Monitor Dutch **breast cancer** screening programme **2024**

Edition november 2025

Key findings 2024

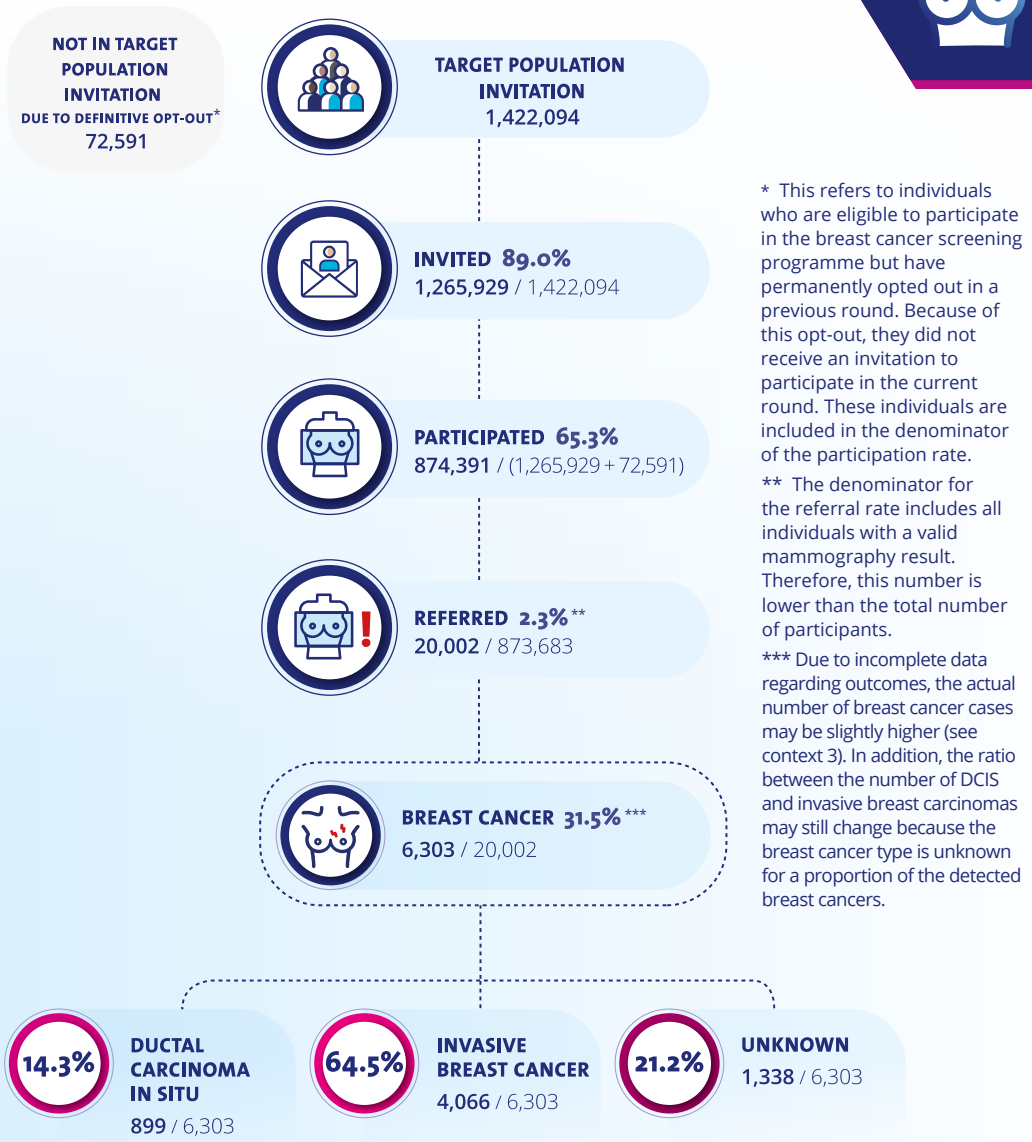
A total of **874,391** individuals participated by having a mammogram. The participation rate was **65.3%**.

In total, **31.6%** were re-invited within 24 ± 2 months after their previous invitation, and **98.4%** received a new invitation within 36 months.

Of all participants, **2.3%** were referred to the hospital due to an unfavourable result.

Breast cancer was detected in **6,303** participants, resulting in a detection rate of **0.72%**.

