



MAMMOGRAPHY SCREENING IN THE SR

Assessment report for 2021

National Oncology Institute

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Acknowledgments

National Oncology Institute would like to thank all physicians, radiology assistants, nurses as well as other healthcare professionals who contribute to breast cancer mammography screening by their daily work. We thank the Ministry of Health of the SR, the Cancer Screening Committee of the MoH SR, health insurance companies and National Health Information Center for their support and cooperation. We are also particularly grateful for the support and cooperation of gynecologists and general practitioners for adults, as well as all other experts participating in the management of women with diseases of the breast, patients' organizations, volunteers, and the public. Only a well-rounded, high-quality and long-term cooperation in mammography screening can bring excellent results and save lives and health of Slovak women.

Data contained in this publication can be used only with a cited source.

If not otherwise stated, the data concerns exclusively women from the Slovak Republic aged 50 - 69 who have undergone mammography screening in certified mammography screening facilities recommended 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.

TABLE OF CONTENTS

Table of contents.....	3
1 CERTIFIED MAMMOGRAPHY SCREENING FACILITIES IN THE SR.....	8
2 DEMOGRAPHICS.....	11
3 STATISTICAL EVALUATION OF MAMMOGRAPHY SCREENING IN 2021.....	12

LIST OF TABLES, FIGURES AND GRAPHS

Graph 1. Number of certified mammography facilities in individual regions of the SR as of December 31, 2021.....	9
Graph 2. Number of performed screening mammography exams in certified mammography facilities in 2021.....	13
Graph 3. Participation rate of women in screening mammography in certified mammography facilities in 2021 per region.....	14
Graph 4. Participation rate of women in screening mammography in certified mammography facilities in 2021 per district.....	14
Graph 5. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2019 - 2021 per region.....	16
Graph 6. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2019 - 2021 per district.....	16
Graph 7. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2020 - 2021 per month.....	17
Graph 8. Estimated coverage of mammography screening performed in certified mammography screening facilities.....	17
Graph 9. Ratio of clinical stages of malignant breast tumors in Slovakia diagnosed via mammography screening in certified mammography screening facilities in 2021.....	18
Graph 10. Number and percentage of clinical stages of malignant breast tumors in Slovakia diagnosed via mammography screening in certified mammography screening facilities in 2019 - 2021.....	19
Table 1. List of certified mammography facilities in the SR as of December 31, 2021.....	10
Table 2. Number of women invited to mammography screening by health insurance companies in 2021.....	11
Table 3. Relative participation rate of women in mammography screening per region in which certified mammography screening facilities are located.....	15
Table 4. Relative participation rate of women in mammography screening per district in which certified mammography screening facilities are located in 2021.....	15
Table 5. Number of malignancies diagnosed via mammography screening in certified mammography screening facilities in 2021 per TNM stage.....	18

FOREWORD

Breast cancer mammography screening is a long-term, systematic, state-supported, and guaranteed detection of early stages of breast cancer in asymptomatic women aged 50 - 69 from the entire population¹. Its objective is to reduce mortality, prolong the lives of women thanks to a more effective treatment of early stages of the disease and improve quality of life. After implementation of general mammography screening and increasing participation rate of women, there is a transient 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 a very important factor - high-quality and up-to-date data collected in National Screening and Oncology Register. Precise impact of mammography screening on the population can be assessed only after the quantification of these factors. That is why long-term, regular statistical evaluation of changes in the spectrum of detected malignancies and validation of screening outcomes is a crucial process in order to ensure quality of individual facilities as well as of general mammography screening². Mammography screening can be performed only at certified mammography screening facilities which work effectively, promptly and with a high level of expertise, ensuring immediate and effective management of detected malignancies in accordance with the requirements of the valid Standard Procedure for Medical Radiation and Prevention - Screening Mammography^{3;4}. It is possible for radiologists in a mammography screening facility to transform preventive mammography referrals to screening mammography since May 15, 2021 if the woman fulfills the age interval, i.e., 50 - 69 years, and all inclusion criteria.⁴

Collection and evaluation of statistical data is also part of the binding structure of mammography screening, which is not only a requirement of self-assessment of individual

¹ Perry N, Broeders M, de Wolf C, Törnberg S, Holland R, von Karsa L. 2006. European guidelines for quality assurance in breast cancer screening and diagnosis. [online]. Fourth edition. Luxembourg: Office for Official Publications of the European Communities, 2006. 416 p. [accessed 1-11-2020]. Available at: <https://www.noisk.sk/files/2019/eu_guidelines_c50_2_rakovina_prsnika.pdf>. ISBN 92-79-01258-4.

² Rečková M. 2019. Breast cancer screening evaluation. [online]. [accessed 1-8-2021]. Available at: <<https://www.noisk.sk/files/2021/2021-05-21-indikatory-hodnotenia-skrining-kp.pdf>>.

³ Horváthová M, Lehotská V, Nikodemová D, Kallayová A, Slobodníková A. 2019. Standard Procedure for Medical Radiation and Prevention - Screening Mammography, 1st revision. [online]. Bratislava: Ministry of Health of the Slovak Republic, 2019. 23 p. [accessed 1-8-2021]. Available at: <<https://www.standardnepostupy.sk/standardy-skriningove/>>.

⁴ Horváthová M, Lehotská V, Nikodemová D, Kallayová A, Slobodníková A. 2021. Standard Procedure for Medical Radiation and Prevention - Screening Mammography, 2nd revision. [online]. Bratislava: Ministry of Health of the Slovak Republic, 2021. 50 p. [accessed 1-8-2021]. Available at: <<https://www.standardnepostupy.sk/standardy-skriningove/>>.

mammography screening facilities, but also a requirement of statistical collection of data about participants in the screening and its evaluation. From January 1, 2021, to December 31, 2021, statistical data was collected by National Oncology Institute (NOI) according to an approved design of data collection based on the valid Standard Procedure for Medical Radiation and Prevention - Screening Mammography in order to adhere to all legislation regarding data protection.

Mammography screening takes place at 19 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 health insurance companies, National Health Information Center (NHIC) and Health Care Surveillance Authority. The screening program is supervised by the MoH SR which also guides the methodology and legislation associated with the program.

