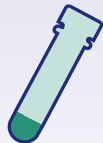


Monitor Dutch colorectal cancer screening programme 2023

Edition November 2024



Key findings 2023



1,484,959 individuals participated via a stool test. The participation rate was **67.2%**.



Of all individuals, **4.8%** was referred for a colonoscopy intake due to an unfavourable stool test result.



Of all referred individuals, **84.1%** underwent a colonoscopy.



In **18,053** individuals, colorectal cancer or an advanced adenoma was detected. The detection rate was **1.22%**.

Disclaimer: This monitor has been carefully compiled. Where possible, results from previous years have been recalculated using the most recent data. These may therefore differ from previously reported results.

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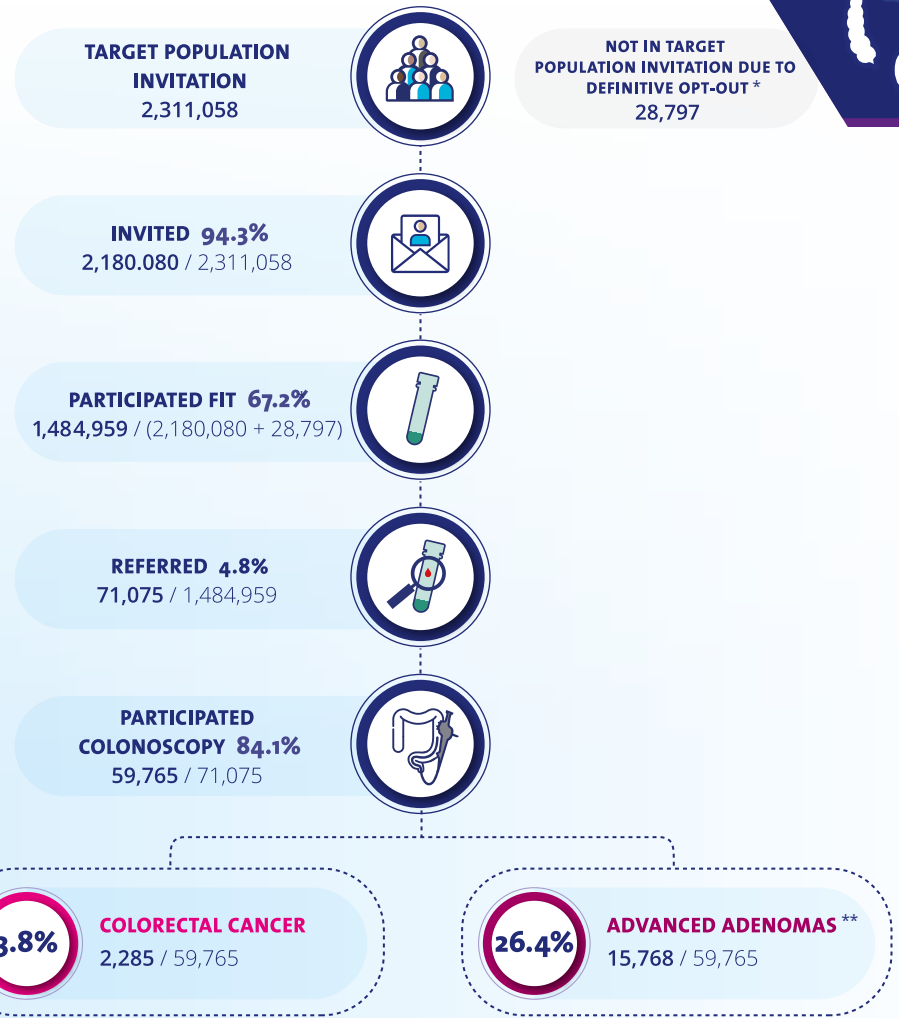


Figure 1 / Flowchart colorectal screening programme in 2023 (source: BVO NL and Palga)

* Individuals who were not invited because they definitively opted out during an earlier invitation round are also included in the calculation of the participation rate (see context 1).

** Due to a change in the classification and registration of colonoscopy findings, it was not possible to distinguish between advanced adenomas, non-advanced adenomas and serrated polyps for some of the findings (see context 2). As a result, results cannot be directly compared with previous years.

1 / Invitations and participation

Introduction:

Colorectal cancer screening programme

In the Netherlands, individuals aged 55 to 75 are biennially invited to participate in the colorectal cancer screening programme through a stool test (FIT). The presence of blood in the stool may indicate the presence of colorectal cancer or precancerous lesions (advanced adenomas). By removing precancerous lesions, colorectal cancer can be prevented. In addition, the screening programme allows colorectal cancers to be detected at an earlier stage. This increases the

chances of successful treatment compared to when colorectal cancer is detected at a late stage. The ultimate goal of the screening programme is to prevent colorectal cancer as much as possible and reduce both colorectal cancer mortality and the burden for people with colorectal cancer.

