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Cervical cancer in women in Norway – epidemiology and prevention

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Abstract

Introduction. In accordance with the guidelines of the World Health Organisation (WHO) as part of the Global Strategy to Accelerate the Elimination of Cervical Cancer, the Norwegian Institute of Public Health coordinates the implementation of primary and secondary prevention measures, aiming to achieve the near-total elimination of this cancer in the general female population in Norway within the next fifteen years.

The aim of this study is to present the current epidemiological situation of women with cervical cancer in Norway and the prevention of this cancer.

Materials and methods. The study involved a review and analysis of literature from the Cancer in Norway database from 2023 and 2024, as well as data published by: Folkehelseinstituttet - FHI (from 2020-2025), Årsrapport, Screeningaktivitet og resultater fra Livmorhalsprogrammet (from 2023 and 2024), Helsedirektoratet Livmorhalskreft – pakkeforløp (from 2022), Helsenorge –Livmorhalskreft (from 2025), Kreftregisteret (from 2022-2025).

Results. Every year, approximately 25,000 Norwegian women are diagnosed with human papillomavirus (HPV) infection, which, as a result of persistent infections, is responsible for the development of dysplastic changes and cervical cancer. In 2024, 269 new cases of cervical cancer were reported, most of them in the early stages of the disease, and the incidence rate was 9.4 per 100,000, showing a significant downward trend compared to previous years. The average age of women at diagnosis was 48, and the disease rarely affected women under the age of 25.

Conclusions. Norway's experience shows that comprehensive preventive measures significantly contribute to reducing morbidity and mortality from cervical cancer. This model confirms that consistent implementation of primary and secondary prevention strategies can lead to long-term improvements in women's health and serve as a model for other countries.

Keywords: cervical cancer, epidemiology, prevention, Norway

Introduction

In 2022, cervical cancer ranked ninth in terms of cancer incidence among women in Norway, with approximately 300 new cases diagnosed each year. The Norwegian Institute of Public Health - Folkehelseinstituttet (FHI) in Oslo, in accordance with the World Health Organisation (WHO) guidelines under the Global Strategy to Accelerate the Elimination of Cervical Cancer, coordinates the implementation of primary and secondary prevention, aiming to almost completely eliminate this cancer in the general female population within the next fifteen years. This strategy includes mass vaccination against HPV, regular participation of women in screening tests and rapid implementation of treatment for early stages of cervical cancer as part of the *„pakkeforløp"* programme.

The aim of this study is to present the current epidemiological situation of women with cervical cancer in Norway and the prevention of this cancer.

Materials and methods

The study involved a review and analysis of literature from the Norwegian online database Cancer in Norway from 2023 and 2024, as well as data published by: Folkehelseinstituttet - FHI (from 2020-2025), Årsrapport, Screeningaktivitet og resultater fra Livmorhalsprogrammet (from 2023 and 2024), Helsedirektoratet Livmorhalskreft – pakkeforløp (from 2022), Helsenorge –Livmorhalskreft (from 2025), and Kreftregisteret (from 2022-2025).

Results

The incidence of cervical cancer in the general female population in Norway between 1975 and 2000 declined steadily, with a slight increase observed in the 35–49 age group since mid-2000. A similar situation occurred in the 25–34 age group in 2013. In subsequent years, cervical cancer incidence rates declined steadily. During the Covid-19 pandemic, i.e. from 2020 onwards, an increase in incidence was expected due to delays in diagnosis, but this hypothesis was not confirmed. Current epidemiological data from 2024 indicate that cervical cancer was

diagnosed in 269 women, which was the lowest number of reported cases in the Cancer Registry in the history of this cancer in Norway. The incidence rate per 100,000 inhabitants in 2024 was 9.4%, and the five-year relative survival rate between 2020 and 2024 was 82.4%. According to statistics, at the end of 2024, 8,000 women who had survived cervical cancer were registered, while in 2023 there were 80 deaths from this cancer. The cumulative risk of developing cervical cancer in women up to the age of 80 in 2020–2024 was 0.9% [1,2].

