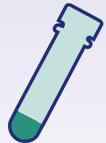


# Monitor Dutch colorectal cancer screening programme 2022

Edition October 2023



## Key findings 2022



A total of **2,102,881** individuals were invited, of whom **68.4%** participated by stool test.



Of all participants, **4.7%** were referred for colonoscopy intake due to an unfavourable stool test result.



Of those referred, **83.7%** actually underwent a colonoscopy.



In **16,616** participants either colorectal cancer or an advanced adenoma was found. The detection rate was **1.16%**.

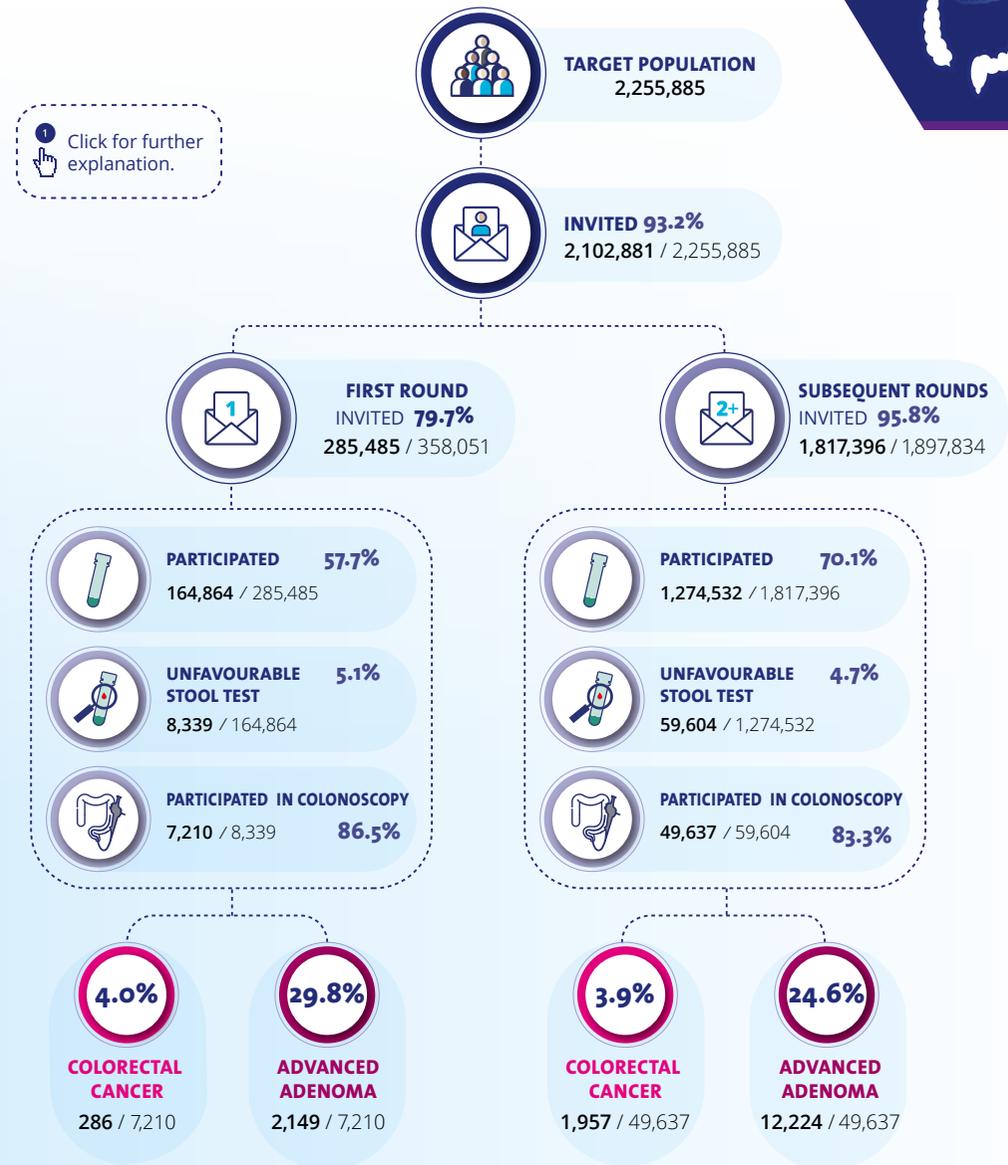


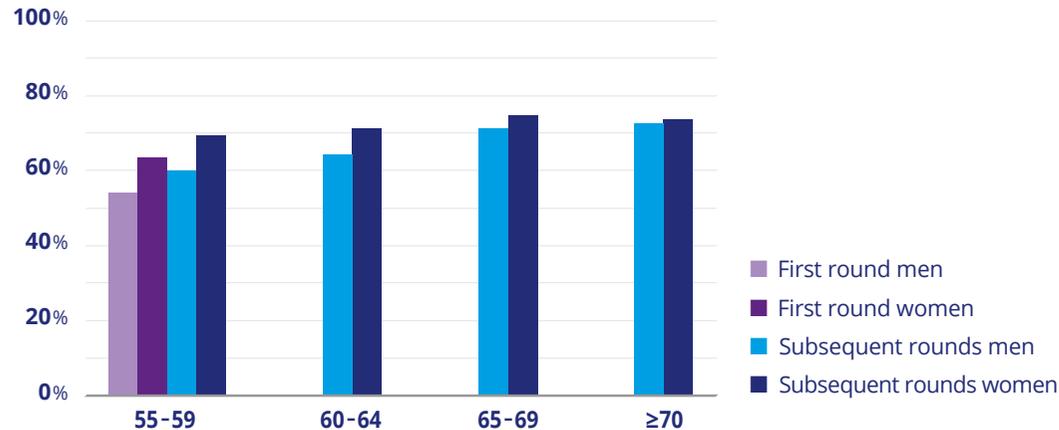
Figure 1 / Flowchart colorectal cancer screening programme process 2022 (Source: BVO NL and Palga)

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# 1 / Participation and referrals

Figure 2 / **Participation rate stool test 2022** by invitation round, sex and age  
(source: BVO NL)



## 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.

- In 2022, 2,102,881 individuals of the target population were invited to participate in the colorectal cancer screening programme. This resulted in an invitation coverage rate of 93.2%.