Context 1:

Renewed calculation participation rate

In previous monitors, the published participation rate was equal to the number of participants divided by the number of invitees. From this current monitor onwards, the number of individuals who are eligible for screening, but did not receive an invitation because they definitively opted out during an earlier round, is added to the number of invitees. This applies for all reporting years presented in this monitor.

Table 1 / **Invitations and participants by year** (source: BVO NL)

	2019	2020	2021	2022	2023
Previously opted out*	36,435	53,426	44,950	34,632	28,797
Invitations sent	2,200,326	1,890,228	2,262,155	2,131,496	2,180,080
Participants stool test*	1,580,009	1,364,606	1,609,145	1,470,914	1,484,959

* Individuals who were not invited because they definitively opted out during an earlier invitation round are also included in the calculation of the participation rate (zie context 1).



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

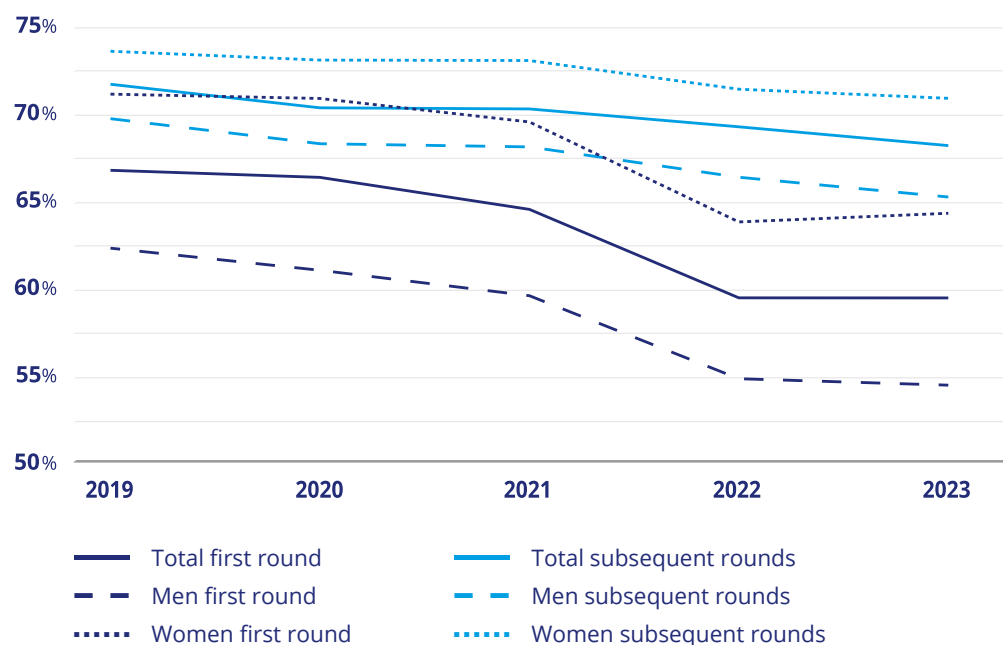


Table 2 / **Participation rate stool test** by sex, age and year (source: BVO NL)

	2019	2020	2021	2022	2023
Men	68.1%	67.6%	66.9%	65.0%	64.1%
55 – 59 years	63.2%	63.4%	61.7%	58.1%	57.1%
60 – 64 years	67.5%	66.9%	66.2%	63.5%	63.3%
65 – 69 years	72.6%	70.8%	70.9%	69.7%	69.2%
≥70 years	71.2%	71.3%	71.7%	72.0%	71.8%
Women	73.1%	72.7%	72.5%	70.7%	70.3%
55 – 59 years	71.9%	71.5%	70.9%	67.3%	66.7%
60 – 64 years	73.4%	72.8%	72.4%	69.9%	69.9%
65 – 69 years	75.8%	74.8%	74.7%	73.8%	73.6%
≥70 years	71.6%	72.0%	72.8%	72.9%	73.1%
Total	70.6%	70.2%	69.7%	67.9%	67.2%

- In 2023, a total of 1,484,959 individuals (67.2%) participated. In addition, 42,934 individuals (1.9%) actively opted out in 2023 (non-participants) and 652,187 individuals (29.6%) did not respond to the invitation (non-respondents). The remaining 28,797 persons definitively opted out during an earlier round and were therefore not invited (1.3%).

