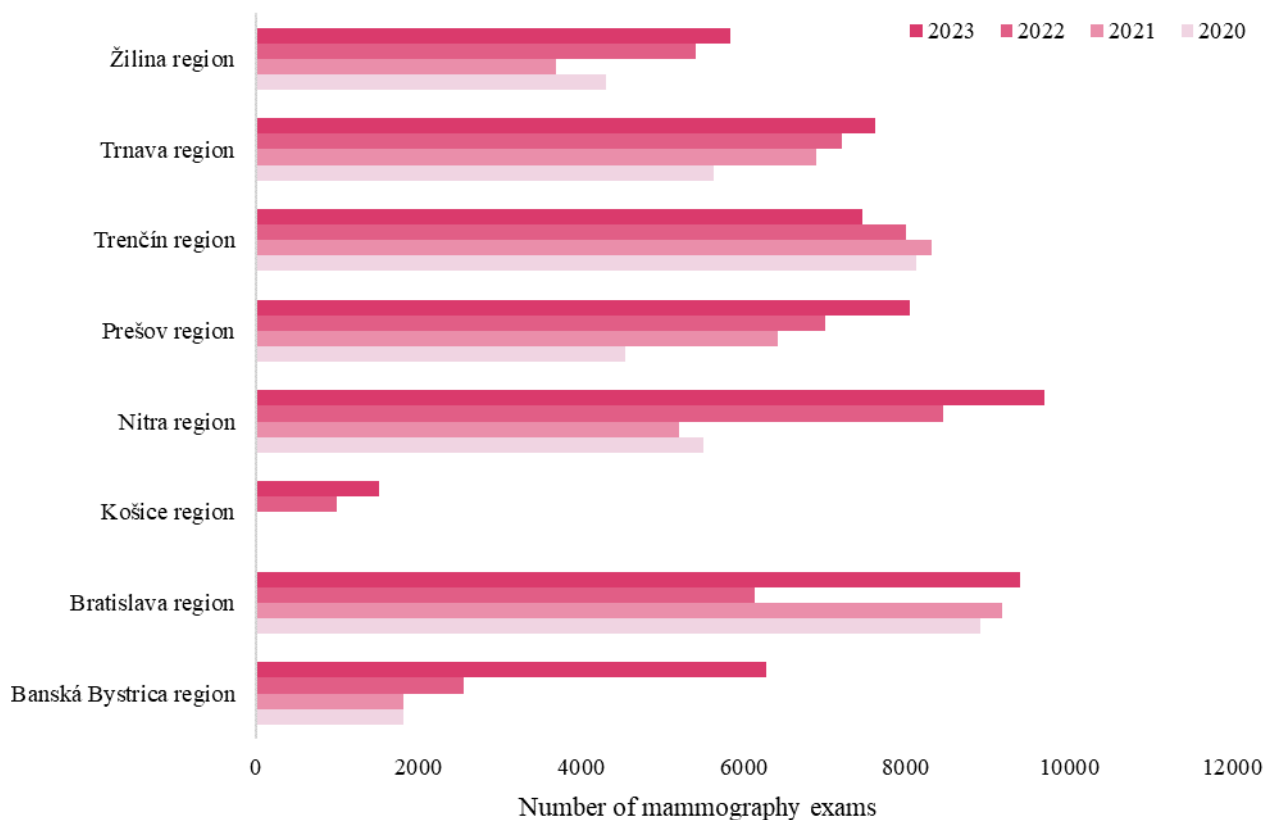
Territory of activity of mammography facility per region (NUTS 2)	Number of performed screening mammography exams of women aged 50 – 69	Mammography screening coverage when adhering to screening interval (%)
Bratislava region	9,408	20.7%
Western Slovakia	24,782	19.5%
Central Slovakia	12,122	13.7%
Eastern Slovakia	9,562	9.6%
SLOVAK REPUBLIC	55,874	15.5%

T 9. Organized mammography screening coverage in 2023 per region with certified mammography screening facility.