- Of the 2,102,881 individuals invited with a stool test, 1,439,396 individuals (68.4%) participated. A total of 40,916 individuals (1.9%) actively opted out (non-participants). The remaining 622,569 individuals (29.6%) did not respond to the invitation (non-responders).
- The participation rate was lower for the first round (57.7%) than subsequent rounds (70.1%).
- The participation rate was higher among women (71.4%) than men (65.4%).
- Of all invited individuals who participated in the previous screening round, 1,198,849 (91.4%) participated again in 2022. This so-called re-participation rate was high and in line with previous years. The re-participation rate was similar for men (91.2%) and women (91.5%).



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Figure 3 / Referral rate in 2022 by invitation round, sex and age (source: BVO NL)

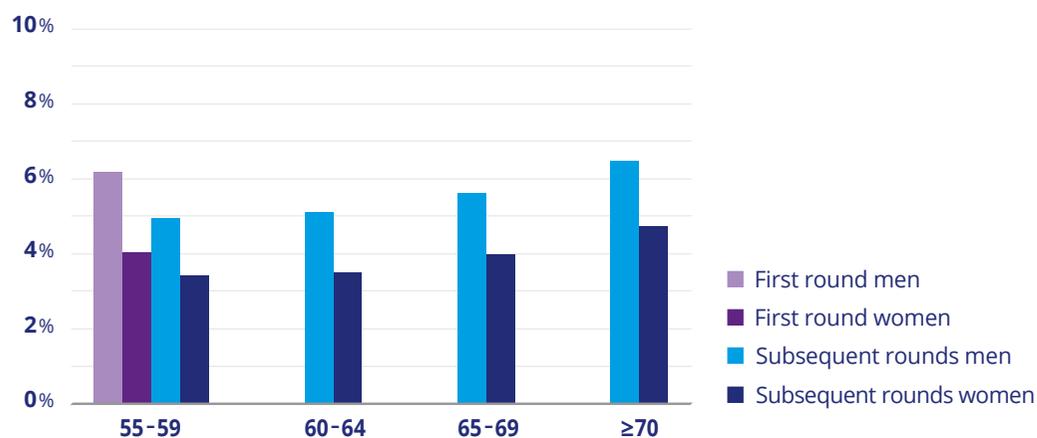
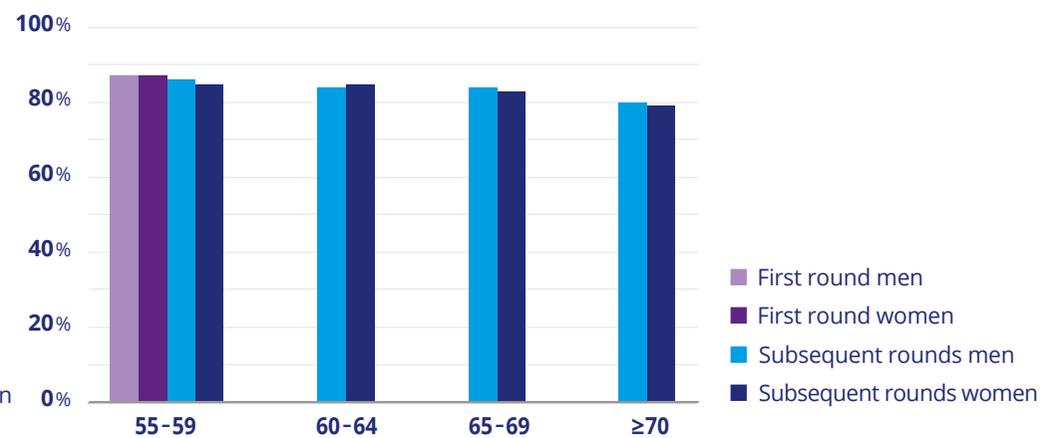