- The declining participation trend visible in previous years continues in 2023 (Table 2). Over five years, the overall participation rate decreased from 70.6% in 2019 to 67.2% in 2023.

- As in previous years, participation was lower for men and for those invited for the first time (Figure 2). Participation was lowest for men invited for the first round (54.6%). Accordingly, participation was lower in the younger age groups than in the older age groups (Table 2).

- Compared to 2022, the decrease in participation was greatest for the youngest age group: from 58.1% to 57.1% for men and from 67.3% to 66.7% for women.



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

	(2017 +) 2019	(2018 +) 2020	(2019 +) 2021	(2020 +) 2022	(2021 +) 2023
Re-participation rate*	91.8%	91.5%	92.5%	91.4%	91.3%
Switch no participation to participation**	18.7%	19.0%	18.1%	15.0%	15.6%

* Proportion of invitees who participated in the previous invitation round and participated again in the current invitation round (in the reporting year).
 ** Proportion of invitees who did not participate in the previous invitation round but did participate in the current invitation round (in the reporting year).

- Of those who participated in the previous invitation round, 91.3% participated again in 2023 (Table 3). This is referred to as the re-participation rate.
- In 2023, the re-participation rate was lowest for individuals aged 55-59 years (88.3%) and similar for men (91.1%) and women (91.5%)

- Of those who did not participate in the previous invitation round, 15.6% did participate in 2023 (Table 3). The proportion who switched from no participation to participation was higher for women (16.4%) than for men (14.8%) and decreased over the past few years from 18.7% in 2019 to 15.6% in 2023.

- Overall, the number of 'switchers' in 2023 (15.6%) was higher than in 2022 (15.0%). However, a decrease was seen within the 55-59-year-olds. This decrease was larger for women (from 18.7% to 17.7%) than for men (from 15.7% to 15.4%).

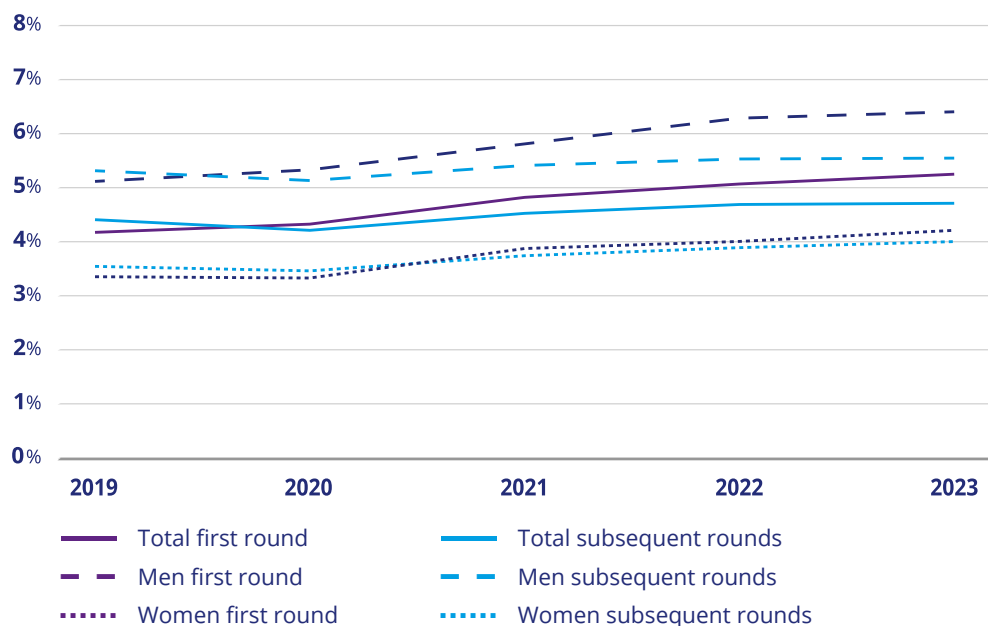


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2 / Referrals and outcomes

Figure 3 / Referral rate by sex, invitation round and year (source: BVO NL)



Tabel 4 / Referral rate by sex, age and year (source: BVO NL)