The introduction of a cervical cancer prevention programme called Livmorhalsprogram, aimed at early detection and effective treatment, has played a significant role in improving the epidemiological situation with regard to cervical cancer. The programme has been running since 1995 and currently involves systematic screening of women aged 25-69, once every five years in the case of a negative test result [3,4,5,6]. The first stage of primary prevention is testing for the presence of human papillomavirus (HPV). From 1 July 2023, this test will be performed on all women who meet the criteria for screening every three years, replacing the current cytological examination. Performing an HPV screening test once every five years, assuming that the result is negative, is as safe as cytology every three years (in healthy women). The sample from the cervix can be taken by a midwife, gynaecologist or general practitioner [7,8,9,10].

A negative test for HPV means that the risk of developing cervical cancer within the next five years is low and, therefore, the next test is recommended after this period. A positive test result is an absolute indication for microscopic examination. In the case of a positive HPV test result, a significant proportion of women are found to have no pathological changes in their cervical cells and, despite the presence of the virus/viruses, there are no indications for treatment. In such cases, the test should be repeated within one year, as the likelihood of the virus disappearing spontaneously during this time is quite high [11,12,13]. Of the 200 types of HPV currently known, screening takes into account the HPV panel with the highest oncogenic risk and covers the following types of HPV: types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66 and 68. This panel is used, among other things, to assess the risk of developing cervical dysplasia or to determine eligibility for further diagnosis [14,15].

Every year, approximately 25,000 Norwegian women are diagnosed with human papillomavirus (HPV) infection, which is responsible for persistent infections and the development of cervical cancer. In order to improve the diagnosis and early detection of cervical cancer in Norway, women have been given the option of performing HPV tests

themselves at home. This method has the potential to improve early detection statistics for cervical cancer and reduce mortality rates. The Norwegian Cancer Society (Kreftforeningen) has been campaigning for the availability of home HPV testing for several years, arguing that research shows that home testing detects HPV as effectively as testing performed by professionals. This test is also recommended by the Norwegian Gynaecological Society [16,17,18,19].

Primary prevention of cervical cancer in Norway begins during childhood. Since 2018, the childhood vaccination programme has included immunisation against HPV for girls and boys aged around 12, i.e. in the seventh grade of primary school, and consists of two doses administered six months apart [20,21]. Two preparations are currently available: Cervarix, whose immunisation efficacy is estimated at 87-100%, and Gardasil 9, at 90%. This regimen provides full and very high immune protection – as effective as the recommended three doses for adolescents over 15 years of age and adults [22,23,24] .

HPV vaccinations are becoming increasingly common among Norwegian children thanks to their promotion and availability. According to statistical reports, among teenage girls who were eligible for vaccination due to their age, the vaccination coverage rate increased from approximately 72.5% in 2009 to 87.3% in 2014 over a five-year period [25]. A few years later, in 2021, the percentage of girls vaccinated against HPV in Norway was already close to 92%, one of the highest rates in the world [26]. This confirms the pro-health attitudes of Norwegian society – from growing interest in prevention and its acceptance to the implementation of specific preventive measures. It should be noted that the period analysed coincides with the Covid-19 pandemic , when anti-vaccination attitudes and beliefs intensified in many countries, manifesting themselves, among other things, in: a lack of trust in health care institutions, fear of receiving vaccines and the occurrence of adverse reactions, and even suspicions of manipulation and conspiracy theories.

Boys and adult men are also at risk of cancers caused by HPV and can transmit the virus. In view of this, HPV vaccination has been extended to Norwegian boys since 2018, meaning that the vaccination programme is now uniform for both sexes [27]. In addition, the state policy aimed at expanding vaccination emphasises the importance of the issue from the point of view of public health and improving health equity and epidemiological indicators.