Figure 4 / Participation rate colonoscopy in 2022 by invitation round, sex and age (source: BVO NL)



- In 2022, 67,943 individuals received an unfavourable stool test result and were therefore referred for a colonoscopy intake. This resulted in a referral rate of 4.7%.
- Men were more likely to receive an unfavourable stool test result (5.7%) than women (3.9%).
- Men invited for the first round and men aged ≥70 (who were invited for a subsequent round) were most frequently referred. The referral rate was 6.3% and 6.4% for these groups, respectively.
- Of all those invited for a colonoscopy intake, 1,259 participants (1.9%) did not show up to the appointment.

- During the intake, 55,179 individuals (93.1%) were advised to undergo colonoscopy. 888 individuals (1.5%) were advised to undergo CT colonography. The remaining individuals (5.4%) were advised to undergo neither colonoscopy nor CT colonography.
- Of all individuals who were advised to undergo a colonoscopy, 53,297 individuals (96.6%) actually underwent a colonoscopy. Another 3,550 people also underwent a colonoscopy, but their intake conclusion was not available.
- The waiting time between an unfavourable test result and the intake for colonoscopy was 9.6 days on average. For 91.1% of individuals, the colonoscopy intake was scheduled within the set standard of 15 working days after the unfavourable stool test.

- Of the 67,943 individuals with unfavourable stool test results, 56,847 individuals underwent colonoscopy. The participation rate for colonoscopy was thus 83.7%.
- The participation rate for colonoscopy was higher in the first round (86.5%) than in the subsequent rounds (83.3%). This is most likely due to the lower age of individuals participating in the first round.
- The average travel distance to the colonoscopy was 13.3 km. In 99.0% of those with an unfavourable stool test, the travel distance was within 40 km.

- The waiting time between the intake appointment and the colonoscopy was 11.2 days on average. In 76.5% of individuals, the colonoscopy was scheduled within 15 working days of the intake appointment.



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## 2 / Outcomes

Figure 5 / Colonoscopy yield of individuals with an unfavourable stool test in 2022 by invitation round, sex and age (source: BVO NL)