Note! Disclaimer: *This monitor has been carefully compiled. Where possible, outcomes from previous years have been recalculated based on the most recent data. As a result, these may differ from previously reported results. The most recent publication should always be used as point of reference.*



* This refers to individuals who are eligible to participate in the breast cancer screening programme but have permanently opted out in a previous round. Because of this opt-out, they did not receive an invitation to participate in the current round. These individuals are included in the denominator of the participation rate.

** The denominator for the referral rate includes all individuals with a valid mammography result. Therefore, this number is lower than the total number of participants.

*** Due to incomplete data regarding outcomes, the actual number of breast cancer cases may be slightly higher (see context 3). In addition, the ratio between the number of DCIS and invasive breast carcinomas may still change because the breast cancer type is unknown for a proportion of the detected breast cancers.

Figure 1 / **Flowchart breast cancer screening programme in 2024** (source: BVO NL and Palga)

Erasmus MC

Table of Contents

Introduction

Breast cancer screening programme

In the Netherlands, women aged 50 to 75 years are invited to participate in the breast cancer screening programme by having X-rays taken of the breasts (mammograms). The screening organisation aims to invite individuals every two years (24 +/- 2 months). However, due to capacity issues, the invitation interval is temporarily extended to a maximum of three years (36 months) from 2020 onwards.

Through the screening programme, breast cancer can be detected at an early stage. This increases the chance of successful treatment and often requires less invasive treatment than if breast cancer is detected at a late stage. The ultimate goal of the screening programme is to reduce the breast cancer mortality and the disease burden for people with breast cancer.

1 / Invitations and participation

Table 1 / **Target population, invitations and participation** by year (source: BVO NL)

	2020	2021	2022	2023	2024
Target population invitation	1,395,776	1,418,041	1,432,058	1,417,979	1,422,094
Previously definitively opted out*	82,225	78,561	75,936	74,002	72,591
Invitations sent	752,401	1,221,232	1,221,499	1,198,668	1,265,929
Invitation coverage	53.9%	86.1%	85.3%	84.5%	89.0%
Participants	534,122	887,290	865,899	849,076	874,391

* This refers to individuals who are eligible to participate in the breast cancer screening programme but have permanently opted out in a previous round. Because of this opt-out, they did not receive an invitation to participate in the current round. These individuals are included in the denominator when calculating the participation rate.

- Of all individuals eligible for an invitation in 2024, 72,591 individuals (5.4%) were not invited because they had permanently opted out during a previous round (Table 1). Additionally, 74,731 individuals (5.6%) actively opted out after receiving the invitation (non-participants), and 316,807 individuals (23.7%) have (still) not responded to the invitation (non-respondents). In total, 874,391 individuals participated in 2024 (65.3%).
- A total of 507,075 individuals received a reminder because they had not participated twelve weeks after the initial invitation. Of this group, 181,883 individuals eventually participated (35.9%). This accounts for 20.8% of the total number of participants.

Context 1: **Change in calculation participation rate**

In previous monitoring reports, the published participation rate was calculated as the number of participants divided by the number of invitees. Starting with this monitoring report, the number of individuals who are eligible for the screening programme but did not receive an invitation because they permanently opted out during a previous round is added to the number of invitees. The participation rate has been recalculated retrospectively for all reporting years presented in this monitor.

Context 2: **Invitation and screening round**

In previous monitoring reports, both the participation rate and the referral rate were reported by invitation round: the round in which an individual receives an invitation to the screening programme. However, in this monitor, the referral rate for all reporting years is presented by participation round: the round in which an individual participates in the screening programme. As a result, these results differ from previously reported figures. Participation is still reported by invitation round.