The implementation of protective vaccinations against human papillomavirus (HPV) in 2019 in the population of Norwegian girls and boys born in 2007, broken down by region of

the country, is presented in Table 1. The percentage of vaccinations administered is relative to the total population, broken down by gender. The data covers 11 regions of the country, where 32,172 girls and 34,061 boys were vaccinated against HPV, representing 93% and 90% respectively. The difference in vaccination coverage between the sexes was 3%, with girls having a higher rate. The lowest vaccination rates among girls were recorded in the Oslo region (n=3,512, i.e. 90%) and Nordland (n=1,357, i.e. 91%), and among boys in Vestfold and Telemark (n=2,699, i.e. 88%) and Nordland (n=1,511, i.e. 89%). The highest vaccination coverage among girls was in Vestland (n=3,891, i.e. 94%) and Rogaland (n=3,168, i.e. 94%) and Møre og Romsdal (n=1,651, i.e. 94%), and for boys in the Trøndelag region (n=2,894, i.e. 92%) (Table 1) [28].

Tab. 1. HPV vaccination coverage in different regions of Norway among girls and boys born in 2007 (data from 2019)

Region of the country	Population of girls (n)	Percentage of girls vaccinated (%)	Population of boys (n)	Percentage of boys vaccinated (%)
Agder	2005	93	2071	90
Innlandet	1962	93	2185	91
Møre og Romsdal	1651	94	1729	91
Nordland	1357	91	1511	89
Oslo	3512	90	3692	90
Rogaland	3168	94	3297	91
Troms of Finnmark	1403	92	1463	91
Trøndelag	2744	93	2894	92
Vestfold of Telemark	2500	92	2699	88
Vestland	3891	94	4051	91
Viken	7979	92	8468	90
Together	**32 172**	**93**	**34 061**	**90**

https://www.fhi.no/va/sysvak/dekningsstatistikk/ [28]

Epidemiological data clearly indicate that Norway's health policy on HPV infection prevention has achieved the expected results, as evidenced by one of the highest global vaccination rates in the primary group (i.e. children/adolescents aged 9-14) [29].

As previously emphasised, in order to develop effective immunity and consolidate immunological memory, it is recommended that children/adolescents (aged 9–14) receive two doses of the vaccine 6–12 months apart. An example of the implementation of the HPV

vaccination programme in the population of girls born in 2011 is provided by data from 15 Norwegian regions for 2023 and 2024, with both the first and second doses administered six months apart. The lowest vaccination coverage with two doses was recorded in the Finnmark region (89% and 80%, respectively). The highest number of girls received the first dose in the Trøndelag and Vestland regions (94% and 94%, respectively), and the second dose in the Trøndelag region (91%). The overall vaccination rate for girls with the first dose in 2023 was 92% and with the second dose in 2024 was 88%. The percentage vaccination rate for the first dose was 4% higher than for the second dose, and this trend is consistent across all regions of Norway (Table 2) [30].

Tab. 2. HPV vaccination with the first and second doses in the general population of girls born in 2011 (data as of 31 August 2024)

Region of the country	Percentage of girls vaccinated with the first dose (%)	Percentage of girls vaccinated with the second dose (%)
Agder	93	90
Akershus	93	89
Buskerund	90	87
Finnmark	89	80
Innlandet	92	88
Møre og Romsdal	93	90
Nordland	93	86
Oslo	91	88
Rogaland	92	89
Telemark	91	87
Troms	92	87
Trøndelag	94	91
Vestfiold	93	90
Vestland	94	90
Østfold	93	90
Average	**92**	**88**

https://www.fhi.no/contentassets/94c955ca53904684bc00e60961e6bfc6/hpv-andel-for-16-ar_jenter_fodt-2011.pdf [30]

Two doses of the vaccine are currently recommended by the Norwegian Institute of Public Health, as human papillomavirus is responsible for 99% of pathological changes in cervical cells, which, if left untreated, can lead to cancer [18,23,31].

The impact of the booster vaccination programme on the incidence of HPV infection and cervical lesions in the Troms and Finnmark regions was presented in a study by Jørgensen AS. The authors found that between 2017 and 2023, the incidence of these cervical lesions decreased significantly: CIN2+ by 33.4% and CIN3+ by 63.4%. This proves that the booster vaccination programme has significantly reduced the incidence of HPV-16/18 infections and cervical lesions in Troms and Finnmark, even with lower vaccination coverage in the booster programme. This proves the effectiveness of the HPV vaccination programme [23].