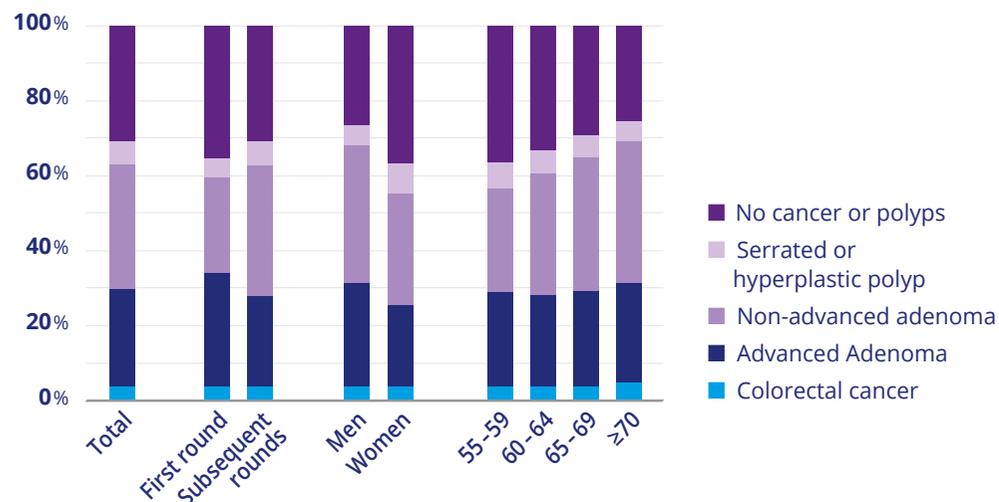


Table 1 / Detection rate of colorectal cancer (CRC) and advanced adenomas (AA) in 2022 by invitation round, sex and age (source: BVO NL)

|                      | CRC          | Detection rate | AA            | Detection rate |
|----------------------|--------------|----------------|---------------|----------------|
| <b>Total</b>         | <b>2,243</b> | <b>0.16%</b>   | <b>14,373</b> | <b>1.00%</b>   |
| First round          | 286          | 0.17%          | 2,149         | 1.30%          |
| Subsequent round     | 1,957        | 0.15%          | 12,224        | 0.96%          |
| <b>Men</b>           | <b>1,233</b> | <b>0.18%</b>   | <b>8,804</b>  | <b>1.30%</b>   |
| <b>Women</b>         | <b>1,010</b> | <b>0.13%</b>   | <b>5,569</b>  | <b>0.73%</b>   |
| <b>55 - 59 years</b> | <b>472</b>   | <b>0.12%</b>   | <b>3,874</b>  | <b>1.01%</b>   |
| <b>60 - 64 years</b> | <b>402</b>   | <b>0.11%</b>   | <b>3,226</b>  | <b>0.88%</b>   |
| <b>65 - 69 years</b> | <b>689</b>   | <b>0.17%</b>   | <b>4,151</b>  | <b>1.01%</b>   |
| <b>≥70 years</b>     | <b>680</b>   | <b>0.24%</b>   | <b>3,122</b>  | <b>1.12%</b>   |

- A total of 2,243 colorectal cancers (3.9%) and 14,373 advanced adenomas (25.3%) were found during the colonoscopy.
- In a total of 29.2% of individuals with an unfavourable stool test, a relevant finding was present during the colonoscopy. This is referred to as the positive predictive value.
- The positive predictive value for colorectal cancer was similar for men (3.9%) and women (4.1%).

- For advanced adenomas, the positive predictive value was higher for men (27.5%) than for women (22.4%).
- The positive predictive value for colorectal cancer and advanced adenomas was higher for the first round (33.8%) than for subsequent rounds (28.6%). Because a number of colorectal cancers and advanced adenomas are already detected in the first screening round, the risk of detecting colorectal cancers or advanced adenomas is lower when participating in subsequent rounds.

- Of all participants, 0.16% were diagnosed with colorectal cancer and 1.00% with an advanced adenoma. The detection rate for colorectal cancer and advanced adenomas was thus 1.16%.
- The detection rate for colorectal cancer was higher for men (0.18%) than for women (0.13%).

- The detection rate for advanced adenomas was also higher for men (1.30%) than for women (0.73%).
- The detection rate for colorectal cancer and advanced adenomas was higher for the first screening round (1.47%) than subsequent screening rounds (1.11%).



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Table 2 / **Complications within 30 days of colonoscopy in 2022** (source: DRCE) <sup>1</sup>

|              | Mild         |              | Moderate    |              | Severe      |              | Fatal      |              |
|--------------|--------------|--------------|-------------|--------------|-------------|--------------|------------|--------------|
| Perforation  | 10 ▶         | 0.02%        | 2 ▶         | 0.00%        | 9 ▶         | 0.02%        | 1 ▶        | 0.00%        |
| Bleeding     | 83 ▶         | 0.14%        | 74 ▶        | 0.12%        | 3 ▶         | 0.01%        | 0 ▶        | 0.00%        |
| Other        | 17 ▶         | 0.03%        | 3 ▶         | 0.01%        | 2 ▶         | 0.00%        | 0 ▶        | 0.00%        |
| Unknown      | 5 ▶          | 0.01%        | 3 ▶         | 0.01%        | 1 ▶         | 0.00%        | 2 ▶        | 0.00%        |
| <b>Total</b> | <b>115 ▶</b> | <b>0.19%</b> | <b>82 ▶</b> | <b>0.14%</b> | <b>15 ▶</b> | <b>0.03%</b> | <b>3 ▶</b> | <b>0.01%</b> |

- In 2022, a total of 59,681 colonoscopies were performed within the colorectal cancer screening programme. A complication was registered in 215 colonoscopies (0.4%).
- There were 3 fatal (0.01%) and 15 severe (0.03%) complications.
- The most common complication was a bleeding, which occurred in 160 colonoscopies (0.27%).

