national monitoring of the **colorectal cancer** screening programme in the Netherlands **2021**

	2019 total	2020 total	2021 total		
target population	2,226,513	2,198,311	2,553,371	1,253,999	1,299,372
invited	2,192,881	1,860,135	2,312,606	1,134,791	1,177,815
participated	1,574,506	1,338,052	1,632,493	767,521	864,972
participation rate	71.8%	71.9%	70.6%	67.6%	73.4%
referral rate	4.3%	4.3%	4.6%	5.4%	3.8%
colonoscopy participation	86.1%	85.5%	84.1%	84.3%	83.7%
positive predictive value CRC and/or AAD	36.8%	34.1%	31.5%	33.8%	28.5%
detection rate CRC and/or AAD	1.4%	1.2%	1.2%	1.5%	0.9%

CRC = colorectal cancer, AAD = advanced adenomas

most important results 2021

In 2021 extra invitations were sent to eliminate the backlog that existed after the Dutch screening programme for colorectal cancer was halted in 2020 due to the COVID-19 pandemic. In total more than **2.3 million** individuals received an invitation for the colorectal cancer screening program and more than **1.6 million** individuals participated. The participation rate in 2021 was **70.6%**.

Of these 1.6 million participants **4.6%** had an unfavourable FIT result. This corresponds to more than **74,309** participants who were referred for a colonoscopy. **84.1%** of these referred participants underwent a colonoscopy.

2,790 colorectal cancers and **16,878** advanced adenomas were detected, which is **31,5%** of all participants who underwent a colonoscopy after an unfavourable FIT result. Of all participants who underwent a FIT, **1.2%** had colorectal cancer or an advanced adenoma.

The incidence of colorectal cancer increased in 2021 compared to 2020 but decreased compared to 2019. Colorectal cancer mortality further decreased.

IKNL Netherlands comprehensive cancer organisation

edition: September 2022

introduction

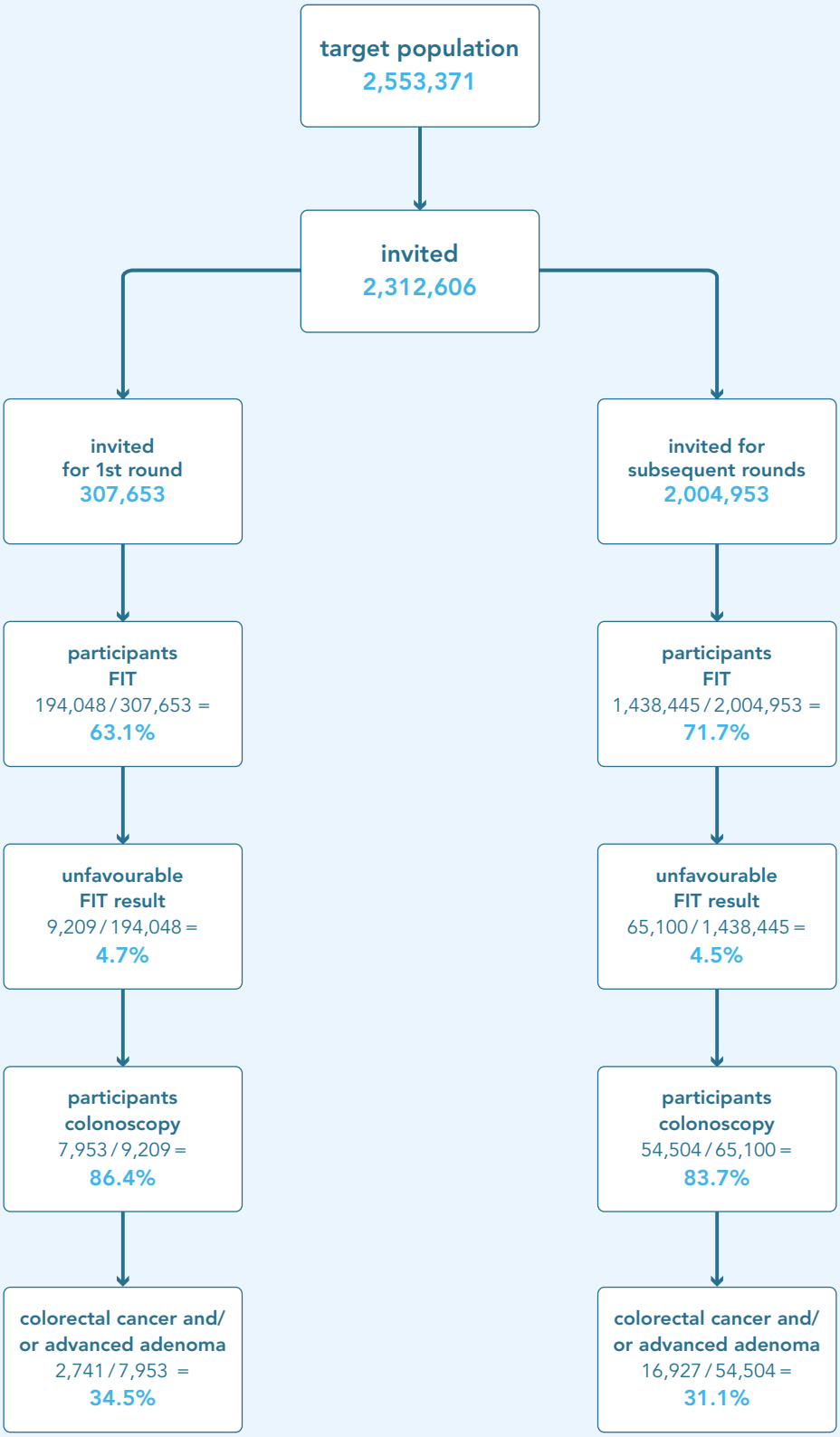
The Dutch colorectal cancer screening programme can prevent colorectal cancer by detecting and removing advanced adenomas (large polyps). In addition, colorectal cancer might be detected at an early stage, before any symptoms, resulting in a better prognosis.