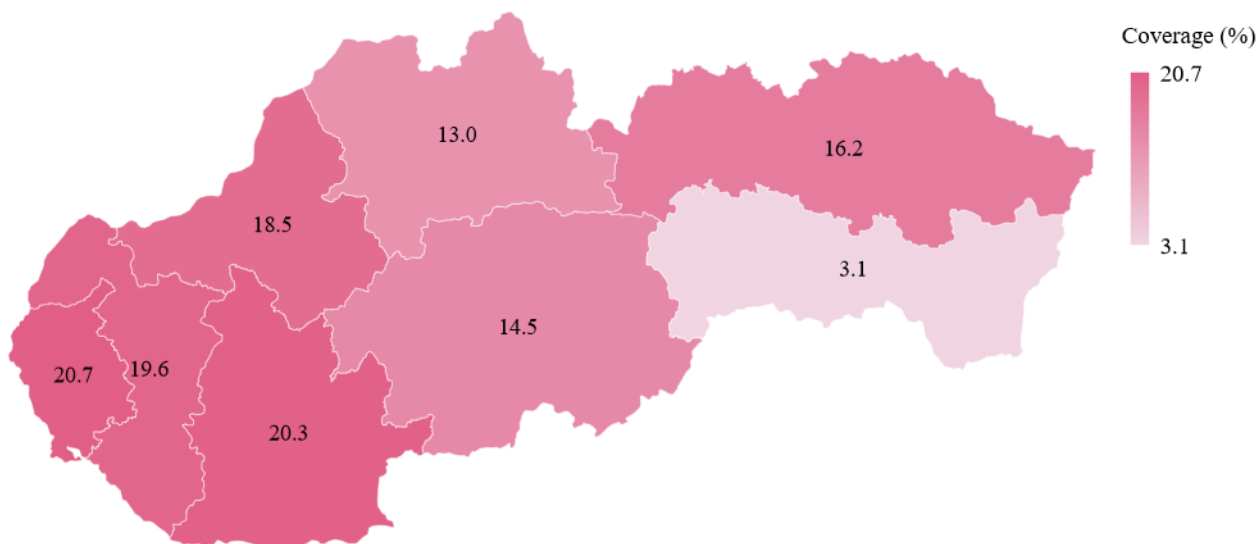
Territory of activity of mammography facility	Number of performed screening mammography exams of women aged 50 – 69	Mammography screening coverage when adhering to screening interval (%)
Banská Bystrica region	6,279	14.5%
Bratislava region	9,408	20.7%
Košice region	1,520	3.1%
Nitra region	9,706	20.3%
Prešov region	8,042	16.2%
Trenčín region	7,463	18.5%
Trnava region	7,613	19.6%
Žilina region	5,843	13.0%
SLOVAK REPUBLIC	55,874	15.5%



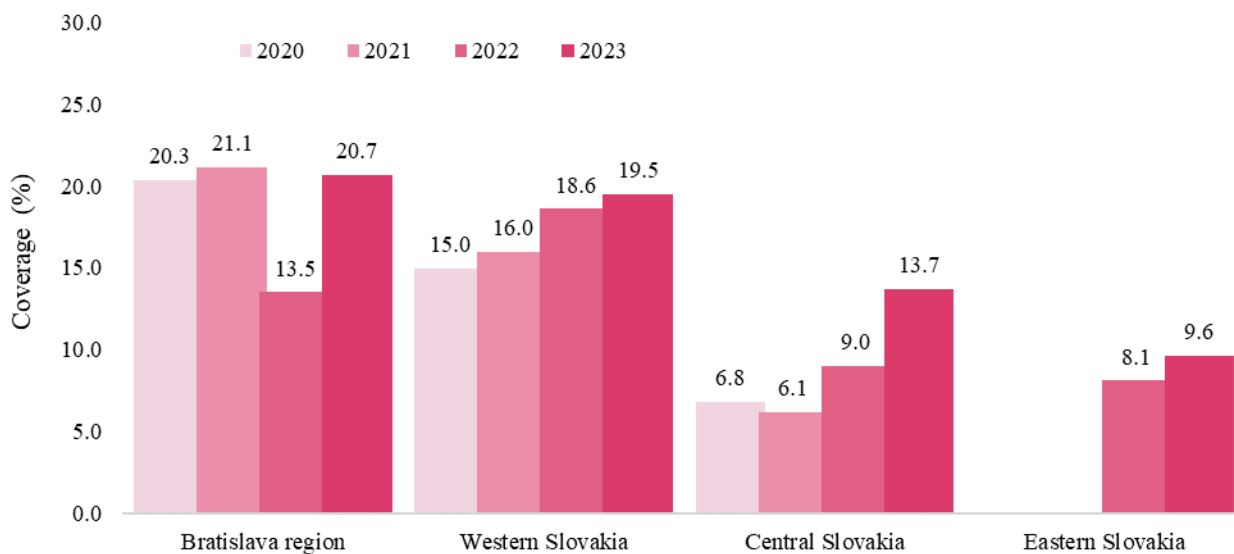
CH 8. Number of all screening mammography exams of asymptomatic women aged 50 – 69 in the SR in 2023 per region of the certified mammography screening facility in which the mammography was performed.



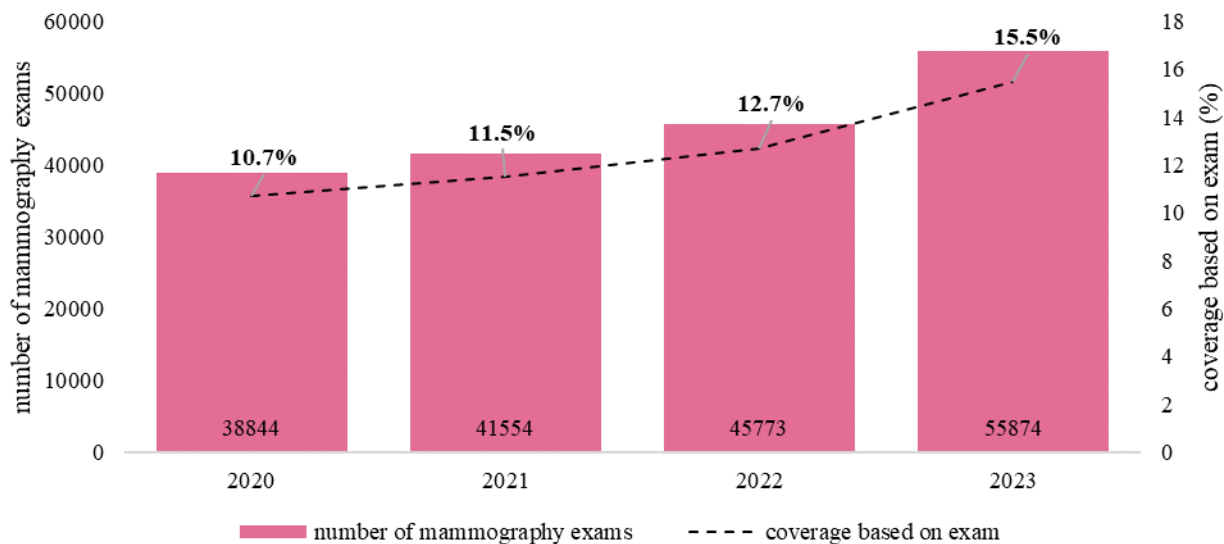
CH 9. Comparison of the number of screening mammography exams performed in certified mammography screening facilities in 2020 – 2023 per region with certified mammography screening facility.