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 the 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 quality data collection by NOI. This data will be a requirement and part of re-assessment for mammography screening facilities involved in the screening and, as such, a precondition of 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.

Data collection from the 16 certified mammography screening facilities (three facilities were certified only at the end of 2021 and their statistical results were not included in this statistical set) according to the valid standard procedure took place in 2021. This analysis included data from all 16 facilities. Standard BI-RADS classification is used to evaluate screening mammography. BI-RADS 1 means that the exam result is negative; BI-RADS 2: result is benign; BI-RADS 3: result is probably benign; BI-RADS 4: result is probably malignant and BI-RADS 5: result is malignant. Since the beginning of 2021 until December 31, 2021, 41,554 women altogether were examined by screening mammography, i.e., 11.5 percent of the entire screened population of women aged 50 - 69. The numbers of examined women and relative participation rate in each region and district are found later in the text.

Detected malignancies and their stage: During the monitored screening period, 285 carcinomas were detected in 41,554 examined women (more on this further in the text), usually in early stages.

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

- The COVID-19 pandemic stopped or reduced the number of people coming to facilities in 2021.
- There is no general system of targeted invitations in Slovakia. Health insurance companies should send invitations to all screening participants in a targeted manner and 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 screening facilities⁵ where the woman had undergone the screening.
- An estimated 20% of women in Slovakia undergo preventive mammography examinations at non-certified diagnostic-preventive mammography facilities, which is called opportunistic screening. It is necessary to transfer these examinations to certified high-quality mammography screening facilities.

⁵ Horváthová M, Lehotská V, Nikodemová D, Kallayová A, Slobodníková A. 2021. Standard Procedure for Medical Radiation and Prevention - Screening Mammography, 2nd revision. [online]. Bratislava: Ministry of Health of the Slovak Republic, 2021. 50 p. [accessed 1-8-2021]. Available at: <<https://www.standardnepostupy.sk/standardy-skriningove/>>.

- The network of 19 certified mammography screening facilities is insufficient and there are regional disparities regarding their availability, which is why it is necessary to ensure the 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 important activity is increasing the possibilities of education in mammography diagnostics in radiology as a certified work activity. Several other radiology facilities are registered for certification at the moment.
- It is also necessary to increase the participation rate of women in the screening by educational campaigns repeated several times per year with unified communication from all stakeholders - MoH SR, NOI, health insurance companies and patients' organizations.

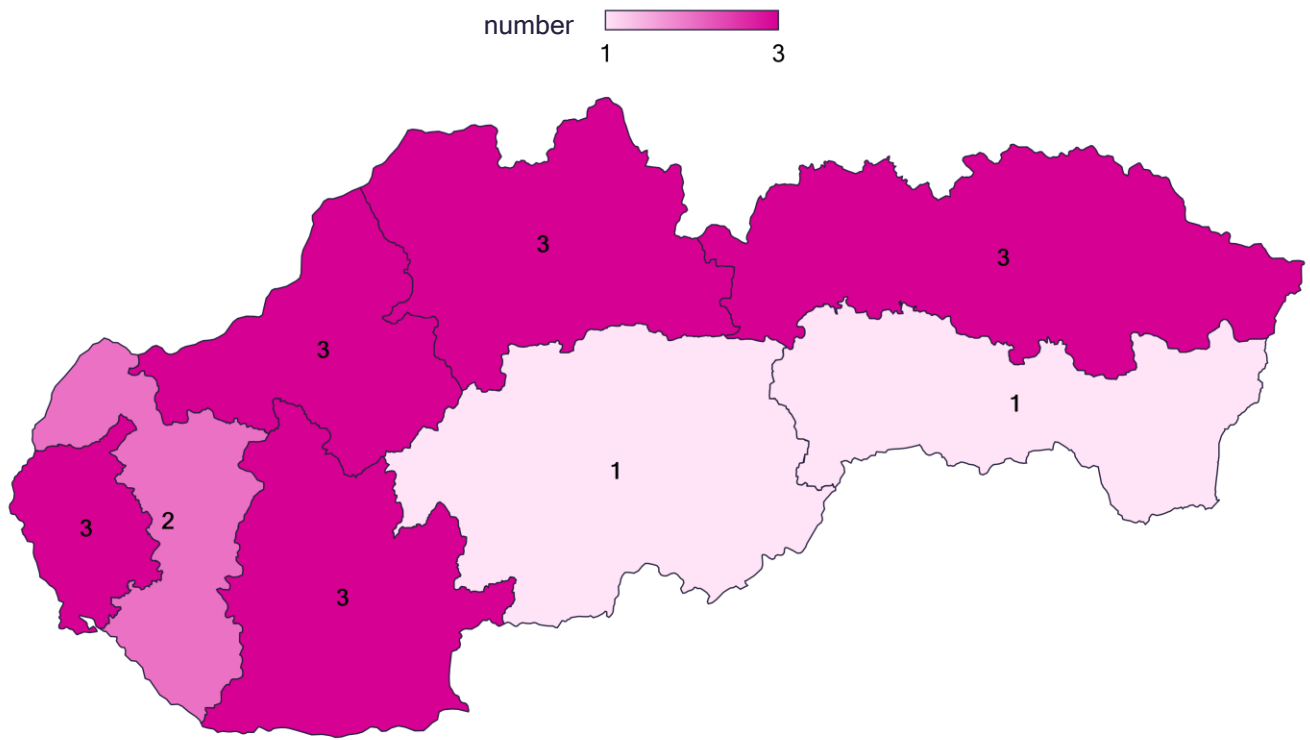
1 CERTIFIED MAMMOGRAPHY SCREENING FACILITIES IN THE SR

In the time period from January 1, 2021, to December 31, 2021, the temporary Expert Working Group for Quality Assurance of Mammography Facilities of the MoH SR Committee for Quality Assurance in Radiodiagnostics, Radiation Oncology and Nuclear Medicine included 19 certified mammography screening facilities in the list of certified mammography facilities (*Graph 1, Table 1*).

There has been a slight increase since 2020 when 15 screening mammography facilities were registered in Slovakia.