The colorectal cancer screening programme is coordinated by the National Institute for Public Health and the Environment (RIVM).
The RIVM commissioned the Netherlands Comprehensive Cancer Organisation (IKNL) to carry out annual national monitoring of the colorectal cancer screening programme. Monitoring ensures the quality of the colorectal cancer screening programme and identifies important trends. Monitoring is conducted using data from ScreenIT, the national information system for the colorectal cancer screening programme. All data that that were in ScreenIT by the end of June 2022 are included in this monitor. Additionally, complications of the colonoscopy are gathered from the Dutch Registration of Complications in Endoscopy (DRCE), information on colorectal cancer mortality from Statistics Netherlands (CBS) and information on the incidence of colorectal cancer from the Netherlands Cancer Registry (NCR). The current monitoring report presents the results of all individuals who were invited for the nationwide colorectal screening programme in 2021.
After February 2022 the continuous linking with PALGA (Pathological Anatomical National Automated Archive) with ScreenIT was temporarily stopped. The impact on the indicators, however, seems to be limited.

terminology

• **advanced adenomas (AAD)** = large polyps • **colonoscopy** = endoscopic examination of the large bowel • **CRC** = colorectal cancer • **detection rate** = proportion of participants in whom colorectal cancer and/or advanced adenoma is detected of all participants • **interval cancers** = colorectal cancer diagnosed after a favourable FIT result before the invitation to the next screening round • **non-participants** = invited individuals who actively opt out of screening • **non-responders** = invited individuals who did not respond • **participation rate** = proportion of individuals that participated in the colorectal cancer screening programme after receiving an invitation in the reporting year • **positive predictive value (PPV)** = proportion of participants with colorectal cancer and/or advanced adenomas of the total number of participants who underwent a colonoscopy • **re-attendance** = proportion of participants in the current screening round of those who also participated in the previous round • **referral rate** = proportion of participants with an unfavourable FIT result of the total number of participants • **sensitivity** = proportion of participants with a screen-detected colorectal cancer of all participants detected with colorectal cancer (screen-detected cancers and interval cancers) • **specificity** = proportion of participants with a true favourable FIT result of all participants in whom no colorectal cancer is detected before the next screening round (true favourable and false unfavourable results)

flowchart
total screening process in 2021



In the first round colorectal cancer or advanced adenomas were detected in 2,741 participants that after an unfavorable FIT underwent a colonoscopy. This relates to a positive predictive value of 34.5%. In subsequent rounds colorectal cancer or advanced adenomas were detected in 16,927 participants. This relates to a positive predictive value of 31.1%.