	2019	2020	2021	2022	2023
Men	5.2%	5.1%	5.4%	5.7%	5.7%
55 – 59 years	4.8%	4.7%	5.1%	5.5%	5.5%
60 – 64 years	4.9%	4.8%	5.0%	5.1%	5.0%
65 – 69 years	5.1%	5.1%	5.6%	5.8%	5.7%
≥70 years	6.2%	5.9%	6.2%	6.4%	6.4%
Women	3.5%	3.5%	3.8%	3.9%	4.0%
55 – 59 years	3.2%	3.1%	3.4%	3.7%	3.7%
60 – 64 years	3.2%	3.3%	3.5%	3.5%	3.6%
65 – 69 years	3.5%	3.5%	3.9%	4.0%	4.1%
≥70 years	4.3%	4.2%	4.6%	4.7%	4.6%
Total	4.3%	4.2%	4.6%	4.7%	4.8%

• In 2023, 71,075 individuals received an unfavourable stool test result, after which they were referred for a colonoscopy intake. This brought the referral rate to 4.8% (Table 4). Over recent years, a slight increase is observed for the referral rate: from 4.3% in 2019 to 4.8% in 2023.

• As in previous years, men received an unfavourable stool test result (5.7%) more often than women (4.0%) in 2023. Men invited for the first invitation round and men aged ≥70 years (invited for a subsequent round) had an unfavourable result most often (both 6.4%)

• Of all referred individuals, 1,348 individuals (1.9%) did not show up to the colonoscopy intake without cancelling.
 • Of those whose advice regarding follow-up examination was known, 61,364 individuals (94.0%) were advised to undergo a colonoscopy. A total of 837 individuals (1.3%) were advised to undergo a CT colonography. The remaining persons (4.7%) were advised not to undergo any intestinal examination.

• In 93.8% of individuals, the colonoscopy intake appointment was scheduled within the set standard of 15 working days after the unfavourable stool test.



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Figure 4 / **Participation rate colonoscopy** by age, invitation round and year (source: BVO NL)

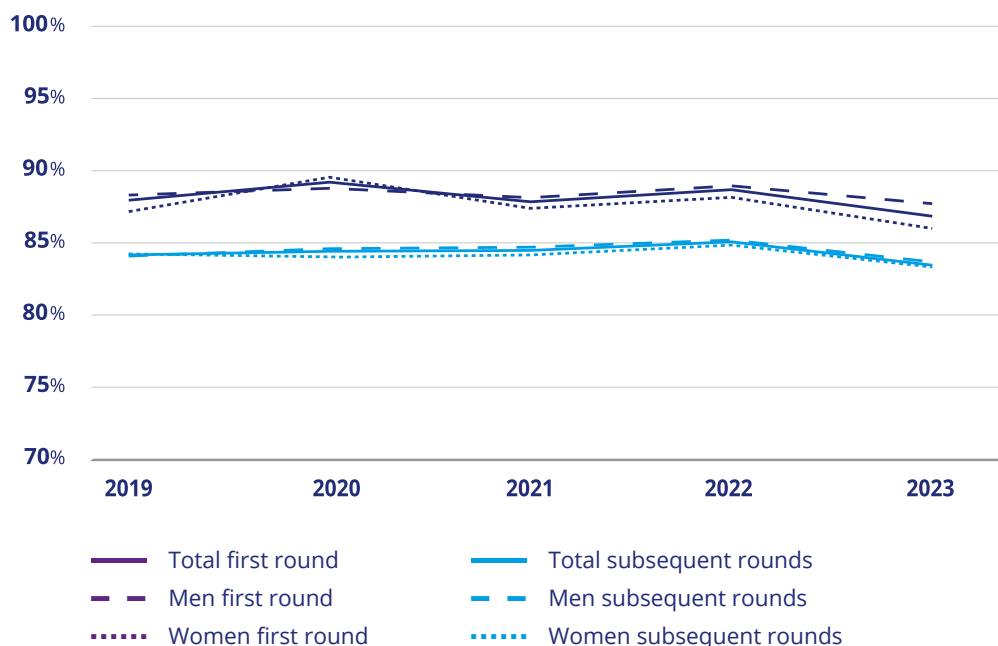


Table 5 / **Participation rate colonoscopy** by age and year (source: BVO NL)

	2019	2020	2021	2022	2023
55 – 59 years	88.0%	87.9%	87.5%	88.6%	87.0%
60 – 64 years	86.8%	85.9%	86.7%	86.6%	85.6%
65 – 69 years	84.1%	84.1%	84.7%	85.2%	83.4%
≥70 years	81.3%	81.0%	81.3%	81.5%	80.4%
Total	85.0%	84.8%	85.0%	85.6%	84.1%

- Of the 71,075 individuals with an unfavourable stool test result, 59,765 underwent colonoscopy. The participation rate for colonoscopy was 84.1% (Table 5).