Figure 2 / **Participation rate** by invitation round and year (source: BVO NL)

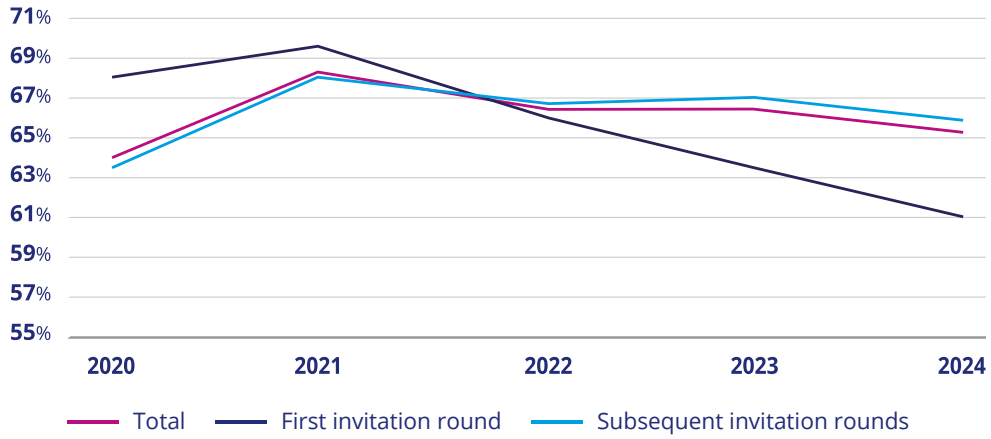


Table 2 / **Participation rate** by age and year (source: BVO NL)

	2020	2021	2022	2023	2024
<55 years	68.2%	70.7%	67.9%	66.9%	64.7%
55-59 years	64.9%	68.6%	67.1%	67.5%	65.9%
60-64 years	64.3%	68.6%	67.3%	67.6%	66.4%
65-69 years	64.2%	69.3%	68.6%	68.5%	67.4%
≥70 years	57.2%	63.7%	62.6%	63.0%	62.2%
Total	**64.0%**	**68.3%**	**66.7%**	**66.7%**	**65.3%**

- The overall participation rate in 2024 was 65.3%, which was lower than in 2023, when the participation rate was 66.7% (Figure 2).
- In 2024, participation was higher among individuals invited for a subsequent round (65.8%) than among those invited for the first time (61.1%) (Figure 2).
- There has been a steady decline in participation in the first round since 2021, when the participation rate was 69.5%. Participation in 2024 is 12.1% lower than in 2021. For the subsequent rounds, the decline compared to 2021 is less pronounced (3.4%).
- As in 2022 and 2023, participation was highest among those aged 65-69 (67.4%), and lowest among those aged 70 and older (62.2%) (Table 2). In previous years, participation was highest in the youngest age group (<55 years).
- The decline in participation is visible across all age groups and is greatest among individuals under 55 years old (Table 2).

Table 3 / **Participation patterns over two invitation rounds** by year (source: BVO NL)

Invited in	2018+2020	2019+2021	2020+2022	2021+2023	2022+2024
Re-participation rate	85.3%	87.2%	87.3%	89.0%	88.7%
Switch non-participation to participation	20.5%	21.8%	22.3%	22.8%	20.9%

Table 4 / **Participation patterns over two invitation rounds*** by year (source: BVO NL)

	2020	2021	2022	2023	2024
Individuals aged <52 years at first invitation	**94.2%**	**90.3%**	**87.8%**	**89.4%**	**90.7%**
Average invitation interval (months)	**29.6**	**32.6**	**32.1**	**28.4**	**27.8**
Invitation interval <22 months	3.4%	1.3%	1.5%	4.2%	2.2%
Invitation interval 24 +/- 2 months	15.6%	1.4%	9.4%	28.5%	31.6%
Invitation interval 26-29 months	32.9%	10.7%	14.1%	40.7%	40.2%
Invitation interval 30-35 months	44.5%	82.3%	62.5%	20.3%	24.3%
Invitation interval 36-41 months	2.8%	3.2%	11.2%	5.2%	0.9%
Invitation interval ≥ 42 months	0.8%	1.1%	1.3%	1.1%	0.7%
Average Screening interval (months)	**31.9**	**34.5**	**34.1**	**30.8**	**30.3**
Screening interval <30 months	43.6%	14.3%	27.6%	69.1%	70.5%
Screening interval 30-35 months	47.4%	74.8%	54.0%	19.5%	22.0%
Screening interval 36-41 months	3.6%	5.2%	11.5%	4.1%	1.1%
Screening interval ≥ 42 months	5.3%	5.7%	6.9%	7.3%	6.5%

* The screening interval is influenced both by the capacity of the screening programme and by the participation behavior of the invitees. Screening intervals were calculated based on individuals who completed a full screening examination in the current round.