figure 1a **participation rate FIT men**

by year and age group

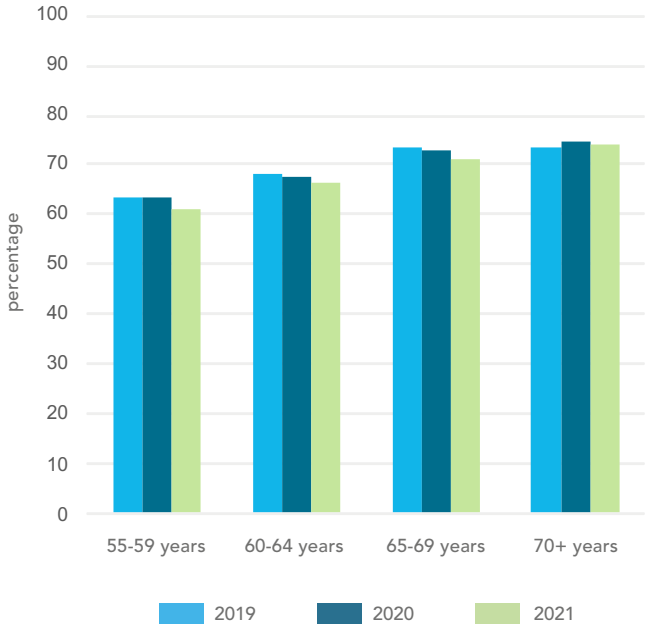
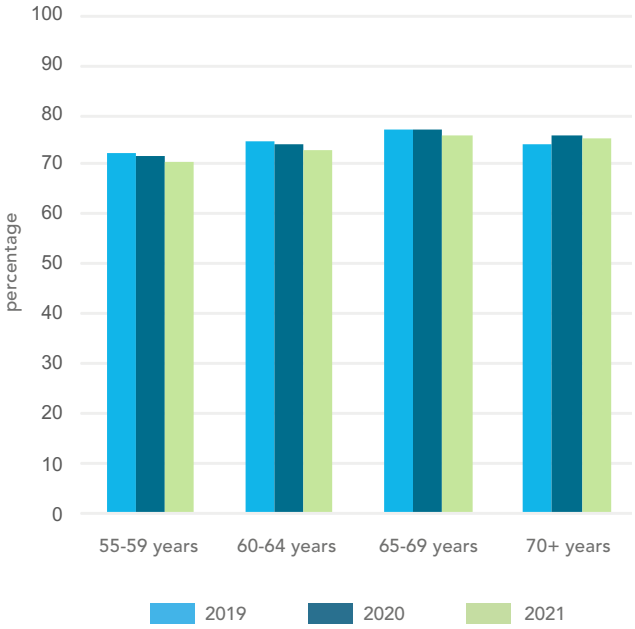


figure 1b **participation rate FIT women** by year and age group



- In 2021 1,632,493 (70.6%) individuals participated in the colorectal cancer screening programme. The participation rate was higher among women compared to men, 73.4% and 67.6% respectively.
- Participation rates were highest in men in the age group 70+ years (74.0% in 2021) and in women in the age group 65 – 69 years (74.0% in 2021). The biggest difference in participation rate between men and women was in the age group 55 - 59 years.
- In both men and women participation rate decreased slightly in almost all age groups in 2021 compared to 2019 and 2020.
- Participation rate was in the first round as the subsequent rounds lower in men than in women. In men the participation rate in the first round was 58.2% and 69.1% in the subsequent rounds. In women these percentages were 68.0% and 74.2 respectively.
- Of all individuals who participated in previous screening rounds, 1,339,056 individuals participated again in a subsequent round in 2021. The re-attendance rate was 92.5%.