In 2020, the World Health Organisation (WHO) The main objective was to achieve measurable indicators, i.e. a high percentage of vaccinations in the population under 15 years of age, amounting to at least 90%. The main objective was to achieve measurable indicators, i.e.: a high percentage of vaccinations in the population up to the age of 15, amounting to at least 90%, high participation of women in screening tests, reaching 70%, and a significant percentage of treatment of precancerous conditions and invasive cervical cancer, maintained at 90% [32,33,34]. The World Health Organisation has set a public health priority of achieving a 90% HPV vaccination coverage rate among 15-year-old girls by 2030. Norway, as one of nine European countries, is predicted to have a realistic chance of fully achieving this target [35].

Human papillomavirus is a key risk factor for pathological changes in the cervix, and Norway's vaccination programme covers girls born in 1997 and later. The impact of HPV vaccination on the incidence of high-grade cervical cancer precursors (CIN2+) was the subject of a study by Mikalsen MP et al. To this end, screening results from 15,328 women aged 20–25 from the Troms and Finnmark regions between 2008 and 2022 were analysed. It was found that the incidence of CIN2+ initially increased from 31 cases per year in 2008 to 110 cases in 2018, and then decreased significantly to 44 cases per year by 2022 ($p<0.01$). Women in the pre-vaccination cohorts had a significantly higher risk of CIN2+ (OR 9.02, 95% CI 5.9–13.8) and CIN3+ (OR 19.6, 95% CI 7.3–52.6). Importantly, no vaccinated woman with CIN2+ tested positive for HPV types 16 or 18. Furthermore, none of the 13 cases of cervical cancer recorded during the study came from the vaccinated cohorts. The results clearly indicate a significant reduction in the incidence of cervical malignancies following the introduction of the HPV

vaccine into the national vaccination programme in Norway, highlighting its effectiveness in preventing cervical cancer in young women in northern Norway [36].

In 2024, Norway reported a record low incidence of cervical cancer, with 7.1 cases per 100,000 women. This raises particular hopes for achieving the strategic goal set by the WHO, especially as there has been a significant downward trend in the incidence of cervical cancer over the past few years, particularly among women under the age of 30. The incidence of cervical cancer in Norway has been reduced by approximately 40% over the past 50 years [2,37].

The course of HPV infection in women varies, i.e. it may resolve spontaneously within six months to a year and a half, or develop into a persistent infection and initiate cancerous changes in the cervix. In a statistical population of 100 Norwegian women infected with HPV, 90% will clear the infection spontaneously within 6 to 18 months, while in the remaining 10%, the infection will cause pathological changes that require immediate oncological treatment (Fig. 1) [38].