- Of the individuals who participated in the previous invitation round and were invited again in 2024, 88.7% participated again in 2024 (Table 3). This indicates a slightly lower re-participation rate compared to 2023 (89.0%).
- The re-participation rate was highest among those aged 65–69 (90.6%) and lowest among those under 55 years old (86.3%).
- Of the individuals who did not participate in the previous invitation round, 20.9% participated in 2024 (Table 3). The number of people switching from non-participation to participation was lower than in 2023 (22.8%). This decline was observed across all age groups.
- The decline in both re-participation rate and the switch from non-participation to participation from 2023 to 2024 was observed in all age groups. This corresponds with the overall decline in participation among those invited for a subsequent round.
- In 2024, 90.7% of individuals were under the age of 52 when they were first invited (Table 4).
- In 2024, a greater proportion of individuals were re-invited within 24 ± 2 months (31.6%) compared to 2023 (28.5%) (Table 4). Additionally, fewer individuals were invited after 36 months or more (1.6% vs. 6.3% in 2023).
- The percentage of participants with a screening interval shorter than 30 months was slightly higher in 2024 (70.5%) compared to 2023 (69.1%) (Table 4).
- Additionally, the number of participants with a screening interval longer than 42 months was lower than in 2023 (6.5% vs. 7.3%) (Table 4).

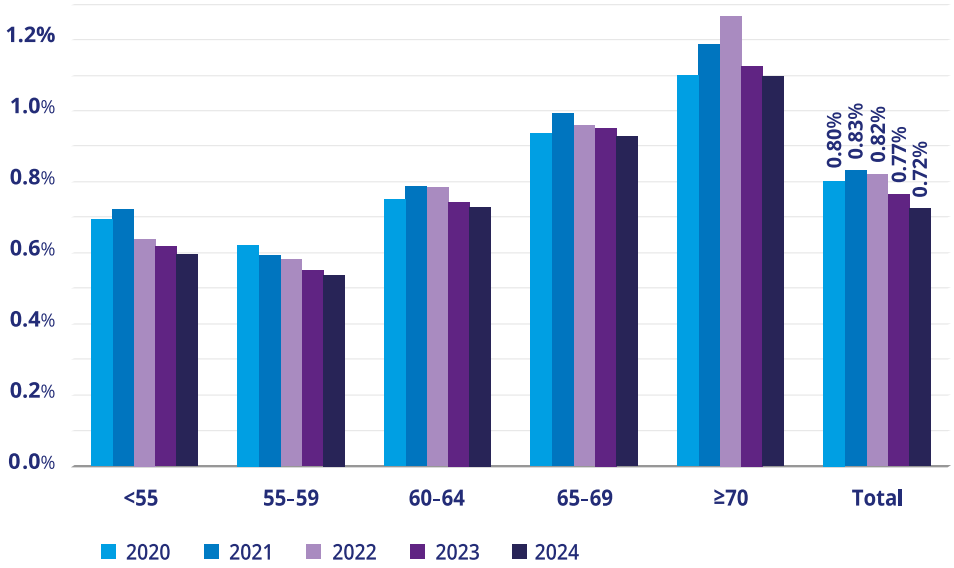
2 / **Referrals and outcomes**

The reference date is April 1, 2025. The number of detections for 2024 is expected to increase slightly, as not all referred individuals had completed additional diagnostics by the reference date.

Table 5 / **Referral rate** by participation round, BI-RADS classification and year (source: BVO NL)