figure 2a **referral rate men**

by year and age group

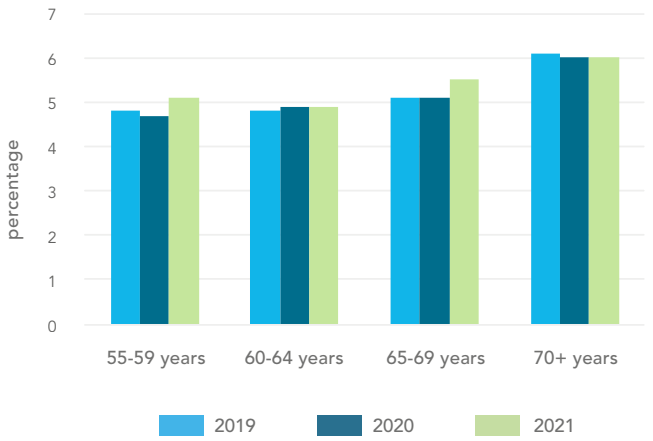
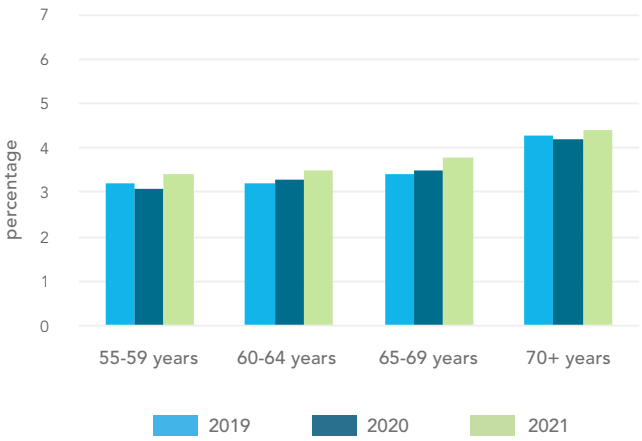


figure 2b **referral rate women**

by year and age group



- In total 74,309 participants (41,470 men and 32,839 women) were referred for colonoscopy after and unfavourable FIT. The referral rate was 4.6%. The referral rate increased with increasing age.
- The referral rate increased in both in men and women in 2021 compared to previous years. In the first round the referral rate increased in men from 5.1% in 2019 to 5.8% in 2021, and in women from 3.4% to 3.9%. The referral rate increased in the subsequent rounds in men from 5.2% in 2019 to 5.4% in 2021 and in women from 3.6% to 3.8%.

figure 3a **colonoscopy participation men** by year and age group

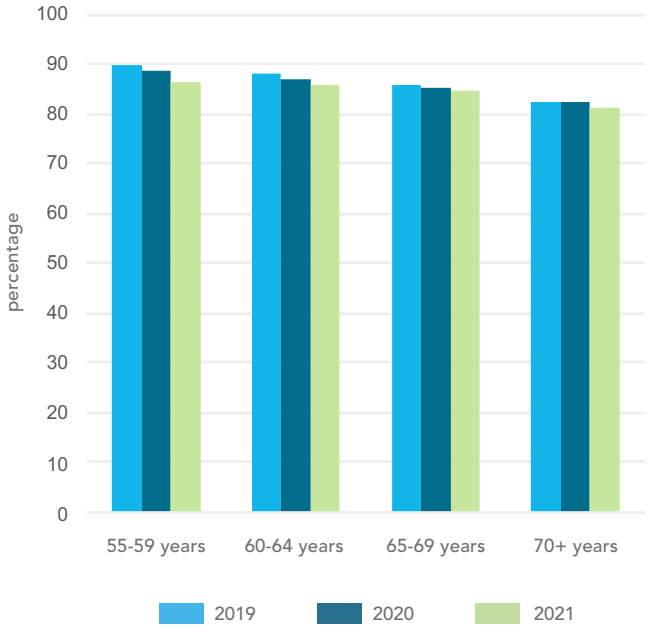
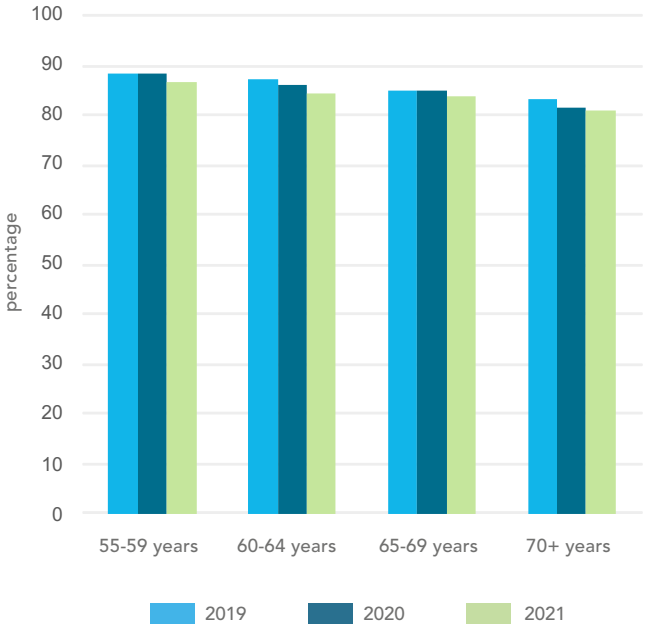