While two separate certified mammography screening facilities in one institution were merged into one in 2020, which caused a decrease in the number of screening facilities between 2019 and 2020, these facilities became two separate centers again in 2021, which increased the number of screening facilities once more. Moreover, three other mammography facilities were included in the list of certified mammography facilities recommended by the temporary Expert Working Group for Quality Assurance of Mammography Facilities of the MoH SR Committee for Quality Assurance in Radiodiagnostics, Radiation Oncology and Nuclear Medicine in November - December 2021.⁶ These facilities only started working as screening facilities in January 2022, which is why only data from the previous 16 certified mammography screening facilities were included in the statistics.

⁶ MoH SR. 2022. List of certified mammography facilities recommended by the temporary Expert Working Group to be included in mammography screening. [online]. [accessed 1-3-2022]. Available at: <<https://www.health.gov.sk/Clanok?dops-zamerana-na-zabezpecenie-kvality-namamografickych-preventivnych-a-diagnostickych-pracoviskach>>.



Graph 1. Number of certified mammography facilities in individual regions of the SR as of December 31, 2021.

Table 1. List of certified mammography facilities in the SR as of December 31, 2021.

Town/City	Name of facility Address	Address of the facility
Banská Bystrica	Mammacentrum sv. Agáty Banská Bystrica, a.s., SVLZ rádiológia	T. Andrašovana 46, 974 01 Banská Bystrica
Bratislava	2nd Radiology Clinic of Faculty of Medicine Comenius University and SECI Mammography Facility 1	SECI Heydukova 10, 812 50 Bratislava
	2nd Radiology Clinic of Faculty of Medicine Comenius University and SECI Mammography Facility 2	
Dolný Kubín	Dr. L. Nádaši Jégé Lower Orava Hospital with Policlinic	Nemocničná 1944/10 026 01 Dolný Kubín
Košice	Mammodiagnostic Center AGEL Hospital Košice-Šaca a.s.	Lúčna 57 040 15 Košice-Šaca
Liptovský Hrádok	X-ray ward SVALZY s.r.o.	Ul. J.D. Matejovie 542, 033 80 Liptovský Hrádok
Malacky	Malacky Hospital 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
	Medical Center Nitra	Fatranská 5, 949 01 Nitra
Poprad	Hospital Poprad a.s. Department of diagnostic and interventional radiology	Banická 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	Central Military Hospital Ružomberok Teaching Hospital	Ul. Generála Miloša Vesela 21, 034 01 Ružomberok
Stará Ľubovňa	Mammography ward, Department of Radiology Ľubovnianska nemocnica n.o. Radiology Clinic s.r.o.	Obrancov mieru 3, 064 01 Stará Ľubovňa
Trenčín	Radiology Clinic s.r.o.	K dolnej stanici 18, 911 01 Trenčín
	Mammography facility of Department of Imaging, Teaching Hospital TN	Legionárska 594/28, 911 01 Trenčín
Trnava	MRI, s.r.o. Imaging Diagnostics Institute	Družba Policlinic (pediatric pavilion – basement) Starohájska 2, 917 01 Trnava
	Radiology clinic, Teaching Hospital in Trnava	A. Žarnova 11, 917 75 Trnava

2 DEMOGRAPHICS

Based on data from the Statistical Office of the Slovak Republic - *demographic statistics /age stratification of the population/*⁷ - there were 724,480 women aged 50 to 69 in Slovakia as of December 31, 2020. When taking into account a 2-year screening interval and inclusion and exclusion criteria, 362,240 women should have attended the mammography screening in 2021 (we need to subtract all women treated for breast cancer or in palliative care at that time). Approximately 30% of women, i.e., approximately 100,000 women, attend an annual preventive mammography, so-called opportunistic screening, based on a referral from their gynecologist, general practitioner or other specialist.

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 invitation process in 2021 was affected and impaired by the COVID-19 pandemic. Total number of invited women in the time period from January 2021 to December 2021 was 96,845 (*Table 2*).

Table 2. Number of women invited to mammography screening by health insurance companies in 2021.

Health insurance company	Number of invited women
VšZP	57,600
Dôvera	26,847
Union	12,398
INVITED WOMEN TOTAL	96,845

⁷ Statistical Office of the SR. 2021. Demographics and social statistics. [online]. [accessed 1-3-2022]. 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%2c%20zlo%2c%20oblasti%2c%20kraje%2c%20okresy%2c%20mesto%2c%20vidiek%20%5bom7009rr%5d&run.outputFormat=&run.prompt=true&cv.header=false&ui.backURL=%2fcognosext%2fcps4%2fportlets%2fcommon%2fclose.html&run.outputLocale=sk >

3 STATISTICAL EVALUATION OF MAMMOGRAPHY SCREENING IN 2021

Since the initiation of mammography screening (i.e., September 2019 - December 2021), 96,851 participants have been examined by screening mammography in certified screening facilities. 87 malignancies were diagnosed in 2019, i.e., 5 cases per 1,000 women. In 2020, 310 malignancies were diagnosed in the target female population, i.e., 8 cases per 1,000 women, with a 10.7% participation rate.⁸ ⁹In 2021, 11.5% of the target female population underwent screening mammography in certified mammography screening facilities, i.e., 41,554 participants in the mammography screening. 285 malignancies were diagnosed in the target group, i.e., malignancy rate of 7 cases per 1,000 women.

The number of performed screening mammography exams in certified mammography facilities in 2021 can be seen in *Graph 2*. Participation rate of women in screening mammography in certified mammography facilities in 2021 per region and district is shown in *Graph 3* and *4*. Relative participation rate of women in mammography screening per region in which certified mammography screening facilities are located is found in *Table 3*. Relative participation rate of women in mammography screening per district in which certified mammography screening facilities are located is found in *Table 4*.