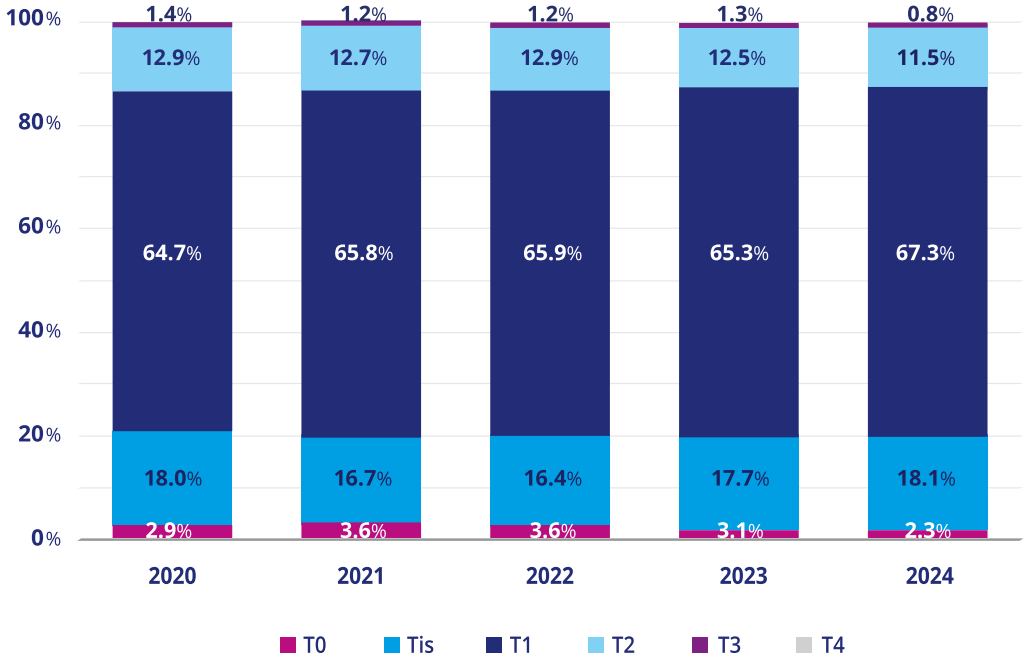
	2020	2021	2022	2023	2024
First invitation round					
Referral rate	6.75%	5.81%	5.51%	5.92%	5.70%
Referral rate with BI-RADS 5	0.21%	0.20%	0.18%	0.18%	0.18%
Referral rate with BI-RADS 4	2.34%	2.10%	2.03%	2.12%	2.03%
Referral rate with BI-RADS 0	4.20%	3.51%	3.29%	3.63%	3.49%
Invitation round					
Referral rate	2.20%	2.03%	1.96%	1.97%	1.88%
Referral rate with BI-RADS 5	0.17%	0.18%	0.17%	0.16%	0.14%
Referral rate with BI-RADS 4	0.95%	0.92%	0.92%	0.88%	0.83%
Referral rate with BI-RADS 0	1.09%	0.93%	0.86%	0.93%	0.91%
Total					
Referral rate	2.78%	2.56%	2.42%	2.41%	2.29%
Referral rate with BI-RADS 5	0.17%	0.18%	0.17%	0.16%	0.15%
Referral rate with BI-RADS 4	1.12%	1.09%	1.06%	1.02%	0.96%
Referral rate with BI-RADS 0	1.48%	1.29%	1.18%	1.24%	1.18%

Figure 3 / **Detection rate breast cancer** by age and year (source: Palga)



- In 2024, a total of 20,002 individuals were referred. The overall referral rate was 2.29% (Table 5). This reflects a downward trend in the referral rate over recent years.
- The referral rate was higher among individuals participating for the first time (5.70%) than among those undergoing a subsequent screening (1.88%) (Table 5). This pattern was also observed in previous years.
- As in previous years, the majority of referrals were due to a BI-RADS 0 finding (Table 5).
- In 2024, breast cancer was diagnosed in 6,303 participants. Corresponding to a detection rate of 0.72% (Figure 3), showing a decline compared to previous years. This decline was observed across all age categories.

Figure 4 / **Stage distribution detected breast cancers** by T-stage and year*
(source: Palga)



* Stages are based on pathological values, which may lead to an underestimation of the stage for individuals who have undergone neoadjuvant therapy. As a result, some T0 stages are reported. Detection of T4 was below 1% for each year and is therefore not visible in the figure. Results are only presented for breast cancers for which the stage was known (79% of all breast cancers).

- Just like in previous years, the vast majority of cancers were detected in T-stage 1 (67.3%) (Figure 4). The stage distribution for 2024 is similar to that of previous years.

Context 3: **Completeness of outcomes**

Due to a large-scale renewal of the IT infrastructure in the breast cancer screening programme and the partial lack of feedback from hospitals, outcome data from 2020 onwards are less complete than in previous years. In the analysis, it was assumed that the number of breast cancer detections and false-positive results following invasive diagnostics was known for all referrals, as these are recorded in Palga. The remaining false-positive results (shown in blue in Table 6) were calculated based on this assumption. It was not possible to distinguish between false positives following non-invasive diagnostics, diagnostics with unknown methods, and cases where the referral advice was not followed. Figures may therefore deviate from reality.