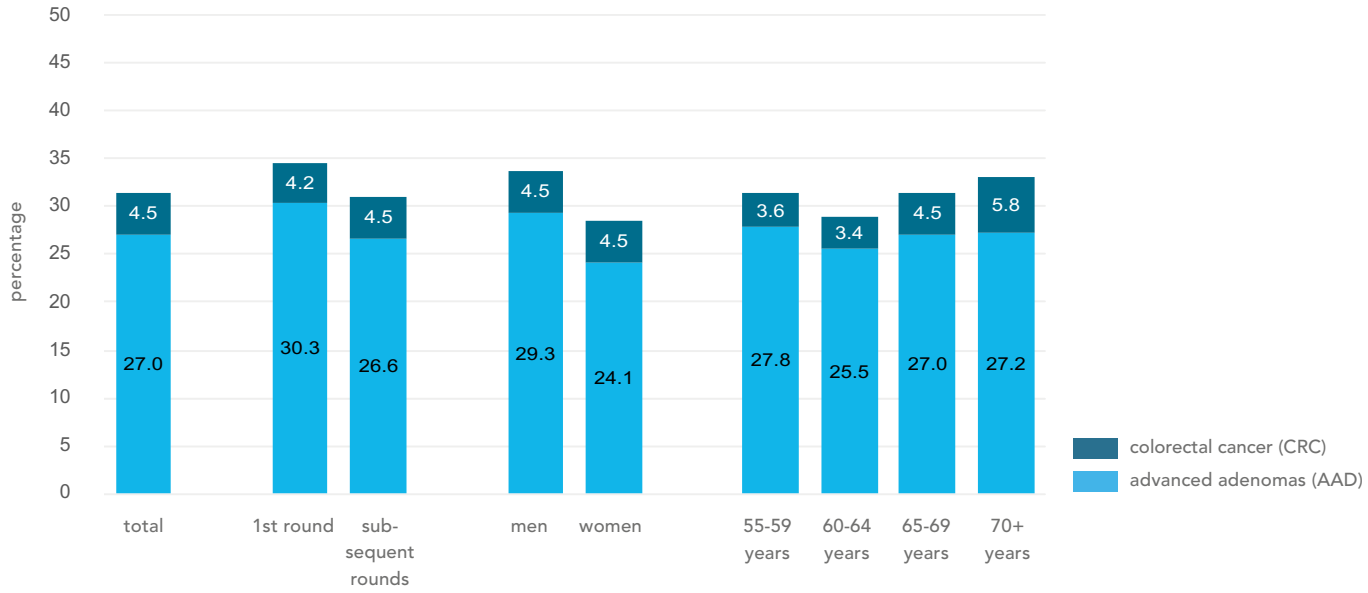
figure 3b **colonoscopy participation women** by year and age group



- In total 63,547 (84.1%) participants with an unfavourable FIT result underwent a colonoscopy in 2021. Colonoscopy participation was comparable in men and women. In both men and women colonoscopy participation decreased with increasing age.
- Colonoscopy participation appears lower in 2021 compared to previous years. It cannot be ruled out that the temporary stop of the linking with PALGA plays a role.
- Of all participants that made a colonoscopy intake appointment, 1,278 (1.7%) participants did not attend the intake without notice of cancellation.
- 2,775 participants were advised during the colonoscopy intake to not undergo a colonoscopy (e.g. because of advanced age or comorbidity).
- Of all participants with an unfavourable FIT result who had an intake interview and received advice for a colonoscopy, the colonoscopy took place in 98.5%.