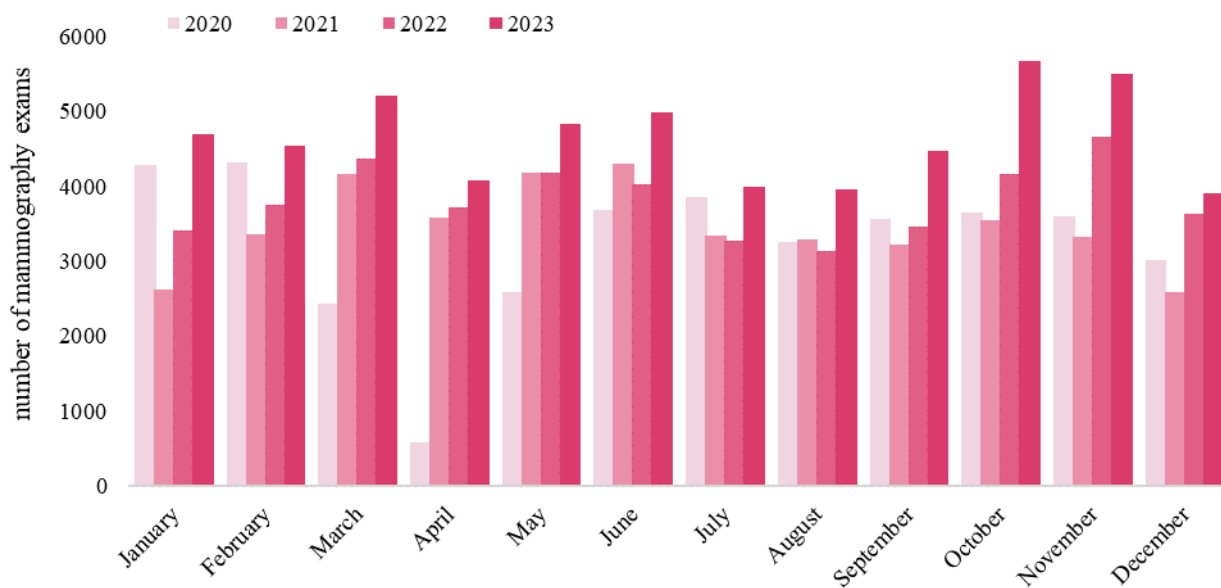
CH 10. Organized mammography screening coverage in the SR in 2023 per region with certified mammography screening facility in which the mammography was performed.



CH 11. Comparison of mammography screening coverage in 2020 – 2023 per territory of activity of mammography facility according to region (NUTS 2).



CH 12. Comparison of the organized mammography screening coverage trends in 2020 – 2023.



CH 13. Comparison of the number of screening mammography exams in certified mammography screening facilities in 2020 – 2023 per month.

4.1. CHARACTERISTICS OF MALIGNANCIES DIAGNOSED WITHIN THE ORGANIZED MAMMOGRAPHY SCREENING

In 2023, 55,874 screening mammography exams were performed in certified mammography screening facilities. **261 malignancies were diagnosed in 2023 within the organized mammography screening, which represents a detection rate of 5 cases per 1,000 exams.**

Since the beginning of the mammography screening, we can see an increasing number of malignancies diagnosed in clinically earlier stages. Compared to 2020, we can see a 7% increase in diagnosed cases of ductal carcinoma in situ and a 5% increase of stage I and II malignancies in 2023. On the contrary, there was a 6% decrease in diagnosed cases of stage III and IV malignancies in this time period. At the same time, the number of malignancies without specified TNM stage

decreased by 7% thanks to efficiently managed breast commissions (T 10, T 11, CH 14, CH 15).

Regarding laterality, 53% of the malignancies were located on the left side and 43% on the right side (CH 16).

Another monitored indicator is treatment type of women with malignancies diagnosed within the mammography screening. Breast-conserving surgery was performed in 64% of women and mastectomy in 12% of women (CH 17).