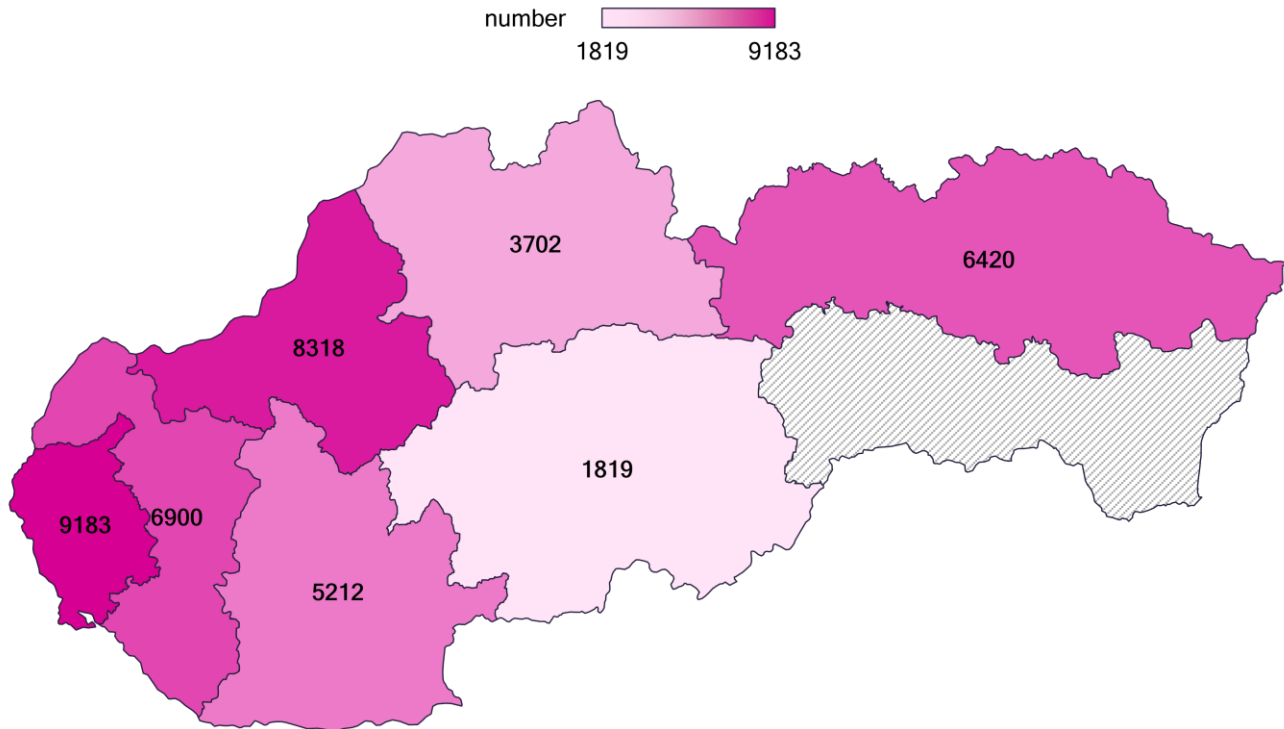
Comparison of the number of performed screening mammography exams in certified screening mammography facilities in 2019 - 2021 per region and district is shown in *Graph 5* and *6*. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2020 - 2021 per month is shown in *Graph 7*. Estimated coverage of mammography screening performed in certified mammography screening facilities is found in *Graph 8*.

The number of malignancies diagnosed via mammography screening in certified mammography screening facilities in 2021 per TNM stage can be seen in *Table 5*. *Graph 9* shows the ratio of clinical stages of malignant breast tumors in Slovakia diagnosed via mammography screening in certified mammography screening facilities in 2021. *Graph 10* shows the number and percentage of clinical stages of malignant breast tumors in Slovakia

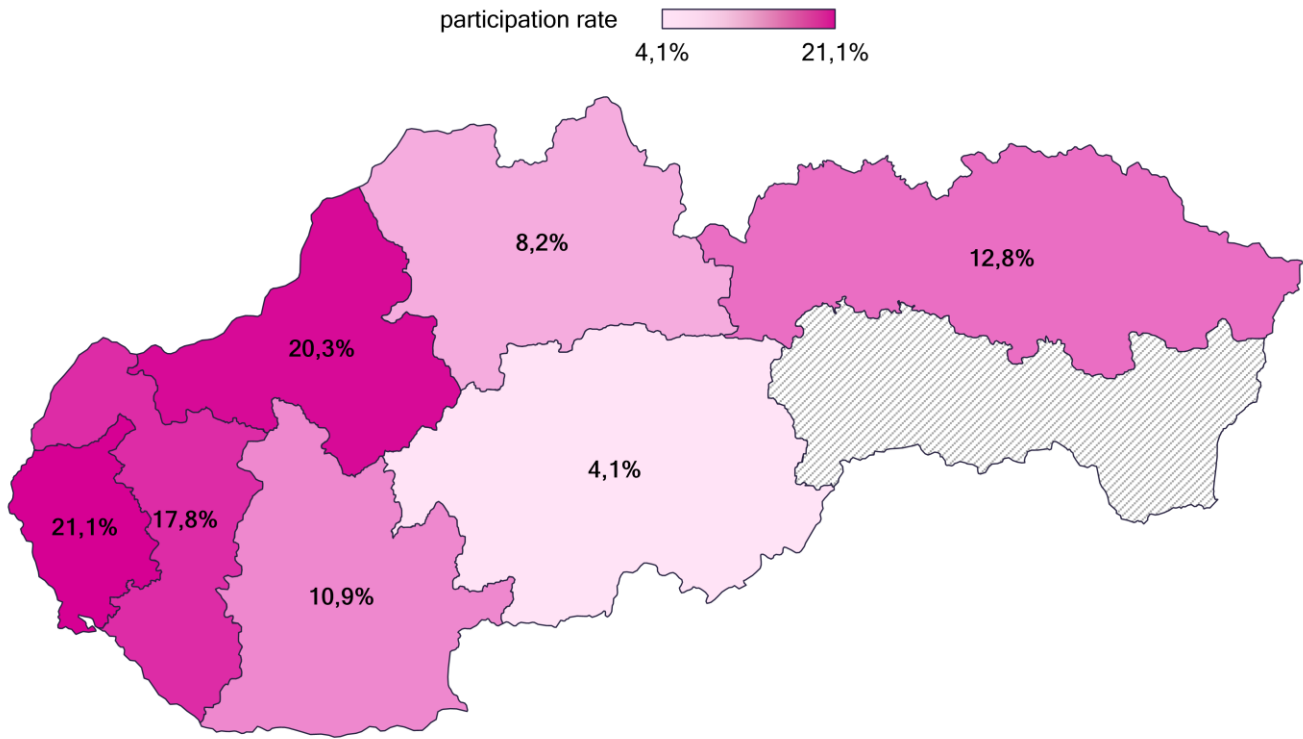
⁸ National Oncology Institute. 2021. MAMMOGRAPHY SCREENING SR- Assessment report for 2020. [online]. Bratislava: NOI, 2021, 2021 p. [accessed 1-3-2022]. Available at: <<https://www.noisk.sk/files/2021/2021-09-16-hodnotiacna-sprava-mamograficky-skrining-2020-sk.pdf>>.