Table 6 / **Indicators related to outcomes*** by year (source: BVO NL and Palga)

	2020	2021	2022	2023	2024
Positive predictive value referral advice	29%	32%	34%	32%	32%
False-positive results in screened individuals	**2%**	**2%**	**2%**	**2%**	**2%**
After non-invasive type diagnostics	**1%**	**1%**	**1%**	**1%**	**1%**
After invasive type diagnostics	1%	1%	1%	1%	1%
Proportion of false positive results after BI-RADS 5 result	**3%**	**3%**	**3%**	**3%**	**5%**
After non-invasive type diagnostics	**1%**	**1%**	**1%**	**1%**	**3%**
After invasive type diagnostics	2%	1%	2%	2%	2%
Proportion of false positive results after BI-RADS 4 result	**57%**	**55%**	**53%**	**53%**	**54%**
After non-invasive type diagnostics	**22%**	**18%**	**18%**	**18%**	**21%**
After invasive type diagnostics	35%	36%	35%	35%	33%
Proportion of false positive results after BI-RADS 0 result	**90%**	**88%**	**87%**	**88%**	**88%**
After non-invasive type diagnostics	**77%**	**72%**	**71%**	**73%**	**74%**
After invasive type diagnostics	13%	16%	16%	15%	14%
Screen-detected cancers**	4,276	7,363	7,132	6,574	6,303
Invasive breast cancer**	72%	73%	73%	72%	65%
Ductal carcinoma in situ	16%	15%	14%	15%	14%
Unknown	13%	12%	13%	13%	21%

* Due to incomplete outcome data, the actual percentage of breast cancers may be slightly higher. This affects the indicators presented in this table. Figures shown in blue are based on assumptions and may therefore deviate from reality (see Context 3).
** The ratio between the number of ductal carcinomas in situ and invasive breast carcinomas may still change, as the type of breast cancer is unknown for a portion of the detected cases due to incomplete data.

- In 2024, the positive predictive value of the referral advice was 32% (Table 6). This is consistent with previous years.
- Of all screened women, 2% received a false-positive result (Table 6). In these women, no breast cancer was found after they were referred. This is also in line with previous years.
- The number of individuals for whom no breast cancer was found after a BI-RADS 0 is consistently high (Table 6). In 2024, this was 88%.

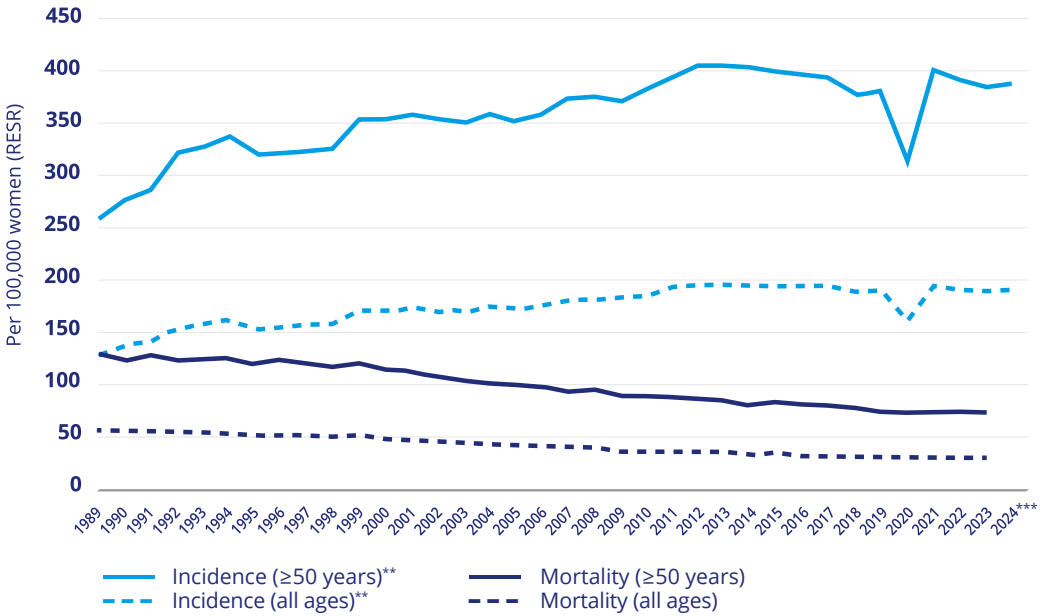
Table 7 / **Interval cancers after favourable mammogram, sensitivity and specificity** by year (source: BVO NL and Palga)