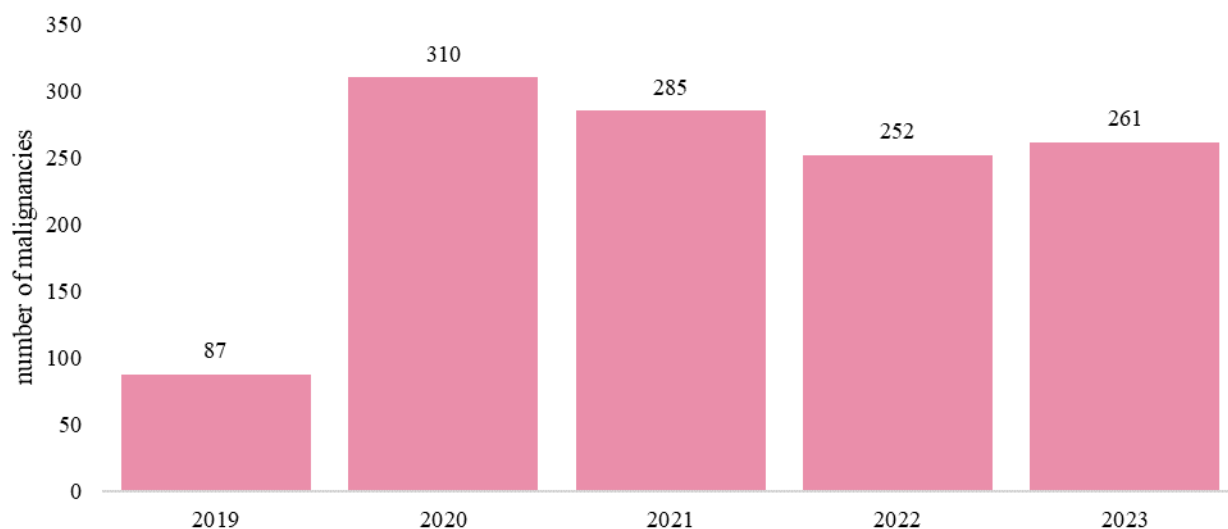
Based on histology type of the malignancy, ductal carcinoma in situ represented 10% (8500/2), invasive ductal carcinoma 72% (8500/3), invasive lobular carcinoma 12% (8520/3) and the remaining 6% were other histology types of invasive carcinomas (CH 18).

T 10. Number of malignancies diagnosed within organized mammography screening in certified mammography screening facilities and detection rate in 2019 – 2023.

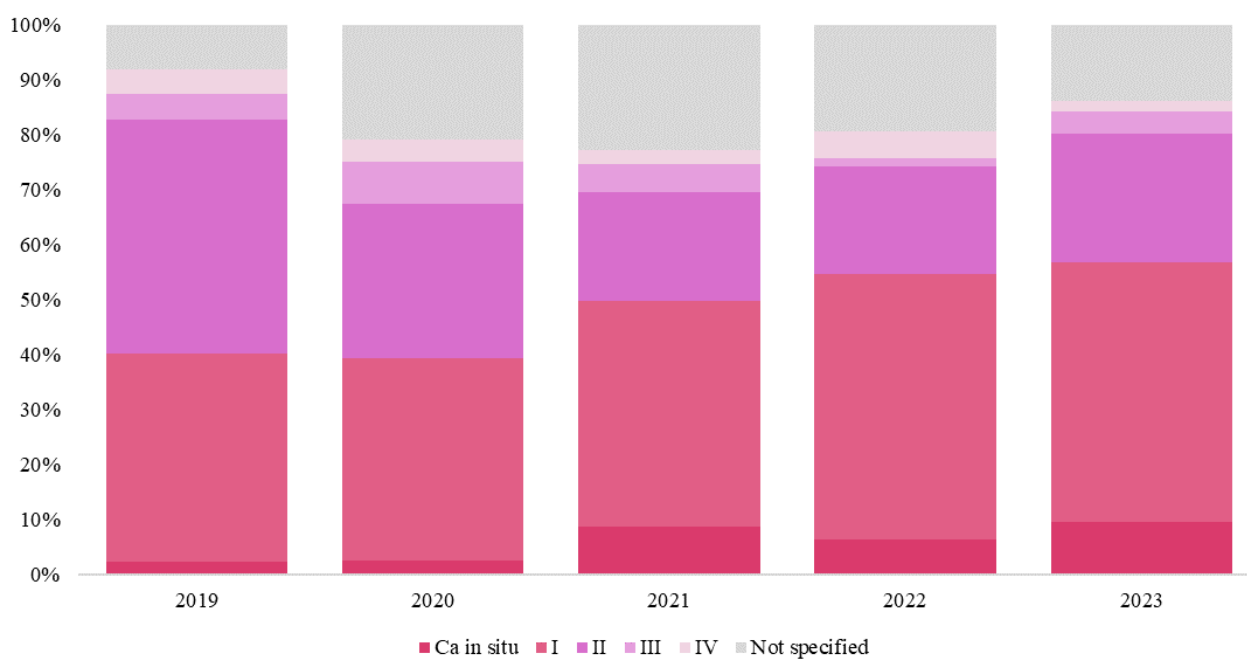
	September 2019	2020	2021	2022	2023
Number of screening mammography exams	16,453	38,844	41,554	45,773	55,874
Number of diagnosed malignancies	87	310	285	252	261
Detection rate (per 1,000 exams)	5 / 1,000	8 / 1,000	7 / 1,000	6 / 1,000	5 / 1,000

T 11. Number of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2019 – 2023 according to TNM stage.