⁹ National Oncology Institute. 2020. MAMMOGRAPHY SCREENING SR - First evaluation of mammography screening of women aged 50 - 69 in the time period September 2019 - June 2020. [online]. Bratislava: NOI, 2020, 2021 p. [accessed 1-3-2022]. Available at: <<https://www.noisk.sk/files/2021/2021-01-13-mmg-skrining-verejnost-sk.pdf>>.

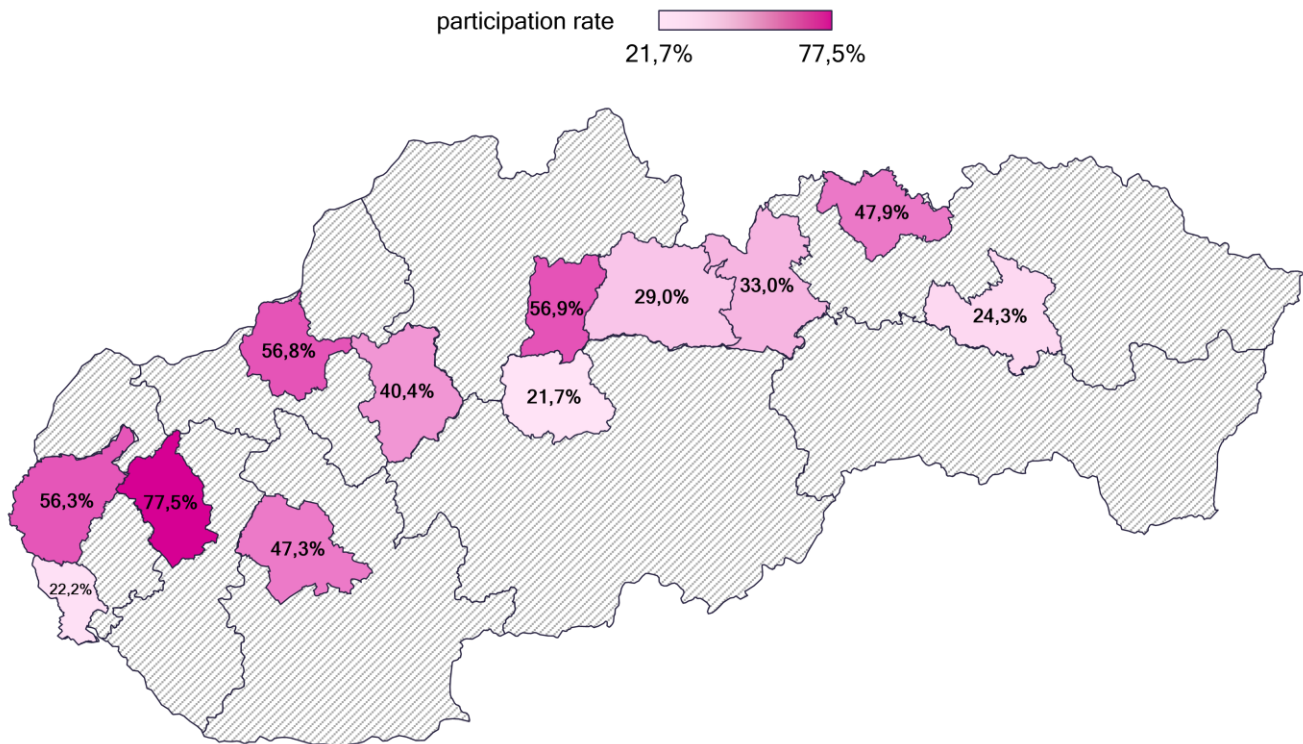
diagnosed via mammography screening in certified mammography screening facilities in 2019 - 2021.



Graph 2. Number of performed screening mammography exams in certified mammography facilities in 2021.



Graph 3. Participation rate of women in screening mammography in certified mammography facilities in 2021 per region.



Graph 4. Participation rate of women in screening mammography in certified mammography facilities in 2021 per district.