- Participation in colonoscopy was higher in the first invitation round (87.0%) than in the subsequent rounds (83.7%) and was higher for the younger age groups than for the older age groups (Figure 4 and Table 5). This may be partly explained by the fact that the older age groups were more likely to be advised not to undergo any intestinal examination (3.0% in 55-59-year-olds compared with 5.9% in persons ≥70 years of age).

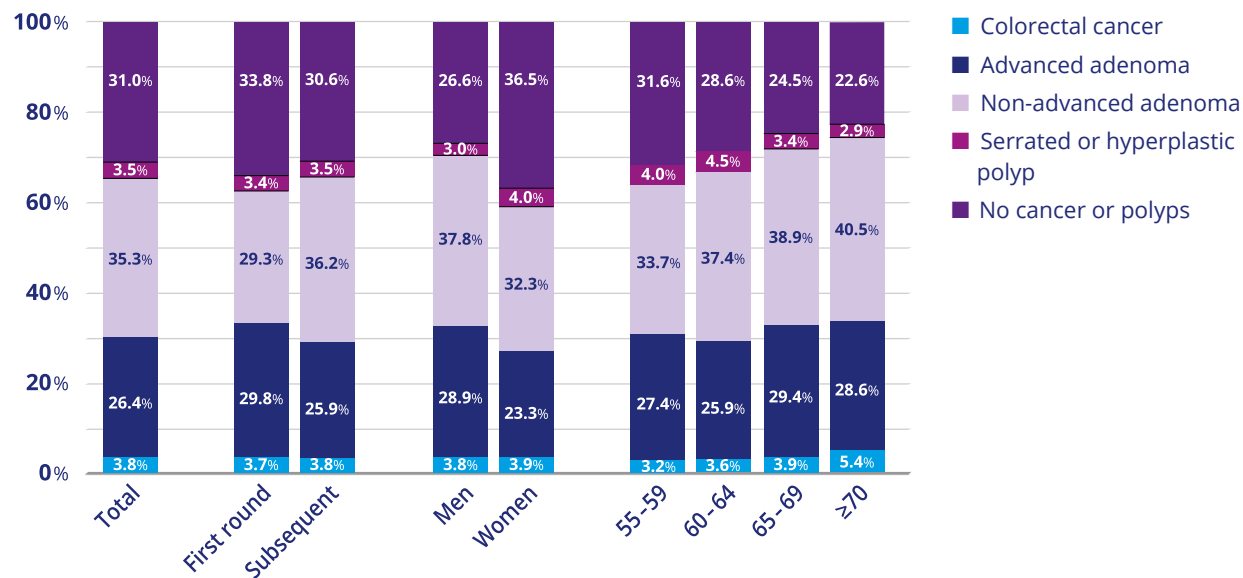
- Compared to previous years, participation in colonoscopy was lower for all age groups in 2023.



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Figure 5 / **Outcomes colonoscopy after unfavourable stool test in 2023***
by invitation round, sex and age (source: BVO NL and Palga)



* Results cannot be directly compared to previous years (see context 2).

- In 2023, 2,285 colorectal cancers (3.8%) and 15,768 advanced adenomas (26.4%) were found during colonoscopy. Thus, a relevant finding was detected in 30.2% of those who underwent colonoscopy following an unfavourable stool test. This is referred to as the positive predictive value.

- The positive predictive value for colorectal cancer and advanced adenomas was higher for the first round (33.5%) than for the subsequent rounds (29.7%). Because colorectal cancers and advanced adenomas are already found in the first round, the probability of their detection is lower when participating in subsequent rounds.
- The positive predictive value for colorectal cancer was similar for men (3.8%) and women (3.9%).
- For advanced adenomas, the positive predictive value was higher for men (28.9%) than for women (23.3%).

Context 2: **Classification outcomes**

At the end of 2022, the registration of colonoscopy findings was changed, following a change in the Colonoscopy Surveillance guideline. According to the old classification, findings were classified as colorectal cancer, advanced adenomas, non-advanced adenomas, serrated or hyperplastic polyps and no cancer or polyps. According to the updated classification, the following categories are possible: colorectal cancer, high-risk profile, low-risk profile and no cancer or polyps. A high-risk profile refers to the presence of advanced adenomas, advanced serrated polyps or at least five non-advanced adenomas. A low-risk profile refers to the presence of non-advanced serrated polyps or fewer than five non-advanced adenomas.