TNM stage	September 2019	2020	2021	2022	2023
Ca in situ	2 (2.3%)	8 (2.6%)	25 (8.8%)	16 (6.3%)	25 (9.6%)
I	33 (37.9%)	114 (36.8%)	117 (41.1%)	122 (48.4%)	123 (47.1%)
II	37 (42.5%)	87 (36.8%)	56 (19.6%)	49 (19.5%)	61 (23.4%)
III	4 (4.6%)	24 (7.7%)	15 (5.3%)	4 (1.6%)	11 (4.2%)
IV	4 (4.6%)	12 (3.9%)	7 (2.5%)	12 (4.8%)	5 (1.9%)
Not specified	7 (8.1%)	65 (20.9%)	65 (22.8%)	49 (19.4%)	36 (13.8%)
All malignancies	87 (100%)	310 (100%)	285 (100%)	252 (100%)	261 (100%)



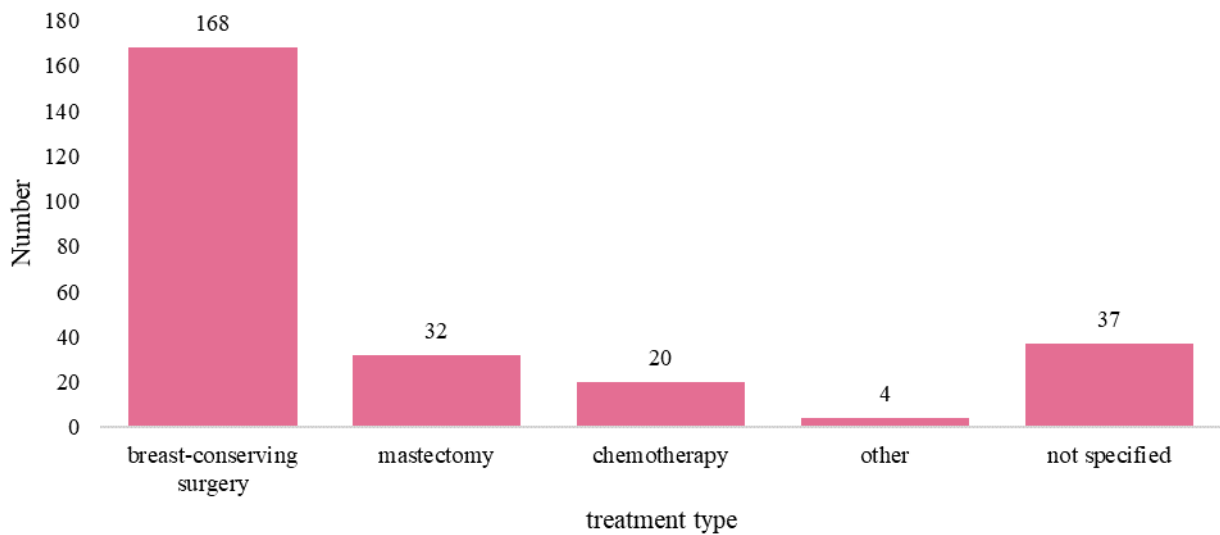
CH 14. Comparison of the number of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2019 – 2023.



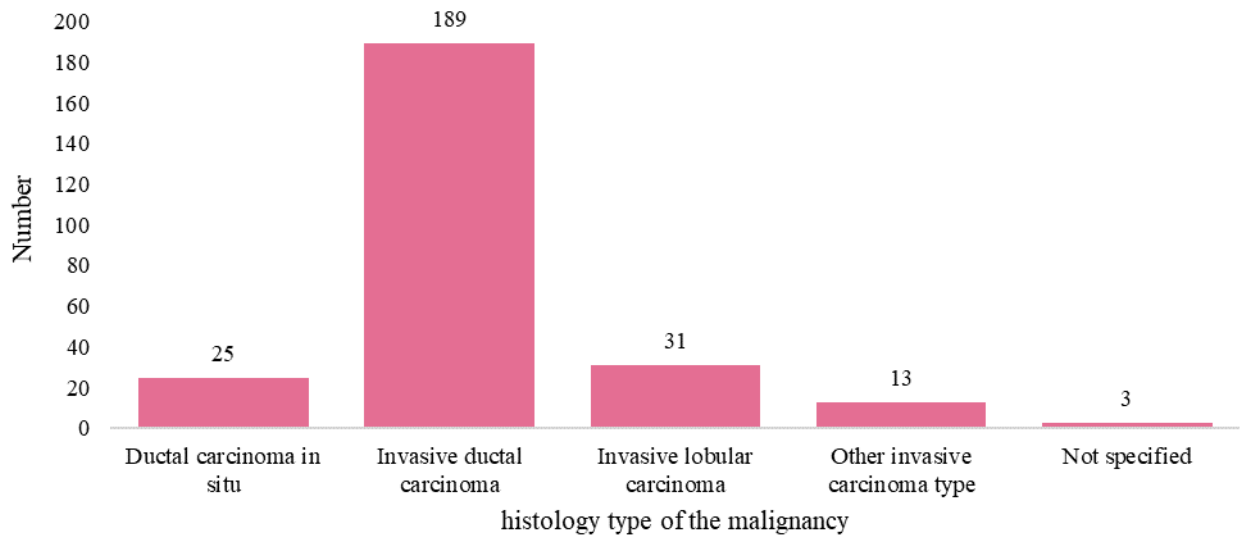
CH 15. Comparison of the number of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2019 – 2023 according to TNM stage.



CH 16. Location of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2023.



CH 17. Treatment type of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2023.