figure 4 **positive predictive value FIT**

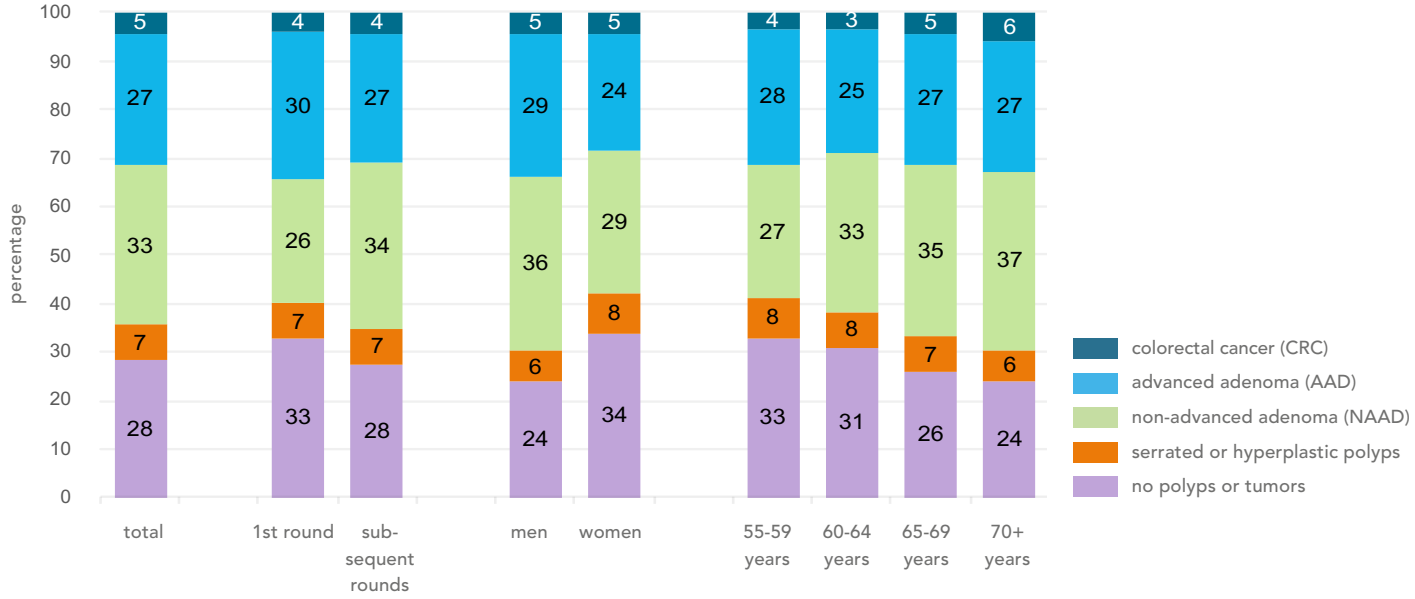
in 2021, by screening round, sex and age group



- In 2021 2,790 colorectal cancers and 16,878 advanced adenomas were detected in participants with an unfavourable FIT result who underwent a colonoscopy. The positive predictive value for colorectal cancer was 4.5% and for advanced adenomas 27.0%
- The positive predictive value for colorectal cancer was 4.5% for both men and women. The positive predictive value for advanced adenomas was higher in men (29.3%) than in women (24.1%).
- The positive predictive value for colorectal cancer was highest in the 70+ age group (5.8%). Positive predictive value was lower in the age group 60-64 years compared to the age group 55-59 years; this is due to the distribution among screening rounds. In older individuals more abnormalities are detected compared to younger individuals. Older individuals, however, are more present in subsequent rounds in which less abnormalities are detected because these abnormalities have been detected in a previous round.

figure 5 **colonoscopy findings**

in 2021, by screening round, sex and age group



- In 17,666 participants (28%) of all participants with an unfavourable FIT result that underwent a colonoscopy no polyps or tumours were detected. This percentage was higher in women compared to men (34% and 24% respectively) and decreased with higher age of the participants (age group 55-59 years 33% and age group 70+ years 24%).
- In 4,531 participants (7%) a serrated or hyperplastic polyp, and in 20,566 participants (33%) a non-advanced was detected.

table 1 **number of detected advanced adenomas and colorectal cancers**

in 2021

	advanced adenomas		colorectal cancer	
	number	detection rate	number	detection rate
total	**16,878**	**1.03%**	**2,790**	**0.17%**
1st round	2,407	1.24%	334	0.17%
subsequent rounds	14,471	1.01%	2,456	0.17%
men	10,264	1.34%	1,560	0.20%
women	6,614	0.76%	1,230	0.14%
55-59 years	5,213	1.00%	682	0.13%
60-64 years	2,715	0.90%	361	0.12%
65-69 years	3,645	1.05%	611	0.18%
70+ years	5,305	1.14%	1,136	0.24%

- In 19,668 individuals, of 1,632,493 individuals that participated in the colorectal screening programme in 2021, colorectal or advanced adenomas were detected. This corresponds to a detection rate of 1.2%.
- The detection rate for colorectal cancer is equal in the subsequent rounds compared to the first round, this is amongst other things due to the larger proportion older participants, in which colorectal cancer is more often detected, in the subsequent rounds.
- The detection rate was higher in men than in women, 1.5% and 0.9% respectively.