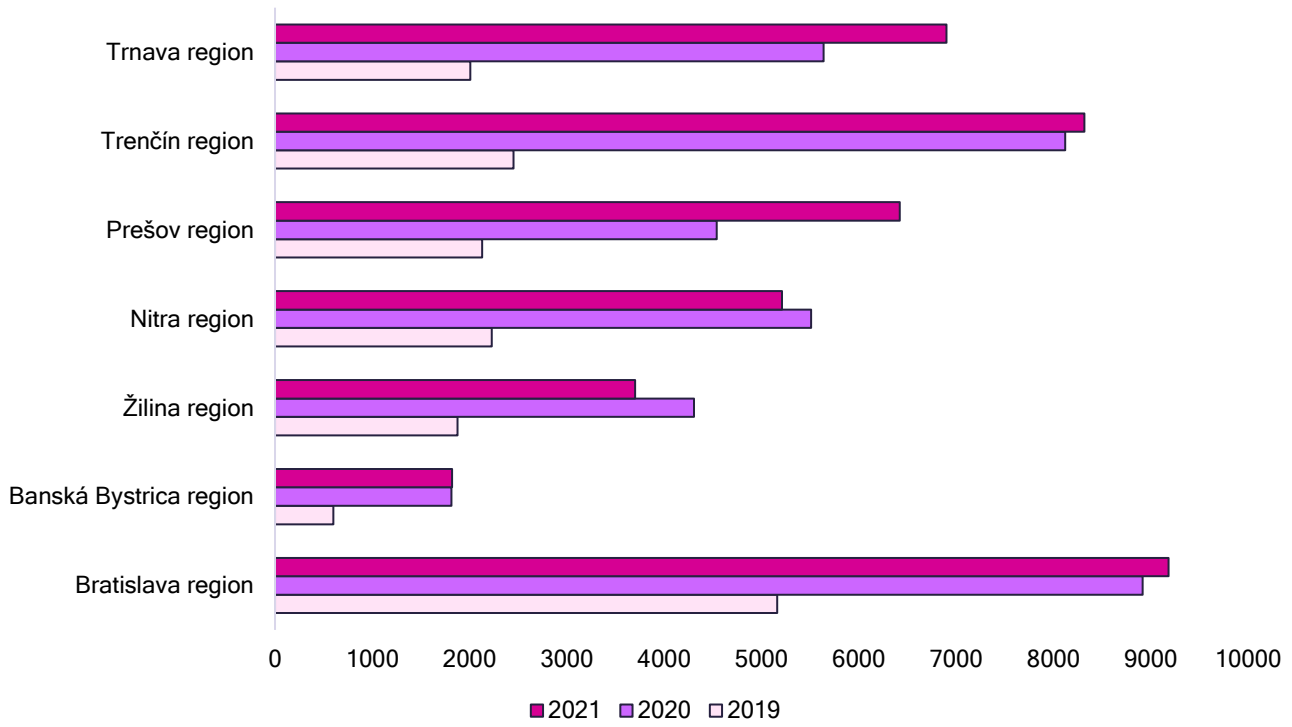
Table 3. Relative participation rate of women in mammography screening per region in which certified mammography screening facilities are located.

Region of the SR /number of facilities per region/	Number of women aged 50-69 / number of women when adhering to screening interval ¹⁰	Number of screening mammography exams carried out	Relative participation rate when adhering to screening interval (%)
Banská Bystrica /1/	89,765 / 44,883	1,819	4.1%
Bratislava /3/	86,882 / 43,441	9,183	21.1 %
Nitra /2/	95,943 / 47,972	5,212	10.9 %
Prešov /3/	100,401 / 50,201	6,420	12.8 %
Trenčín /3/	82,146 / 41,073	8,318	20.3 %
Trnava /2/	77,739 / 38,870	6,900	17.8 %
Žilina /2/	89,843 / 44,922	3,702	8.2 %

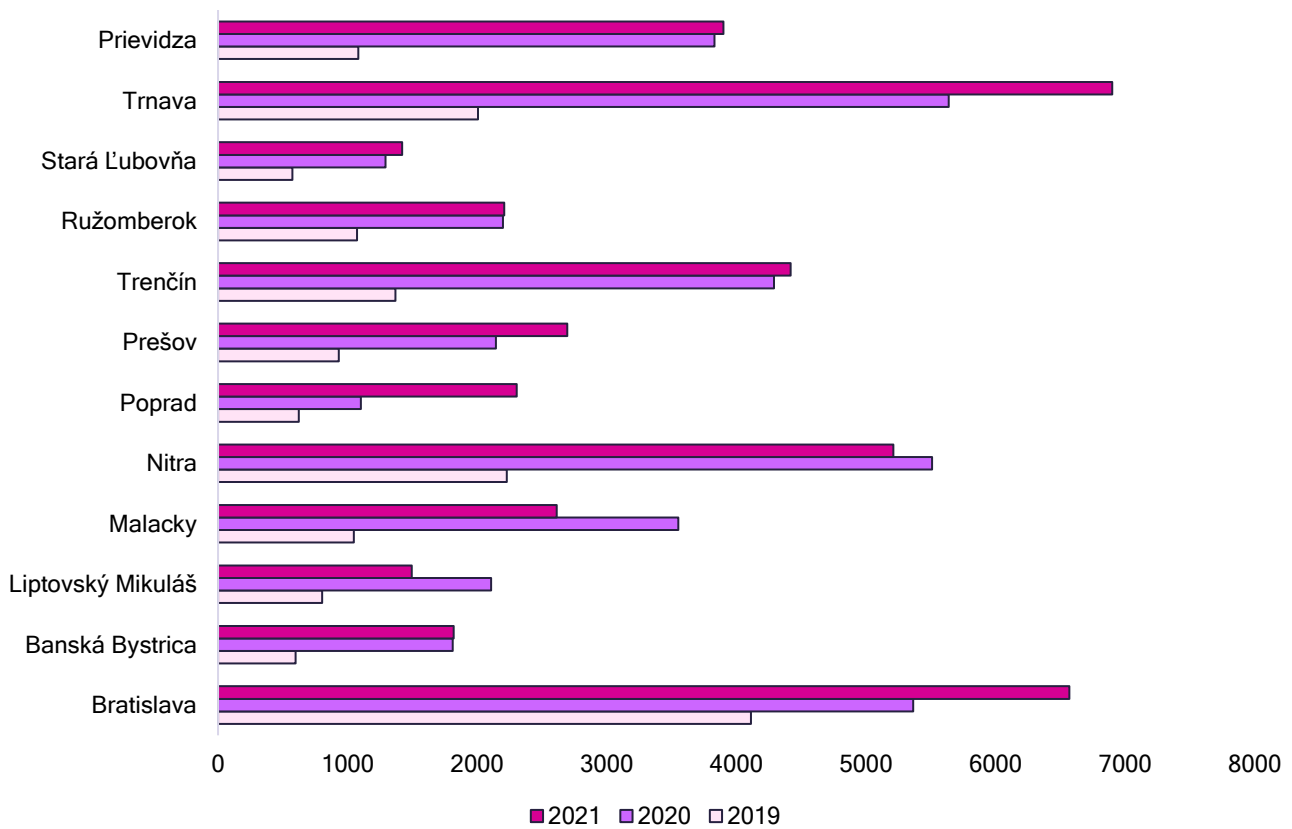
Table 4. Relative participation rate of women in mammography screening per district in which certified mammography screening facilities are located in 2021.