CH 18. Histology type of malignancies diagnosed within organized mammography screening in certified mammography screening facilities in 2023.

4.2. ORGANIZED BREAST CANCER SCREENING EVALUATION: INDICATORS FOR THE SR

T 12. Organized mammography screening evaluation in the SR in 2023 according to Slovak indicators.

ID	Indicator name	Evaluation for 2023
SR1	Scope of the screening program <i>(Number of women in the target population within the organized screening program / Number of women of relevant age in the country)⁹</i>	100%
SR2	Invitation coverage <i>(Number of women invited to the screening in the given time period / Number of women in the target population)</i>	38.3%
SR3.1	Coverage based on exam of the invited women <i>(Number of invited women who underwent the organized screening in the given time period / Number of women in the target population)</i>	7.1%
SR3.2	Coverage based on exam <i>(Number of women who underwent the organized screening in the given time period / Number of women in the target population)</i>	15.5%
SR4	Participation rate based on invitations <i>(Number of invited women who underwent the screening in the given interval / Number of invited women in the given interval)</i>	18.4%
SR5	Follow-up rate <i>(Number of women who underwent the screening and were referred to another exam / Number of women who underwent the screening)</i>	Impossible to evaluate at the moment
SR6	Follow-up for technical reasons ratio <i>(Number of women who were repeatedly invited to the screening exam for technical reasons / Number of women who underwent the screening)</i>	Impossible to evaluate at the moment
SR7	Interval mammography ratio <i>(Number of women who were repeatedly invited to the screening exam due to symptoms / Number of women who underwent the screening)</i>	Impossible to evaluate at the moment
SR8	Missing (indicators necessary on various degrees) <i>(Number of women who underwent the screening but lack a first-degree result / Number of women who underwent the screening)</i>	0%
SR9	Referral to surgery ratio <i>(Number of women who were referred to a surgery or women with inoperable cancer / Number of women who underwent the screening)</i>	0.4%
SR10	B/M ratio <i>(Number of women with benign histology / Number of women with histologically confirmed carcinoma in situ or invasive carcinoma)</i>	1.1
SR11	Breast cancer detection rate (including carcinoma in situ) <i>(Number of women with histologically confirmed carcinoma in situ or cancer / Number of women who underwent the screening)</i>	0.5%
SR12	DCIS detection rate <i>(Number of women with DCIS / Number of women who underwent the screening)</i>	0.05%
SR13	Invasive breast cancer detection rate <i>(Number of women with breast cancer / Number of women who underwent the screening)</i>	0.4%

⁹ Number of women of relevant age when adhering to a 2-year time interval in the country.

T 12 (continued). Organized mammography screening evaluation in the SR in 2023 according to Slovak indicators.

ID	Indicator name	Evaluation for 2023
SR14	Share of biopsies with a benign result <i>(Number of women with benign histology / Number of women who underwent the screening)</i>	0.5%
SR15	Share of small invasive carcinomas out of all invasive carcinomas <i>(Number of women with stage pT1A or pT1B breast cancer / Number of women with cancer)</i>	63%
SR16	Undetected small invasive carcinomas out of all invasive carcinomas <i>(Number of women with cancer and missing pT data / Number of women with breast cancer)</i>	15%
SR17	Share of detected carcinomas with negative result for lymph nodes out of all carcinomas diagnosed within the screening <i>(Number of women with negative lymph node result / Number of women with cancer)</i>	62%
SR18	Share of undetected carcinomas with negative result for lymph nodes out of all carcinomas diagnosed within the screening <i>(Number of women with no data about lymph node result / Number of women with cancer)</i>	16%
SR19	Share of detected II+ breast carcinomas out of all carcinomas diagnosed within the screening <i>(Number of women with pTNM stage IIA – IV / Number of women with cancer)</i>	33%
SR20	Share of undetected II+ breast carcinomas out of all carcinomas diagnosed within the screening <i>(Number of women with no pTNM stage data / Number of women with cancer)</i>	15%
SR21	Share of detected II+ breast carcinomas out of all women who underwent the screening <i>(Number of women with pTNM stage IIA – IV / Number of women who underwent the screening)</i>	0.1%
SR22	Share of undetected II+ breast carcinomas out of all women who underwent the screening <i>(Number of women with no pTNM stage data / Number of women who underwent the screening)</i>	0.1%
SR23	Conservative treatment (DCIS) <i>(Number of women with DCIS who underwent breast-conserving surgery / Number of women who underwent surgery for DCIS)</i>	40%
SR24	Missing data about DCIS conservative treatment <i>(Number of women with DCIS and no data on surgery / Number of women with DCIS)</i>	20%
SR25	Conservative treatment (invasive carcinoma) <i>(Number of women with carcinoma who underwent breast-conserving surgery / Number of women with carcinoma)</i>	38%
SR26	Missing data about conservative treatment (invasive carcinoma) <i>(Number of women with carcinoma and no data on surgery / Number of women with carcinoma)</i>	15%
SR27	Conservative treatment for pT1 stage <i>(Number of women with pT1 stage carcinoma who underwent breast-conserving surgery / Number of women with pT1 stage carcinoma)</i>	83%
SR28	Missing data about conservative treatment for pT1 stage <i>(Number of women with pT1 stage carcinoma with no data on surgery / Number of women with pT1 stage carcinoma)</i>	5%

T 12 (continued). Organized mammography screening evaluation in the SR in 2023 according to Slovak indicators.