The modification of classification has been phased into electronic patient records of colonoscopy centres throughout 2023. As a result, findings were both reported according to the old and new guideline in 2023. To present data in a uniform way, all data in this monitor are presented according to the old classification. Because insufficient information was available to correctly classify high-risk and low-risk profiles according to the old classification, all high-risk and low-risk profiles are classified as advanced adenomas and non-advanced adenomas, respectively. Results may therefore differ from reality, with possible an overestimation of the total advanced adenomas. It is important to take this into account when interpreting the results.



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Table 6 / **Detection rates colorectal cancer (CRC) and advanced adenomas (AAD) in 2023** by invitation round, sex and age (source: BVO NL and Palga)

	CRC	Detection rate CRC	AAD*	Detection rate AAD*	Detection rate CRC and AAD*
Total	2,285	0.15%	15,768	1.06%	1.22%
Invitation round					
First round	276	0.17%	2,240	1.36%	1.53%
Subsequent rounds	2,009	0.15%	13,528	1.02%	1.18%
Sex					
Men	1,260	0.18%	9,567	1.38%	1.56%
Women	1,025	0.13%	6,201	0.78%	0.91%
Age category					
55 - 59 years	592	0.12%	5,027	1.03%	1.15%
60 - 64 years	393	0.13%	2,809	0.90%	1.02%
65 - 69 years	460	0.15%	3,467	1.13%	1.28%
≥70 years	840	0.22%	4,465	1.19%	1.42%

* Results cannot be directly compared to previous years (see context 2).

• Of all participants, 0.15% were diagnosed with colorectal cancer and 1.06% with an advanced adenoma (Table 6). The overall detection rate was thus 1.22%.

• The detection rate for colorectal cancer and advanced adenomas was higher for the first round (1.53%) than for the subsequent rounds (1.18%).

• The detection rate for colorectal cancer was higher for men (0.18%) than for women (0.13%). This also applies to the detection rate for advanced adenomas, which was 1.38% for men and 0.78% for women.

• The detection rate for colorectal cancer and advanced adenomas was highest for those aged 70 years and older (1.42%).



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Table 7 / **Trend detection rates and positive predictive values** by invitation round (source: BVO NL and Palga)

	2019	2020	2021	2022	2023*
Detection rate colorectal cancer	0.20%	0.18%	0.17%	0.16%	0.15%
<i>First round</i>	0.18%	0.20%	0.18%	0.17%	0.17%
<i>Subsequent rounds</i>	0.21%	0.18%	0.17%	0.15%	0.15%
Detection rate colorectal cancer and advanced adenomas	1.36%	1.24%	1.23%	1.15%	1.22%
<i>First round</i>	1.49%	1.44%	1.45%	1.48%	1.53%
<i>Subsequent rounds</i>	1.33%	1.23%	1.20%	1.11%	1.18%
Positive predictive value colorectal cancer	5.42%	4.90%	4.49%	3.95%	3.82%
<i>First round</i>	4.79%	5.17%	4.26%	3.97%	3.67%
<i>Subsequent rounds</i>	5.60%	4.88%	4.52%	3.94%	3.84%
Positive predictive value colorectal cancer and advanced adenomas	36.8%	34.1%	31.5%	29.2%	30.2%
<i>First round</i>	40.2%	37.3%	34.5%	33.8%	33.5%
<i>Subsequent rounds</i>	35.8%	33.9%	31.1%	28.6%	29.7%

* Results cannot be directly compared to previous years ([see context 2](#)).

- In 2023, the detection rate for colorectal cancer and advanced adenomas was higher than in previous years (Table 7). This is most likely due to the fact that a proportion of non-advanced adenomas and serrated polyps were incorrectly classified as advanced adenomas in 2023 ([see context 2](#)).

- In 2023, the positive predictive value for colorectal cancer was again lower than in previous years. This applies to both the first round and the subsequent rounds.
- In contrast, the positive predictive value for colorectal cancer and advanced adenomas was higher than in 2022. The possible overestimation of advanced adenomas plays a role in this ([see context 2](#)).



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Table 8 / **Complications within 30 days of colonoscopy in 2023*** (source: DRCE)

	Mild		Moderate		Severe		Fatal	
Perforation	11 ▶	0.02%	3 ▶	0.00%	8 ▶	0.01%	1 ▶	0.002%
Bleeding**	106 ▶	0.16%	106 ▶	0.16%	2 ▶	0.00%	2 ▶	0.003%
Other	25 ▶	0.04%	5 ▶	0.01%	5 ▶	0.01%	0 ▶	0.000%
Unknown	6 ▶	0.01%	1 ▶	0.00%	4 ▶	0.01%	0 ▶	0.000%
Total	148 ▶	0.22%	115 ▶	0.17%	19 ▶	0.03%	3 ▶	0.005%

* Percentages are calculated based on the total number of colonoscopies performed in 2023 after an unfavourable stool test (independent of the invitation year). An individual may have undergone multiple colonoscopies.