table 2 **complications within 30 days after colonoscopy**

in 2021, by type and severity of the complications (source: complication registration (DCRE)), reference date: 30 June 2022)

	mild		moderate		severe		fatal	
	number	percentage *	number	percentage *	number	percentage *	number	percentage *
perforation	11	0.017%	5	0.008%	9	0.014%	1	0.0015%
bleeding	123	0.187%	88	0.134%	7	0.011%	0	0.0000%
other	24	0.037%	9	0.014%	1	0.002%	1	0.0015%
unknown	12	0.018%	1	0.002%	4	0.006%	0	0.0000%
total	**170**	**0.259%**	**103**	**0.157%**	**21**	**0.032%**	**2**	**0.0030%**

* Percentages are based on the total number of performed colonoscopies in 2021. In total, 66,693 colonoscopies were performed. An individual may have undergone more than one colonoscopy.

- In total 289 (0.454%) complications within 30 days after colonoscopy were reported, of which 2 complications the severity was unknown (not included in table).
- Compared to previous years the complication percentage for severe and fatal complications after colonoscopy were similar (severe complications 0.033% in 2019 and 0.038% in 2020 and fatal complications 0.000% in 2019 and 0.002% in 2020).
- In 2021 2 fatal complications were reported after colonoscopy.

table 3 **indicators 2021 compared to previous years**

	2017	2018	2019	2020	2021
target population					
target population	2,042,349	2,211,011	2,226,513	2,198,311	2,553,371
number of invited individuals	1,939,825	2,185,988	2,192,881	1,860,135	2,312,606
coverage rate invitations	95.2%	98.9%	98.5%	84.6%	90.6%
response FIT					
non-participants	7.2%	5.5%	3.8%	2.9%	2.5%
non-respondents	19.8%	21.6%	24.4%	25.1%	26.9%
participation FIT					
participation rate total	73.0%	72.9%	71.8%	71.9%	70.6%
participation rate 1st round	70.6%	70.0%	66.8%	64.1%	63.1%
participation rate subsequent rounds	75.3%	75.3%	73.4%	72.5%	71.1%
participation rate after initial invitation	62.0%	60.7%	59.9%	60.7%	59.6%
participation rate after reminder	11.0%	12.3%	11.9%	11.2%	11.0%
re-attendance	93.3%	93.2%	92.1%	91.7%	92.5%
average age participants (in years)					
1st round	63.3	60.3	56.2	55.3	55.6
subsequent rounds	67.1	66.6	66.6	64.9	65.7
colonoscopy					
colonoscopy participation after unfavourable FIT result	84.2%	83.4%	86.1%	85.5%	84.1%
travel distance and time intervals					
travel distance to colonoscopy intake < 40 km	98.5%	98.1%	99.8%	99.5%	99.2%
waiting time colonoscopy intake < 15 working days	76.2%	73.6%	94.5%	86.3%	42.2%
waiting time colonoscopy (after intake) < 15 working days	83.2%	84.7%	80.1%	77.1%	71.5%

- The target population in 2021 comprised more than 2.5 million individuals. This number was higher than previous years because this includes individuals that should have been invited in 2020 but were not invited in 2020 due to the COVID-19 pandemic. The backlog of 2020 was caught up in 2021.
- In less than half of the participants the waiting time for the colonoscopy intake was less than 15 working days. Next to the high workload in healthcare due to the COVID-19 pandemic, this relates to the increase of the referral rate in the course of 2021. More intake capacity was needed than expected and waiting times increased.

table 4 **test characteristics compared to previous years**

by year and screening round

	2017	2018	2019	2020	2021
referral rate					
1st round	5.7%	4.9%	4.2%	4.3%	4.8%
subsequent rounds	4.6%	4.2%	4.4%	4.3%	4.5%
detection rate CRC					
1st round	0.39%	0.29%	0.18%	0.20%	0.17%
subsequent rounds	0.23%	0.20%	0.21%	0.18%	0.17%
detection rate CRC and AAD					
1st round	2.46%	1.91%	1.49%	1.44%	1.41%
subsequent rounds	1.56%	1.31%	1.33%	1.23%	1.18%
PPV CRC					
1st round	8.0%	7.0%	4.8%	5.1%	4.2%
subsequent rounds	6.6%	5.4%	5.6%	4.9%	4.5%
PPV CRC and AAD					
1st round	50.8%	46.3%	40.2%	37.3%	34.5%
subsequent rounds	41.2%	37.9%	35.8%	33.9%	31.1%