ID	Indicator name	Evaluation for 2023
SR29.1	Population incidence of breast cancer C50 (in women aged 50 – 69)¹⁰	191.4 / 100,000
SR29.2	Population incidence of breast cancer C50 (in women from all age groups)¹⁰	96.7 / 100,000
SR30	Share of advanced stages of breast cancer C50 (in women from all age groups)¹⁰	57%
SR31.1	Population mortality of breast cancer C50 – gross mortality (in women aged 50 – 69)¹¹	50.6 / 100,000
SR31.2	Population mortality of breast cancer C50 – gross mortality (in women from all age groups)¹¹	36.0 / 100,000

¹⁰ NHIC. Outputs from the National Oncology Register of the SR. Incidence of Malignant Tumors in Slovakia 2014. (Note: these are the most up-to-date statistical data as of June 1, 2024, which can be used for statistical processing of breast cancer population incidence in the SR). Available online: https://www.nczisk.sk/Statisticke_vystupy/Tematicke_statisticke_vystupy/Onkologia/Vystupy_NOR_SR/Pages/Incidencia-zhubnych-nadorov.aspx

¹¹ NHIC. Mortality of Oncological Diseases in Slovakia 2022. (Note: these are the most up-to-date statistical data as of June 1, 2024, which can be used for statistical processing of breast cancer mortality in the SR). Available online: <https://app.powerbi.com/view?r=eyJrIjoiMjA3MGI0MTMtOGE4OS00NTFhLTkzMmEtYzFhN2ZhYjMwOTdiIiwidCI6IjMxMGJhNTRkLTlTAxM2MtNDAYZC05ZWYyLW1lN2Q1ZjFkY2Q2MyIsImMiOiJ9>

5. COMPARISON OF STATISTICAL DATA FROM MAMMOGRAPHY SCREENING IN 2023: ANONYMIZED DATA PROVIDED BY CERTIFIED MAMMOGRAPHY SCREENING FACILITIES AND HEALTH INSURANCE COMPANIES

Based on data provided by certified mammography screening facilities and HICs, NOI was able to compare the numbers of performed mammography exams. The final comparison has shown a total **discrepancy of 4.3%**. Compared to 2022, when the discrepancy between the data

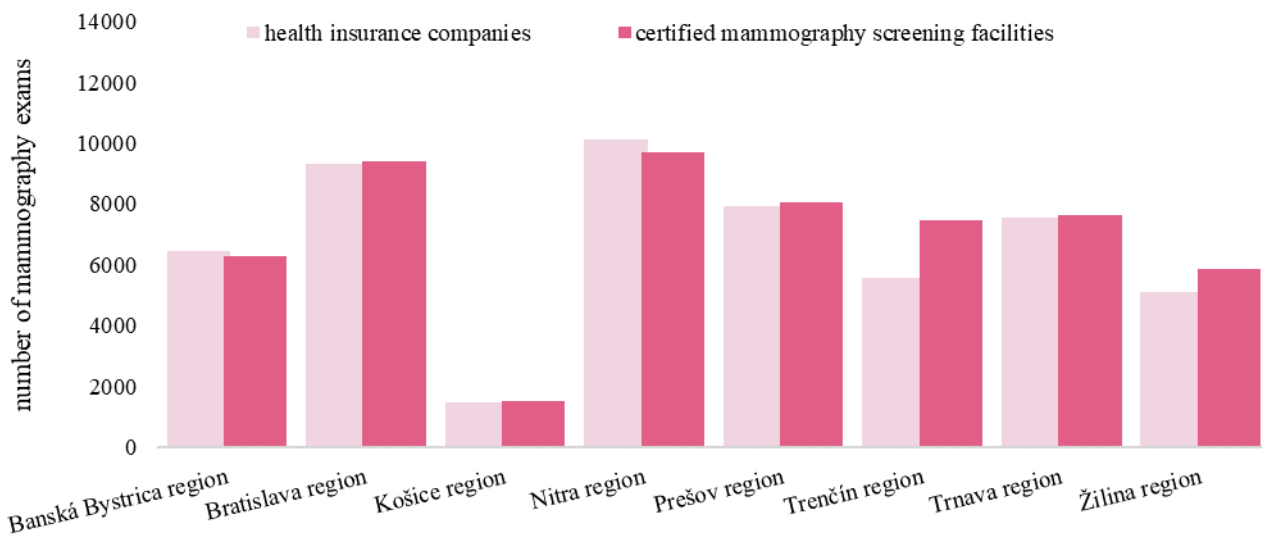
provided by certified screening facilities and health insurance companies was 8.9%, we can see an improvement of the situation in 2023 and a reduction of the discrepancy by half (*T 13, T 14, CH 19, CH 20*).

T 13. Comparison of the number of screening mammography exams based on anonymized data provided by certified mammography screening facilities and health insurance companies in 2023.