** Of 2 bleedings, the severity was unknown.

- In 2023, 66,043 colonoscopies were performed within the colorectal cancer screening programme. A complication was registered for 287 (0.4%) of these colonoscopies (Table 8).

- In total, 3 fatal (0.005%) and 19 serious (0.03%) complications were registered.

- The most common complication was a bleeding, which was registered 218 times (0.33%).

Table 9 / **Trend sensitivity, specificity and interval cancers after favourable stool test** by year (source: BVO NL and NCR)

	2016	2017	2018	2019	2020
Number of interval cancers after favourable stool test	1,010	1,347	1,386	1,299	919
Percentage of interval cancers after favourable stool test	0.10%	0.10%	0.09%	0.09%	0.07%
Sensitivity	81.4%	78.3%	74.6%	73.0%	74.3%
Specificity	94.8%	95.3%	95.8%	95.9%	95.9%

- Of all individuals who participated following an invitation in 2020 and subsequently received a favourable stool test result, 0.07% were diagnosed with colorectal cancer before they received their next invitation for the screening programme (Table 9). The interval cancer rate was lower than in previous years.

- The sensitivity increased from 73.0% in 2019 to 74.3% in 2020. The downward trend for sensitivity does not continue. The specificity was in line with previous years.

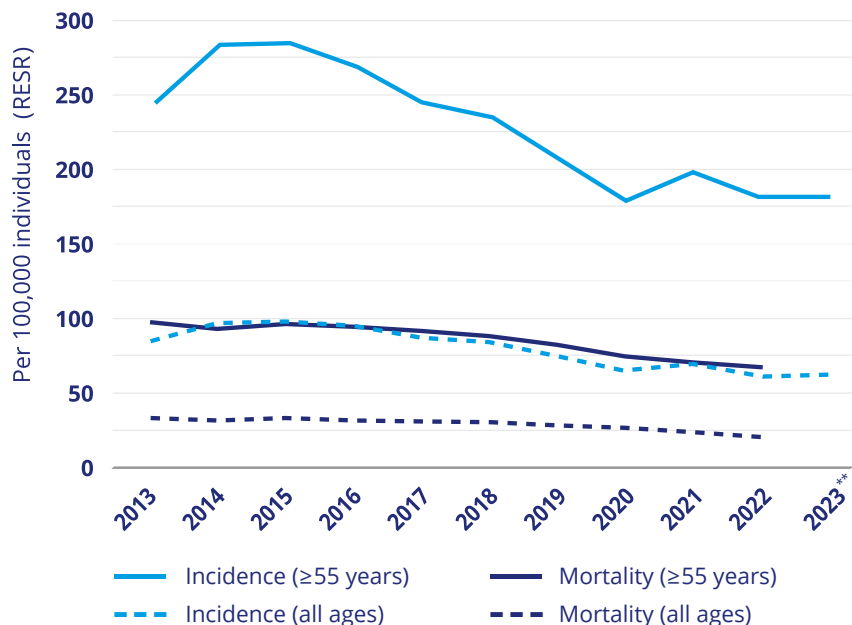


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3 / Incidence and mortality

Figure 6 / **Incidence and mortality colorectal cancer in the Netherlands from the year prior to the implementation of the screening programme in 2014*** (source: NCR (incidence) and mortality (CBS))



* For incidence, results are shown for colon and rectal cancer. For mortality, results also include data from appendix cancer as data were not available in more detail.

** Data for 2023 are preliminary (incidence) or not yet available (mortality).

Table 10 / **Incidence and mortality colorectal cancer in the Netherlands*** (source: NCR (incidence) and mortality (CBS))

	2019	2020	2021	2022	2023**
Incidence colorectal cancer per 100,000 individuals (RESR)					
≥55 years	205.92	176.89	198.05	178.45	179.32
All ages	73.37	63.97	71.17	64.48	65.14
Mortality colorectal cancer per 100,000 women (RESR)					
≥55 years	80.81	74.81	72.06	70.73	-
All ages	27.56	25.72	24.90	24.32	-
Colorectal cancer mortality relative to 2013*** (RESR)					
≥55 years	-16.8%	-22.9%	-25.8%	-27.2%	-
All ages	-16.0%	-21.6%	-24.1%	-25.9%	-

* For incidence, results are shown for colon and rectal cancer. For mortality, results also include data from appendix cancer as data were not available in more detail.