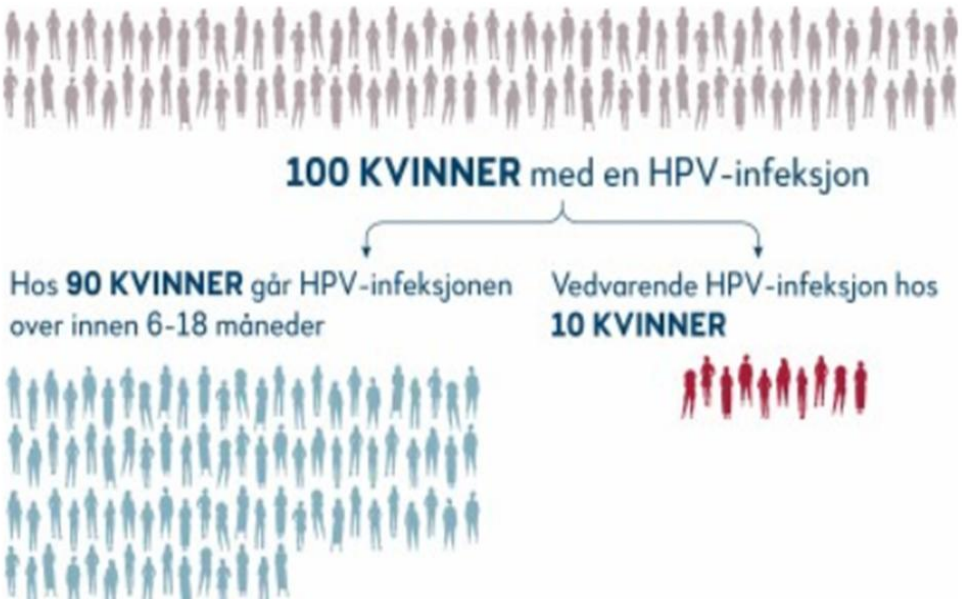

Fig. 1. Course of HPV infection in women in Norway *https://www.fhi.no/kreft/kreftscreening/livmorhalsprogrammet/oss/hva-er-celleforandringer/* [38]

In women who do not undergo treatment for persistent infection, the risk of further development of cervical cancer increases significantly, and the chances of a full recovery

decrease. Abnormal changes in the structure of the cells that make up the cervix do not manifest themselves with any clinical symptoms for the most part over a long period of time. In the event of contact bleeding, persistent pain mainly in the sacral region, bloody vaginal discharge with an unpleasant odour, or irregular bleeding, urgent specialist consultation is indicated [39].

In epidemiology, it is important to determine the incidence rate, which is the number of new cases of a disease in a given period of time in relation to the population size. According to reports, in 2024, the total number of women in Norway was 2,764,814. In this group, 269 new cases of cervical cancer were detected, and the average age of women at the time of diagnosis was 48 years. The incidence rate in the female population in 2024 was 9.4/100,000, and cervical cancer was rarely diagnosed in women under the age of 25 [2]. Z grupy 269. kobiet u których postawiono diagnozę raka szyjki macicy 129 przypadków dotyczyło pierwszego stadium choroby, 50 przypadków drugiego, 53 przypadki trzeciego, 23 przypadki czwartego, a u 14 kobiet (0,5%) nie określono stadium zaawansowania choroby. Najwięcej przypadków raka szyjki macicy w analizowanym okresie czasu w Norwegii rozpoznano we wczesnym stadium, co ma istotne znaczenie dla efektywności leczenia [40].

The age of women at the time of cervical cancer diagnosis varied. In 2024, the average age was 48, with half of all diagnosed cases involving women over 48, rarely under 25 [2]. In contrast, the median age of incidence in 2023 was 46.5 years, which was one and a half years lower than in 2024. The largest number of women were diagnosed with cervical cancer between the ages of 30 and 54. A marked increase in incidence in 2023 occurred in the following age groups: 30–34 years, 45–49 years and 40–44 years (Fig.2) [41].