Table 3 / **Interval cancers after favourable stool test** by year (source: BVO NL en NKR)

|  | 2016  | 2017  | 2018  | 2019  |
|--|-------|-------|-------|-------|
| Number of interval cancers after favourable stool test     | 1,010 | 1,347 | 1,428 | 1,273 |
| Percentage of interval cancers after favourable stool test | 0.10% | 0.10% | 0.10% | 0.09% |
| Sensitivity  | 81.4% | 78.3% | 75.1% | 73.4% |
| Specificity  | 94.8% | 95.3% | 95.8% | 95.9% |

- Of all individuals with a favourable stool test in 2019, 0.09% were diagnosed with a colorectal cancer before they were invited for the next screening round (interval cancer).
- Sensitivity of the colorectal cancer screening decreased in recent years, while specificity remained stable.



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## 3 / Trends over time

Table 4 / Key indicators of the colorectal cancer screening programme by year and invitation round (source: BVO NL and Palga)

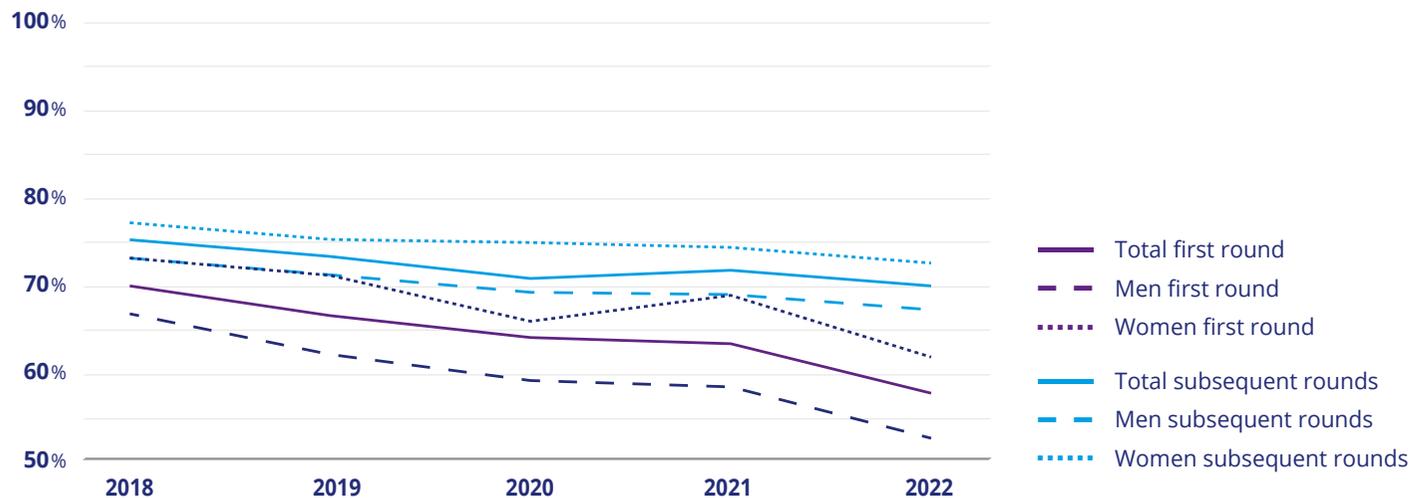
|   |                   | 2018      | 2019      | 2020      | 2021      | 2022      |
|---|-------------------|-----------|-----------|-----------|-----------|-----------|
| Target population   | First round       | 975,190   | 532,216   | 270,688   | 397,037   | 358,051   |
|   | Subsequent rounds | 1,236,887 | 1,695,161 | 1,928,215 | 2,157,549 | 1,897,834 |
| Invited   | First round       | 962,917   | 524,084   | 134,022   | 307,472   | 285,485   |
|   | Subsequent rounds | 1,222,240 | 1,668,729 | 1,726,093 | 2,004,143 | 1,817,396 |
| Invitation coverage rate  | First round       | 98.7%     | 98.5%     | 49.5%     | 77.4%     | 79.7%     |
|   | Subsequent rounds | 98.8%     | 98.4%     | 89.5%     | 92.9%     | 95.8%     |
| Participation rate stool test                                     | First round       | 70.1%     | 66.8%     | 64.3%     | 63.7%     | 57.7%     |
|   | Subsequent rounds | 75.3%     | 73.4%     | 72.6%     | 72.0%     | 70.1%     |
| Referral rate   | First round       | 4.9%      | 4.2%      | 4.3%      | 4.8%      | 5.1%      |
|   | Subsequent rounds | 4.2%      | 4.3%      | 4.3%      | 4.5%      | 4.7%      |
| Participation rate colonoscopy                                    | First round       | 83.8%     | 89.1%     | 89.5%     | 88.0%     | 86.5%     |
|   | Subsequent rounds | 83.0%     | 85.3%     | 85.3%     | 84.8%     | 83.3%     |
| Detection rate colorectal cancer                                  | First round       | 0.29%     | 0.18%     | 0.20%     | 0.18%     | 0.17%     |
|   | Subsequent rounds | 0.20%     | 0.21%     | 0.18%     | 0.17%     | 0.15%     |
| Detection rate colorectal cancer and advanced adenomas            | First round       | 1.91%     | 1.49%     | 1.24%     | 1.27%     | 1.47%     |
|   | Subsequent rounds | 1.31%     | 1.33%     | 1.23%     | 1.02%     | 1.11%     |
| Positive predictive value colorectal cancer                       | First round       | 7.0%      | 4.8%      | 5.2%      | 4.3%      | 4.0%      |
|   | Subsequent rounds | 5.9%      | 5.6%      | 4.9%      | 4.5%      | 3.9%      |
| Positive predictive value colorectal cancer and advanced adenomas | First round       | 46.3%     | 40.2%     | 37.3%     | 34.5%     | 33.8%     |
|   | Subsequent rounds | 37.9%     | 35.8%     | 33.9%     | 31.1%     | 28.5%     |