- The referral rate increased in 2021 in both the 1st round and in the subsequent rounds compared to previous years. No proper explanation can be indicated.
- The detection rate and the positive predictive value decreased over the years.

table 5 **interval cancers**

by year

	2015	2016	2017	2018
number of interval cancers after a favourable FIT result	867	1,008	1,347	1,428
percentage of interval cancers after after a favourable FIT result	0.11%	0.10%	0.10%	0.09%
sensitivity	83.6%	81.2%	78.1%	75.1%
specificity	94.2%	94.8%	95.3%	95.8%

- The proportion interval cancers in individuals with a favourable FIT result declined gradually over the years.
- The sensitivity decreased slightly and the specificity increased slightly over the years.

figure 6 **incidence and mortality**

by year (data source: Netherlands Cancer Registry (NCR) (incidence) and Statistics Netherlands (CBS) (mortality))

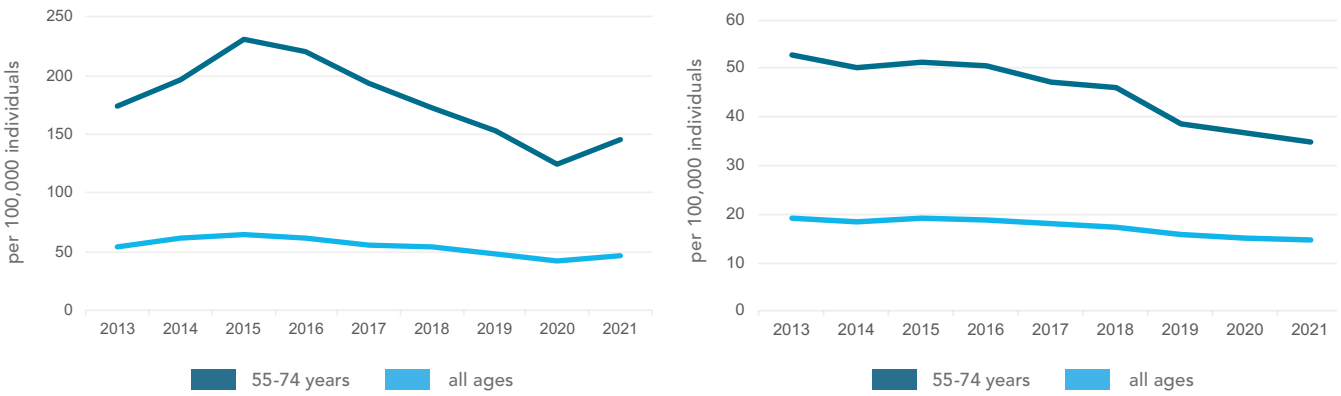


table 6 **incidence and mortality**

by year (data source: Netherlands Cancer Registry (NCR) (incidence) and Statistics Netherlands (CBS) (mortality))

	2013	2014	2015	2016	2017	2018	2019	2020	*2021*
incidence rate colorectal cancer /100,000 (ESR)									
55-74 years	174.4	196.9	231.2	220.3	193.3	172.4	153.2	124.8	*146.2*
all ages	54.8	62.0	64.5	61.6	56.4	54.0	48.4	42.0	*47.2*
mortality rate colorectal cancer /100,000 (ESR)									
55-74 years	52.9	50.2	51.2	50.5	47.1	45.9	38.7	36.9	*34.8*
all ages	19.3	18.6	19.1	18.8	17.9	17.5	16.0	15.2	*14.8*

ESR = European standardized rate, standardized for the European standard population.

The numbers of 2021 are preliminary and therefore italicized.

- The incidence of colorectal cancer in the Netherlands in 2021 was 47,2 per 100,000 individuals. In 2021 there were more colorectal cancer diagnoses compared to 2020 likely because of the delayed care due to the COVID-19 pandemic. The incidence, however, was still lower than before the start of the COVID-19 pandemic.
- The incidence of colorectal cancer in the Netherlands since 2018 is lower than the incidence before the introduction of the colorectal cancer screening programme in 2013. This trend is seen in the total population as well as in the group of individuals within the screening age (55-74 years).
- Colorectal cancer mortality decreased gradually over the years.

This monitor can be found at: www.iknl.nl/en/screening
and: www.rivm.nl/en/national-monitoring-of-colorectal-cancer-screening-programme

Disclaimer: the information in this monitor has been carefully compiled. The results of previous years have been updated with recent data. Therefore, these may differ from previously reported results.