District of the SR /number of certified facilities per district/	Number of women aged 50-69 / number of women when adhering to screening interval ¹⁰	Number of screening mammography exams carried out	Relative participation rate when adhering to screening interval (%)
Banská Bystrica /1/	16,770 / 8,385	1,819	21.7 %
Bratislava /2/	59,258 / 29,629	6,569	22.2 %
Liptovský Mikuláš / 1 /	10,311 / 5,156	1,494	29 %
Malacky / 1 /	9,281 / 4,641	2,614	56.3 %
Nitra / 2 /	22,032 / 11,016	5,212	47.3 %
Poprad / 1 /	13,973 / 6,987	2,305	33 %
Prešov / 1 /	22,141 / 11,071	2,695	24.3 %
Prievidza / 1 /	19,316 / 9,658	3,900	40.4 %
Ružomberok / 1 /	7,763 / 3,882	2,208	56.9 %
Stará Ľubovňa /1/	5,932 / 2,966	1,420	47.9 %
Trenčín / 2 /	15,546 / 7,773	4,418	56.8 %
Trnava / 2 /	17,808 / 8,904	6,900	77.5 %

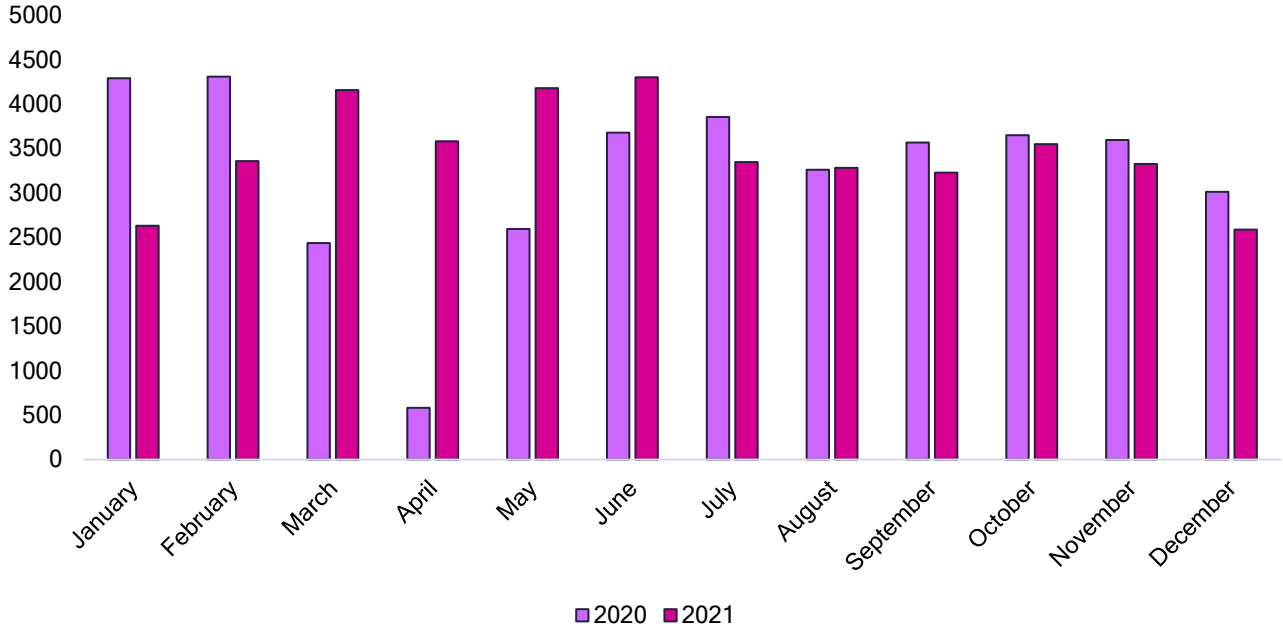
¹⁰ Statistical Office of the SR. 2021. Demographics and social statistics. [online]. [accessed 1-3-2022]. Available at:



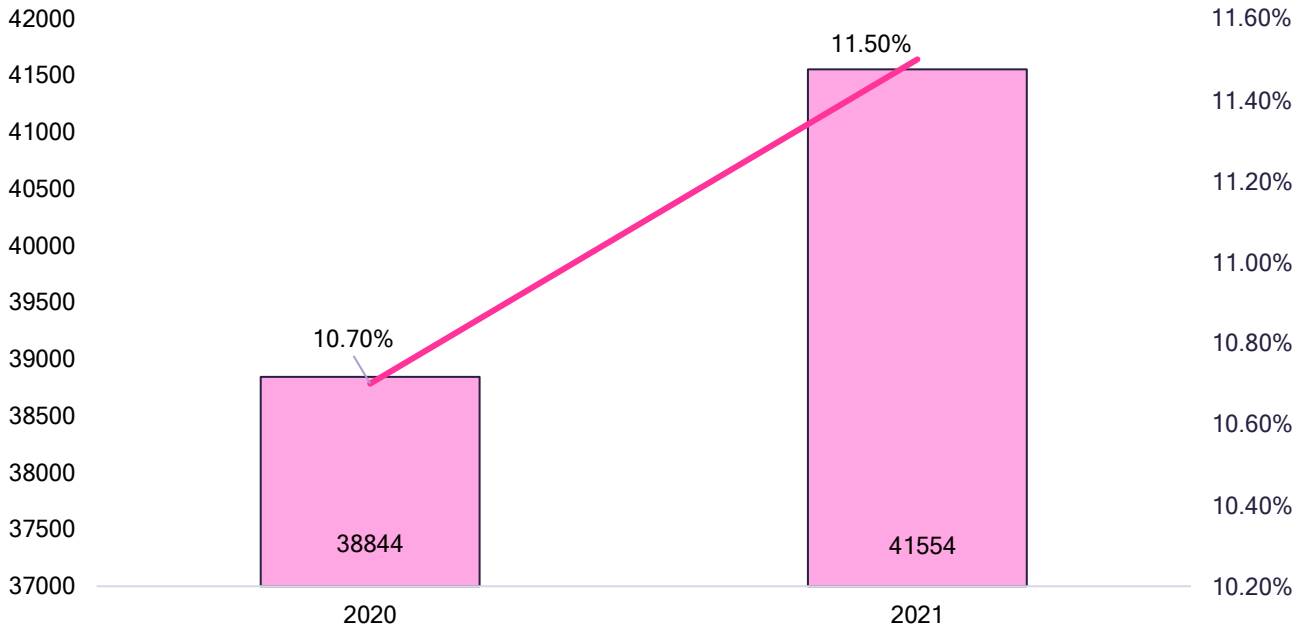
Graph 5. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2019 - 2021 per region.