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Figure 6 / **Participation rate stool test from 2018 to 2022** by year, invitation round and sex (source: BVO NL)



- The most striking change over time is the decline in the participation rates, as shown in figure 6.
- The decline in participation is particularly observed among those invited for the first time. In recent years, the participation rate for the first round decreased from 66.8% (2019) to 57.7% (2022). This is an absolute decline of 9.1% (table 4).
- The participation rate in the first round dropped the most between 2021 and 2022: for men from 58.8% to 53.2% and for women from 68.6% to 62.2%.

- The participation rate in subsequent rounds dropped less, but still decreased from 75.3% in 2018 to 70.1% in 2022.
- Compared to 2021, there was a slight increase in referral rates. The referral rate increased from 4.8% to 5.1% in the first round and from 4.5% to 4.7% in subsequent rounds.
- Between 2021 and 2022, a slight decrease in the participation rate for colonoscopy was observed. This decrease was seen in both the first round (88.0% vs 86.5%) and subsequent rounds (84.8% vs 83.3%).

- The detection rate for colorectal cancer decreased slightly in both the first and subsequent rounds. The detection rate for advanced adenomas was slightly higher in 2022 than in previous years. Between 2021 and 2022, the combined detection rate for colorectal cancer and advanced adenomas decreased from 1.27% to 1.48% in the first round and from 1.02% to 1.11% in subsequent rounds.
- The positive predictive values for colorectal cancer and advanced adenomas decreased slightly compared to previous years.



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## 4 / Incidence and mortality

Figure 7 / **Incidence and mortality of colorectal cancer in the Netherlands** by year (source: NCR (incidence rates) and CBS (mortality rates))