** Data for 2023 are preliminary (incidence) or not yet available (mortality).

*** Year prior to the nationwide implementation of the colorectal cancer screening programme in 2014.

• Out of every 100,000 individuals aged 55 years and older, 181.50 individuals were diagnosed with colorectal cancer in 2023 (Table 10). The sharp decline in incidence observed in recent years appears to have flattened.

• The colorectal cancer mortality rate for individuals aged 55 years and older decreased from 97.09 per 100,000 persons in 2013 to 70.73 per 100,000 persons in 2022 (Figure 6). This is a relative decrease of 27.2%.



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Context

[Context 1](#) and [2](#) are presented elsewhere in the document.

Context 3: **Data and monitoring**

The National Institute for Public Health and the Environment (RIVM) is responsible for the coordination of the national cancer screening programmes in the Netherlands on behalf of the Ministry of Health, Welfare and Sport. Monitoring of the screening programmes is carried out by the Erasmus University Medical Centre (Erasmus MC). The aim of this monitoring is to provide an overview of the screening programmes and identify important trends. This monitor shows results of individuals invited to participate in the screening programme for colorectal cancer in 2023. In addition, results from previous years are also shown.

Most of the data shown in this monitor are derived from Bevolkingsonderzoek Nederland (BVO NL) and the Pathological-anatomical national automated archive (Palga) and have a reference date of 2 July 2023 (outcomes of colonoscopy, detection rates and positive predictive values from 2019 to 2022) or 30 June 2024 (other results). Information regarding complications of colonoscopies is additionally obtained from the Dutch Registration of Complications in Endoscopy (DRCE) and has a reference date of 30 June 2024. Finally, information regarding incidence and mortality is derived from the Netherlands Cancer Registry (NCR) and Statistics Netherlands (CBS) respectively and are measured on 15 February 2024 and 18 January 2023.

Because results from past years have been recalculated based on the most recent data, results may differ from previous publications.

Changes in calculations

Compared to the 2022 monitor, there have been a number of changes in the calculation of indicators. Numbers from previous years have been recalculated according to these new calculations and may therefore differ from previously published results. The change in the calculation of the participation rate and classification of colonoscopy findings are described in [context 1](#) en [2](#).



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Glossary

Advanced adenomas (AAD): advanced polyps, a precursor of colorectal cancer.

BVO NL: Bevolkingsonderzoek Nederland; Dutch screening organisation.

CBS: Statistics Netherlands.

Colonoscopy: endoscopic examination of the colon and rectum.

CT colonography: CT scan of the colon.

Colorectal cancer (CRC): cancer in the colon and/or rectum.

Detection rate: proportion of participants diagnosed with colorectal cancer and/or an advanced adenoma.

DRCE: Dutch Registration of Complications in Endoscopy

FIT: Faecal Immunochemical Test; also called stool test.

Interval cancers: colorectal cancers detected in the period between a favourable stool test result and the invitation to the next screening round.

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

NCR: Netherlands Cancer Registry.

Non-participants: proportion of invited individuals who actively opted out of participation.

Non-respondents: proportion of invited individuals who did not participate without actively opting out.

Palga: Pathological-anatomical national automated archive.

Participation rate colonoscopy: proportion of individuals with an unfavourable stool test who underwent a colonoscopy.

Participation rate stool test: proportion of individuals who participated in the screening programme via a stool test in response to an invitation in the reporting year relative to all individuals invited or not invited due to a definitive opt-out in a previous round.

Positive predictive value: proportion of participants diagnosed with colorectal cancer and/or an advanced adenoma of the total number of participants with an unfavourable stool test result who underwent a colonoscopy.

Referral rate: proportion of participants with an unfavourable stool test result of the total number of screened participants.

Re-participation rate: percentage of invitees who participated in the previous invitation round and participated again in the current invitation round (in the reporting year).

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

RIVM: National Institute of Public Health and the Environment

Sensitivity: proportion of colorectal cancers detected within the screening programme of all colorectal cancers detected in participants (interval cancers and screen-detected cancers).

Specificity: proportion of participants who were rightly not referred (rightly favourable stool test result) of all participants without a colorectal cancer diagnosis before the invitation for the next screening round.

Switch non-participation to participation: proportion of invitees who did not participate in the previous invitation round but did participate in the current invitation round (in the reporting year).

Target population invitation: total number of individuals who should receive an invitation to the screening programme in the reporting year according to program guidelines and who did not definitively opt out.

VWS: ministry of health, welfare and sports.