Graph 6. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2019 - 2021 per district.



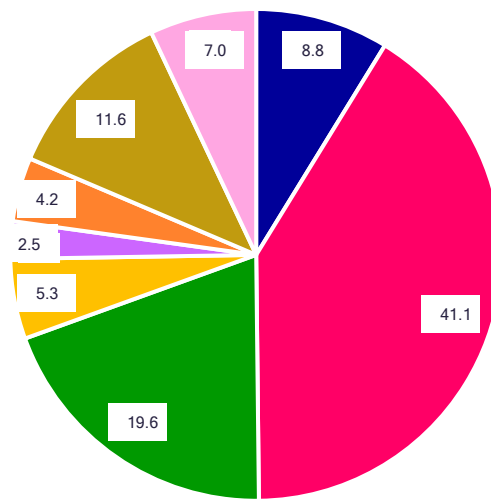
Graph 7. Comparison of the number of performed screening mammography exams in certified mammography facilities in 2020 - 2021 per month.



Graph 8. Estimated coverage of mammography screening performed in certified mammography screening facilities.

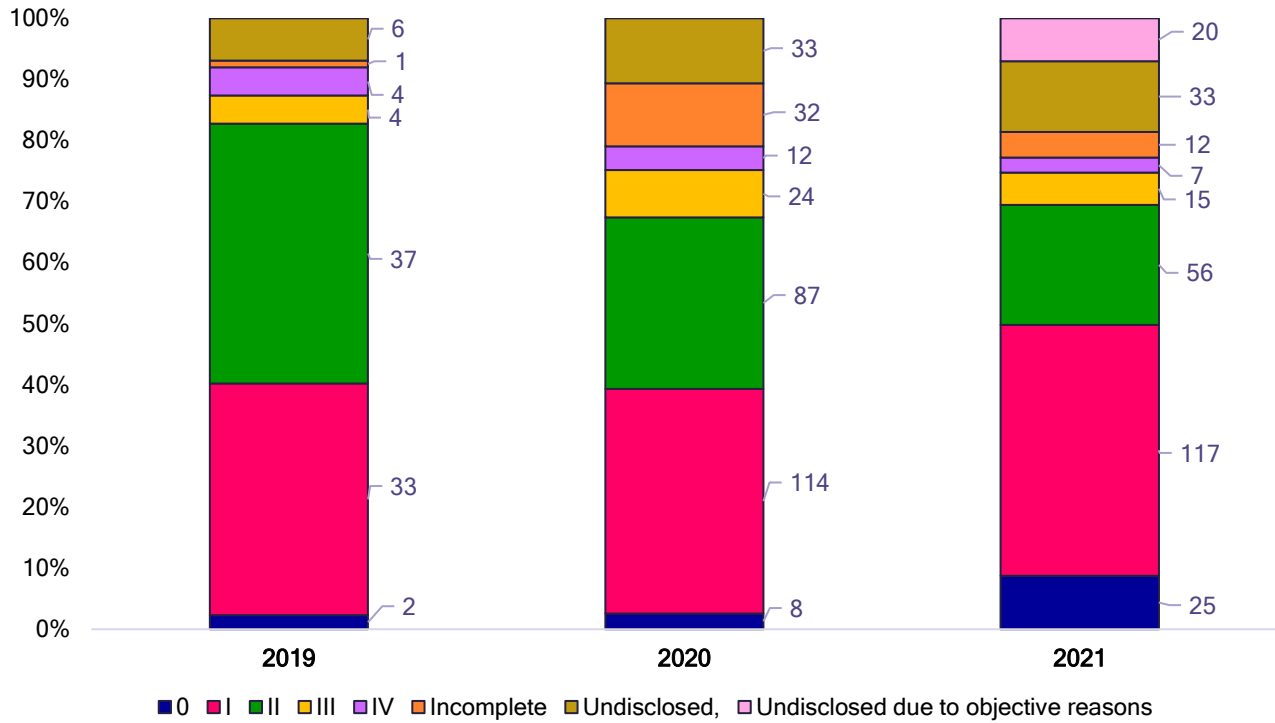
Table 5. Number of malignancies diagnosed via mammography screening in certified mammography screening facilities in 2021 per TNM stage.

TNM stage	Number of diagnosed malignancies during mammography screening in 2021	
	number	percentage
0	25	8.8 %
IA	116	40.7 %
IB	1	0.4 %
IIA	44	15.4 %
IIB	12	4.2 %
IIIA	10	3.5 %
IIIB	1	0.4 %
IIIC	4	1.4 %
IV	7	2.5 %
Incomplete ⁱ	12	4.2 %
Undisclosed due to objective reasons ⁱⁱ	33	11.6 %
Undisclosed ⁱⁱⁱ	20	7.0 %
total	285	100% ^{iv}



■ 0 ■ I ■ II ■ III ■ IV ■ Incomplete ■ Undisclosed ■ Undisclosed due to objective reasons

Graph 9. Ratio of clinical stages of malignant breast tumors in Slovakia diagnosed via mammography screening in certified mammography screening facilities in 2021.



Graph 10. Number and percentage of clinical stages of malignant breast tumors in Slovakia diagnosed via mammography screening in certified mammography screening facilities in 2019 - 2021.

ⁱ The TNM stage was classified as incomplete due to missing M-stage info

ⁱⁱ TNM undisclosed due to objective reasons: death, neoadjuvancy, treatment refusal by patient, contraindication to oncological treatment

ⁱⁱⁱ Missing TNM

^{iv} Due to rounding to one decimal place the sum of percentages does not need to be equal to one hundred