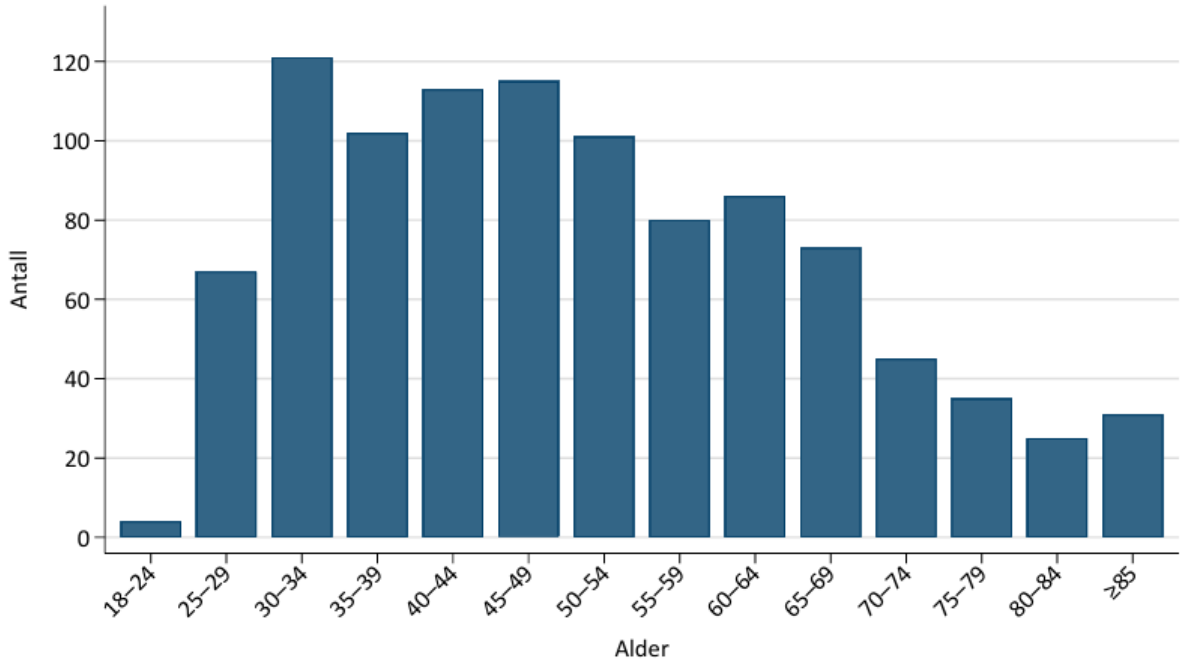

Fig. 2. Wiek kobiet w czasie postawienia diagnozy raka szyjki macicy (dane za 2023 rok) *Årsrapport 2023 Aldersfordeling for kvinner i Norge ved livmorhalskreftdiagnose* [41]

In Norway in 2024, cervical cancer was diagnosed in 54.7% (n=129) of women based on symptoms, in 36.0% (n=85) of women during screening, and in 7.6% (n=18) of women completely by chance during other examinations. A positive trend can be observed in the circumstances of diagnosis, i.e. fewer cases of cancer were diagnosed based on symptoms in 2024 compared to 2021-2023, when the percentage of cases was 57.3% (Fig.3), and based on screening, it has not changed [1]. However, the lower number of reported cases of cervical cancer did not necessarily mean an actual decrease in incidence, but could have been due to the Covid-19 pandemic, i.e. a reduction in the number of screening tests performed, delays in diagnosis and the reorganisation of healthcare due to the need to focus on priority pandemic measures.

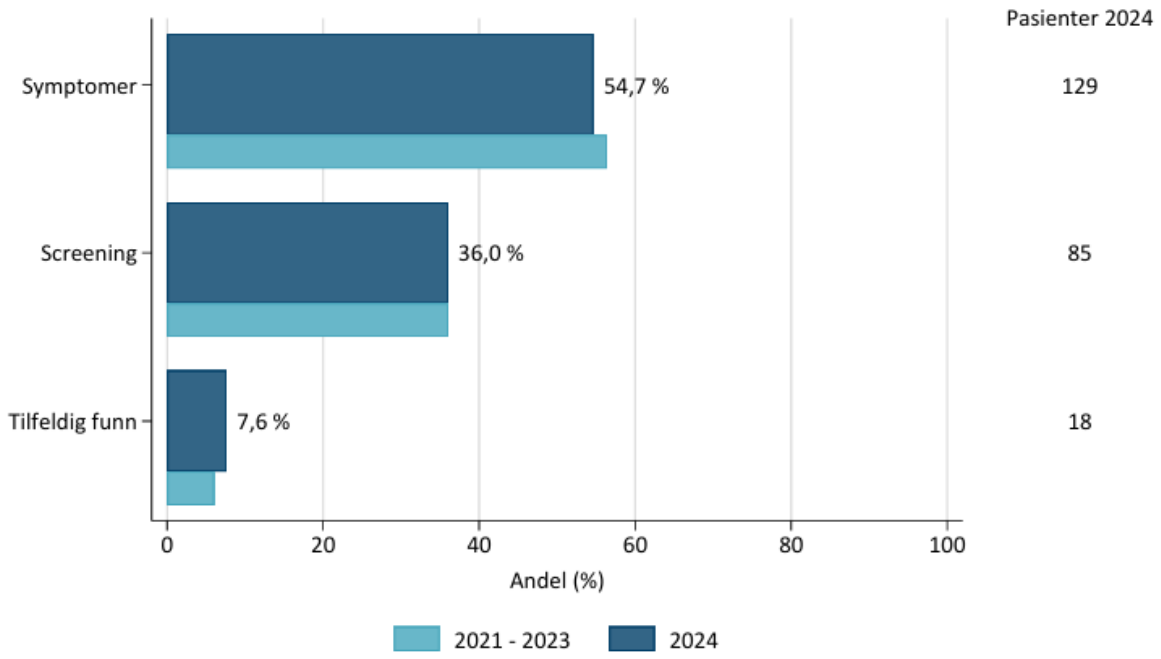

Fig. 3. Circumstances surrounding diagnosis – cervical cancer in women in Norway in 2021–2023 and 2024