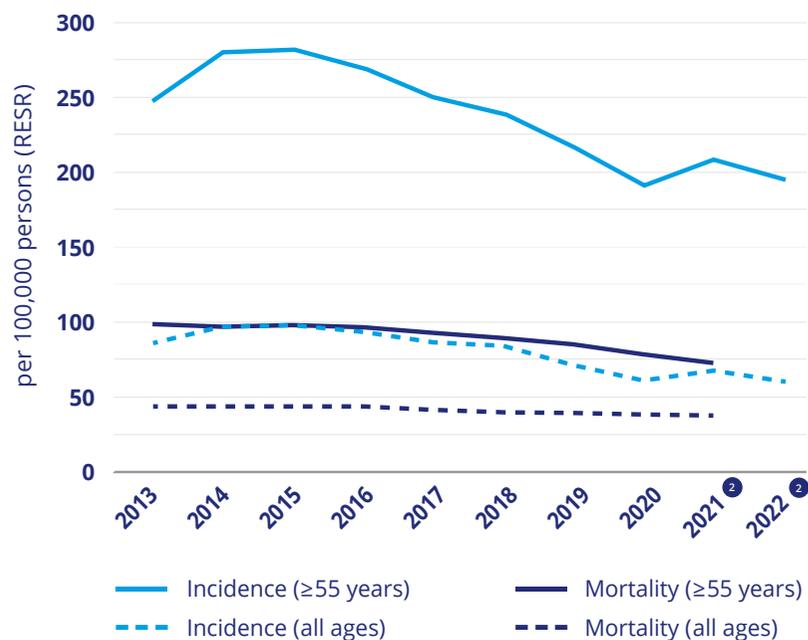


Table 5 / **Incidence and mortality of colorectal cancer in the Netherlands**, by year (source: NCR (incidence rates) and CBS (mortality rates))

|   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019  | 2020   | 2021   | 2022   |
|---|--------|--------|--------|--------|--------|--------|-------|--------|--------|--------|
| <b>Incidence rates colorectal cancer / 100,000 individuals (RESR)</b> |        |        |        |        |        |        |       |        |        |        |
| ≥55 years   | 242.82 | 280.86 | 282.82 | 267.75 | 245.87 | 232.33 | 205.9 | 176.73 | 196.67 | 181.36 |
| All ages  | 85.04  | 97.24  | 97.72  | 93.11  | 85.87  | 81.96  | 73.36 | 63.93  | 70.69  | 65.38  |
| <b>Mortality rates colorectal cancer / 100,000 individuals (RESR)</b> |        |        |        |        |        |        |       |        |        |        |
| ≥55 years   | 98.96  | 96.19  | 97.39  | 95.22  | 91.16  | 87.97  | 83.17 | 77.31  | 74.54  | -      |
| All ages  | 33.48  | 32.44  | 33.09  | 32.51  | 31.15  | 30.14  | 28.39 | 26.61  | 25.75  | -      |

- In 2022, the colorectal cancer incidence for individuals aged 55 years and older was lower than in previous years.

- The mortality rate for individuals aged 55 and older decreased as well. Compared to 2013, the mortality rate was 24.7% lower in 2021.

- In recent years, there has thus been a downward trend in both incidence and mortality rates.



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## Context: 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 presents results of individuals invited to participate in the screening programme for colorectal cancer in 2022.

The data presented in this monitor are derived from Bevolkingsonderzoek Nederland (BVO NL) and the Pathological-Anatomical National Automated Archive (Palga). These data were retrieved on 2 July 2023. Information regarding

complications of colonoscopy originates from the Dutch Registration of Complications in Endoscopy (DRCE) and information regarding incidence and mortality originates from the Dutch Cancer Registry (NCR) and Statistics Netherlands (CBS), respectively.

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

## Glossary

**Advanced adenomas (AA):** 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.

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

**Invitation coverage rate:** proportion of the target population that received an invitation.

**CT colonography:** Computerized Tomography (CT) scan of the colon.

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

**DRCE:** Dutch Registration of Complications in Endoscopy.

**First round:** invitation round of participants invited for the first time to participate in the screening programme.

**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.

**NCR:** Netherlands Cancer Registry.

**Palga:** Pathological-Anatomical National Automated Archive.

**Participation rate stool test:** proportion of individuals who participated in the screening programme by submitting a stool test in response to an invitation in the reporting year.

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

**Non-participants:** proportion of those invited who actively opted out.

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

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

**Re-participation rate:** proportion of invited participants who participated both in the previous and current screening rounds.

**RESR:** Revised European Standardised Rate; revised measure used to present incidence and mortality rates, standardized for the European standard population based on data on the European population in 2010.

**Sensitivity:** proportion of colorectal cancers detected in 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.

**Subsequent round:** invitation round of a participant who has been invited to participate in the screening programme at least once before.

**Target population:** individuals eligible to participate in the screening programme based on the biennial invitation interval.

**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 undergoing a colonoscopy.