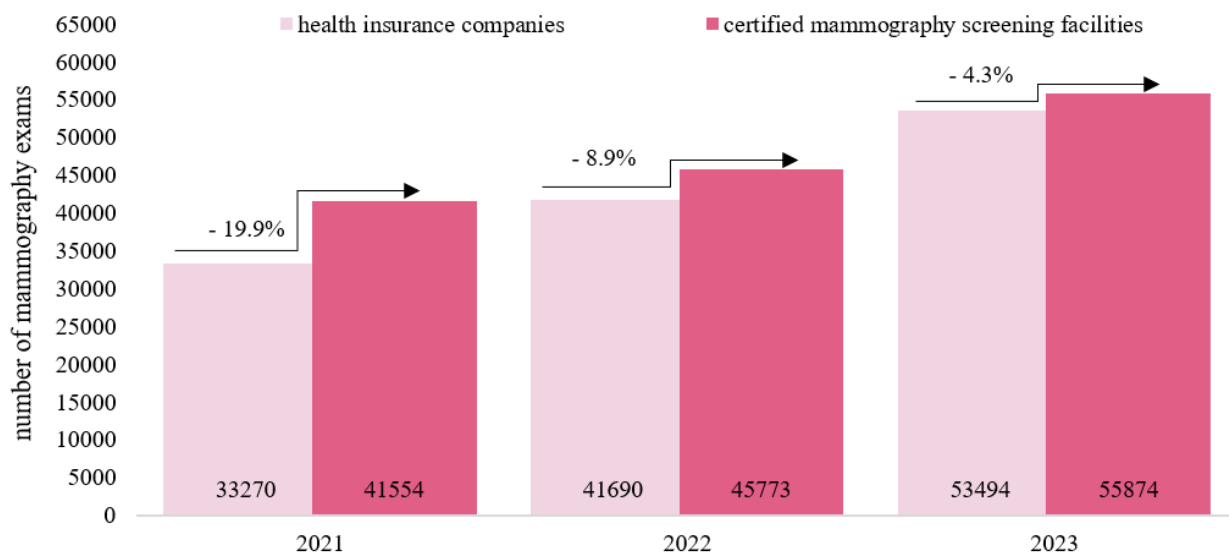
Territory of activity of certified mammography screening facility / Region	Number of screening mammography exams based on anonymized data		Discrepancy
	From certified mammography screening facilities	From health insurance companies	
Banská Bystrica region	6,279	6,433	2.5%
Bratislava region	9,408	9,311	-1.0%
Košice region	1,520	1,486	-2.2%
Nitra region	9,706	10,110	4.2%
Prešov region	8,042	7,940	-1.3%
Trenčín region	7,463	5,551	-25.6%
Trnava region	7,613	7,558	-0.7%
Žilina region	5,843	5,105	-12.6%
SLOVAK REPUBLIC	55,874	53,494	-4.3%

T 14. Comparison of screening mammography coverage based on data provided by certified mammography screening facilities and health insurance companies in 2023.

Territory of activity of certified mammography screening facility	Mammography screening coverage (%)		Discrepancy
	From certified mammography screening facilities	From health insurance companies	
Banská Bystrica region	14.5%	14.8%	0.3%
Bratislava region	20.7%	20.5%	-0.2%
Košice region	3.1%	3.0%	-0.1%
Nitra region	20.3%	21.1%	0.8%
Prešov region	16.2%	16.0%	-0.2%
Trenčín region	18.5%	13.8%	-4.7%
Trnava region	19.6%	19.5%	-0.1%
Žilina region	13.0%	11.3%	-1.7%
SLOVAK REPUBLIC	15.5%	14.8%	-0.7%



CH 19. Comparison of the number of screening mammography exams based on data provided by certified mammography screening facilities and health insurance companies in 2023.



CH 20. Comparison of the difference in percentage in the number of screening mammography exams based on anonymized data provided by certified mammography screening facilities and health insurance companies in 2021 – 2023.

6. FINAL EVALUATION

Based on the analyzed anonymized data provided by certified mammography screening facilities and health insurance companies, it was possible to see matching data in some regions, slight discrepancies in others and more prominent discrepancies in yet others.

This difference can be explained by procedures reported by a certified mammography screening facility not being reimbursed due to incorrect procedure reporting. Due to this, it is appropriate to:

- set and evaluate cumulative screening mammography procedure code reporting in a targeted manner
- set and evaluate diagnosis code reporting related to cumulative screening mammography codes in a targeted manner
- consult and verify error rate in procedure code and diagnosis code reporting related to mammography exams performed in certified mammography screening facilities within internal and external audit
- strictly adhere to contracts and the valid version of the standard procedure when reporting mammography exams to health insurance companies

Based on that, we recommend preparing and publishing a binding guideline in cooperation with health insurance companies' representatives and unifying screening, preventive and diagnostic mammography reporting in certified mammography

screening facilities, which will have a positive impact on the reduction of errors in code reporting related to mammography exams.

Another factor that can influence the data might be incorrect and not unified mammography screening data collection by certified mammography screening facilities. This reason needs to be verified via internal and external audit. At the same time, it is necessary to implement a universally used program to collect mammography screening statistical data in certified mammography screening facilities across the board, which is in development by NOI.

A closer cooperation of NHIC and NOI and the establishment of a working group for data collection for all cancer screenings including mammography screening based on a recommendation by the Cancer Screening Commission of the MoH SR is a very helpful factor in the whole process.

Another important step will be to adjust the organized screening program in order to achieve central management and provision of all processes within the program like it was recommended to Slovakia based on a two-year situational analysis by international experts within the ICCCS project (*Improving Cancer Care Coordination and Screening in Latvia and Slovakia*).

MAMMOGRAPHY SCREENING SR
Assessment Report for 2023
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