	2020	2021
Number of interval cancers after favourable mammogram	1,715	2,410
Percentage of interval cancers after favourable mammogram	0.32%	0.27%
Sensitivity	71.4%	75.3%
Specificity	98.5%	98.7%

- Of all the individuals who participated in response to an invitation in 2021 and who received a favourable result from the mammography, 0.27% were diagnosed with breast cancer before being invited again for the population screening (Table 7). This cannot be directly compared to the results from 2020, as the situation in 2020 was different due to the COVID-19 pandemic.
- For 2021, the sensitivity in 2021 was 75.3% (Table 7).
- The specificity was 98.7% (Table 7). Like in 2020, this is high.

3 / **Incidence and mortality**

Figure 5 / **Incidence and mortality breast cancer in the Netherlands from the year before the implementation of the national screening programme in 1990*** by age and year (source: NCR (incidence) and CBS (mortality))



* This concerns all breast cancers in the Netherlands, regardless of whether they were detected within or outside of the screening programme.
** Incidence is shown only for ductal carcinoma in situ and invasive breast cancer.
*** Data for 2024 is provisional (incidence) or not yet available (mortality).

Table 8 / **Incidence and mortality breast cancer in the Netherlands*** by year (source: NCR (incidence) and CBS (mortality))

	2020	2021	2022	2023	2024**
Incidence invasive breast cancer per 100,000 women* (RESR)**					
≥ 50 years	274.54	343.88	336.47	327.74	326.82
All ages	142.73	170.67	167.95	164.30	164.49
Incidence ductal carcinoma in situ per 100,000 women* (RESR)**					
≥ 50 years	40.62	57.42	55.65	54.71	58.76
All ages	18.57	24.84	24.22	24.29	26.19
Breast cancer mortality per 100,000 women (RESR)					
≥ 50 years	74.88	76.15	75.17	73.78	
All ages	32.64	32.73	32.28	31.11	
Breast cancer mortality relative to 1989**					
≥50 years	-42.6%	-41.6%	-42.4%	-43.4%	
All ages	-42.9%	-42.8%	-43.6%	-45.6%	

* This includes all breast cancer cases in the Netherlands, regardless of whether they were detected within or outside of the screening programme.
** Data for 2024 are provisional (incidence) or not yet available (mortality).
*** Incidence is shown only for ductal carcinoma in situ and invasive breast cancer.
**** Year prior to the introduction of the national breast cancer screening programme in 1990.

- Due to the COVID-19 pandemic, the breast cancer screening programme was temporarily halted in 2020, and people visited their general practitioners less frequently. These two factors can (partially) explain the lower incidence rate that year (Figure 5).
After a small peak in 2021, possibly as a compensation for the low number in 2020, the incidence in 2024 appears to be comparable again to pre-pandemic figures.

- Breast cancer mortality for women aged 50 and older declined from 130.46 per 100,000 women in 1989 to 73.78 per 100,000 women in 2023 (Figure 5). This represents a relative decrease of 43.4%.

Context

Context 1, 2 and 3 are presented elsewhere in this document.

Context 4: **Data and monitoring**

The National Institute for Public Health and the Environment (RIVM) coordinates the breast cancer screening programme in the Netherlands on behalf of the Ministry of Health, Welfare and Sport (VWS). Monitoring of the screening programme is carried out by the Erasmus MC on behalf of RIVM. The goal of this monitoring is to map the progress of the screening programme and to identify important trends. This report presents results for individuals invited to participate in the breast cancer screening programme in 2024, as well as results from previous years.

The data shown in this report is derived from the Dutch screening organisation (BVO NL) and the Pathological-Anatomical National Automated Archive (PALGA). This data has a reference date of April 1, 2025. Information on incidence and mortality is respectively provided by the Netherlands Cancer Registry (NCR) and Statistics Netherlands (CBS) and has a reference date of January 27, 2025 (retrieved September 2025).

Because data from previous years has been recalculated based on the most recent data, figures may differ from earlier publications. Additionally, due to a large-scale renewal of the ICT infrastructure at the screening programme, data from 2020 onwards is reported from a different data source than before. As a result, outcomes from 2020 onwards are delayed and not yet fully available.

Because data from 2023 and earlier years have been recalculated based on the most recent data, figures may differ from previous publications.

Objection

All individuals had the right to object to the use of their data. The number of people who exercised this right from 2020 through 2024 is described in Table 9. Data from these individuals has not been included in this monitoring report.

Table 9 / **Number of individuals who objected to the use of their data**, by year (BVO NL)

	2020	2021	2022	2023	2024
Objection	2,383	2,294	2,187	2,067	1,973

Glossary

BI-RADS: Breast Imaging Reporting and Data System; radiological classification system to assess mammograms. BI-RADS 0: images contain insufficient information to be properly assessed; BI-RADS 4: suspicious abnormality; BI-RADS 5: highly suggestive of malignancy.

BVO NL: Bevolkingsonderzoek Nederland; Dutch screening organisation

CBS: Statistics Netherlands.

Detection rate: number of participants diagnosed with breast cancer relative to all participants (%).

Ductal carcinoma in situ: possible preliminary stage of breast cancer in which abnormal cells have not yet progressed to surrounding tissues and metastasis to other organs is not possible.

False positive result: referral advice following the screening examination, after which no breast cancer is found.

Full screening examination: examination in which assessable images were obtained by means of mammography.

Interval cancers: breast cancers that are detected in the period between a favourable mammography result and the invitation for the next screening examination.

Invasive breast cancer: form of breast cancer in which abnormal cells grow into surrounding tissues and metastasis to other organs is possible.

Invitation coverage: number of people invited for in the breast cancer screening programme relative to the total target group invitation (%).

Invitation interval: time in between two subsequent invitations of an individual.

Invitation round: round in which an individual is invited for screening. This distinguishes between the round in which an individual is invited for the first time (first round) and the subsequent rounds (subsequent rounds).

NCR: Netherlands Cancer Registry.

Non-participants: number of invited individuals who actively unsubscribed during the current invitation round relative to the total number of invitees (%).

Non-respondents: number of invited individuals who did not participate without unsubscribing, relative to the total number of invitees (%).

Palga: Pathological-anatomical national automated archive.

Participation rate: number of individuals who, following an invitation in the reporting year, were registered for a mammography relative to all individuals who were invited or who were not invited due to a definitive opt-out in a previous round (%).

Participation round: the round in which an individual participates in the screening programme. A distinction is made between the round in which a individual participates for the first time (initial round) and the subsequent rounds (subsequent rounds).

Positive predictive value referral advice: number of referred individuals diagnosed with breast cancer relative to all referred participants (%).

Previously definitively opted out: number of individuals who have definitively opted out prior to the current invitation round.

Referral rate: number of participants who were referred to the hospital based on the screening test result relative to all participants (%).

Re-participation rate: number of individuals who participated in the current invitation round (in the reporting year) relative to all individuals who participated in the previous round and were re-invited in the current round (%).

RESR: Revised European Standardised Rate; revised measure used to present incidence and mortality rates, standardised for the European standard population.

RIVM: National Institute for Public Health and the Environment.

Screen-detected cancers: cancers detected through the screening programme.

Screening interval: time between two consecutive screening examinations of a participant.

Sensitivity: number of breast cancers detected through the screening programme relative to the sum of the number of interval cancers and breast cancers detected through the screening programme (%).

Specificity: number of participants who rightly were not referred (correctly favourable result) relative to all participants without a breast cancer diagnosis before the invitation for the next screening examination (%).

Switch non-participation to participation: number of individuals who participated in the current invitation round (in the reporting year) relative to all individuals who did not participate in the previous invitation round and were re-invited in the current round (%).

Target population invitation: number of individuals who, according to the programme guidelines, should receive an invitation for the screening programme in the reporting year and who have not permanently opted out.

T-stage: pathological T stage according to the TNM classification, based on tumour size and growth into surrounding tissue. T0: no evidence of tumour; Tis: carcinoma in situ; T1: tumour is ≤2 cm in size; T2: tumour is 2-5cm in size; T3: tumour is >5 cm in size; T4: tumour has grown through into surrounding tissue (regardless of tumour size).

VWS: Ministry of Health, Welfare and Sport.