Nasjonalt kvalitetsregister for gynekologisk kreft / Årsrapport 2024 [1]

An important measure of the effectiveness of cancer treatment is the relative five-year survival rate. In Norway, this rate for cervical cancer was relatively high in 2024, at 82.4%, and was comparable to the rate for 2019–2023, at 82.7%. The highest relative survival rate was recorded in the central region of Norway, i.e. Helse Midt-Norge (86.7%, n=229), followed by eastern Helse Sør-Øst (83.3%, n=1003), followed by western Helse Vest (80.7%, n=361), and the lowest in northern Helse Nord (78.9%, n=125) (Fig.4) [40,41].

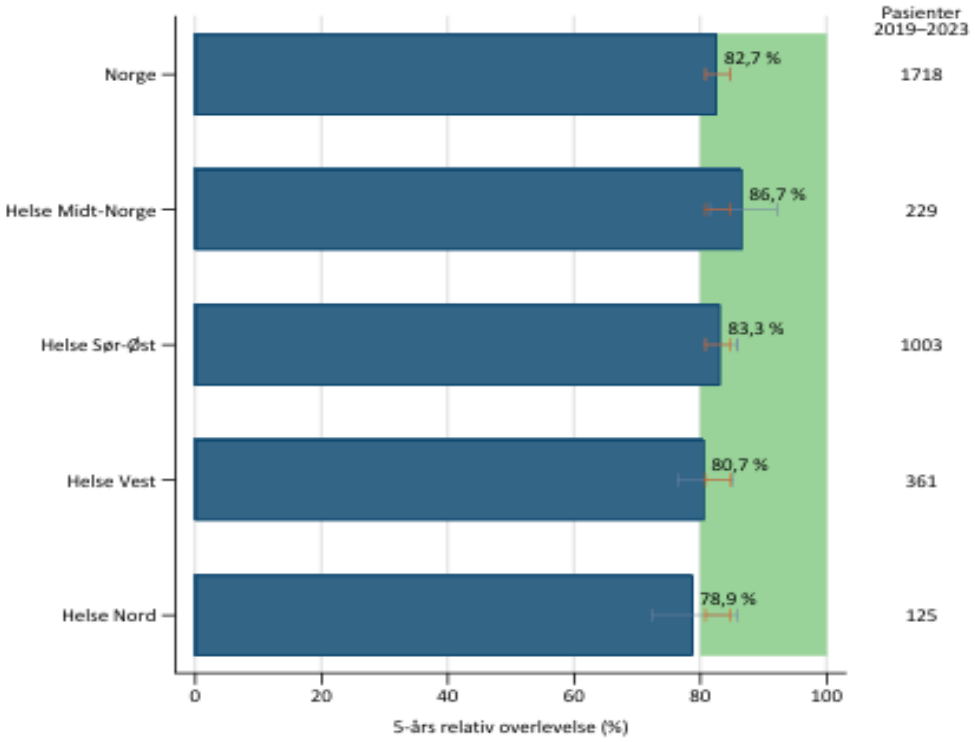

Fig. 4. Five-year survival rates for women with cervical cancer in Norway as a whole and broken down into the four main regions of the country in 2019–2023

Kreftregisteret Statistiskkbank 2025 *https://sb.kreftregisteret.no/?sub=incidence_table&lang=norsrapport-2023-nasjonalt-kvalitetsregister-for-gyneko* [40,41]

The high 5-year survival rate for women with cervical cancer may indicate that new cases are being diagnosed at an early stage, that cancer treatment is effective, and that the prognosis is good. If cervical cancer is diagnosed in the first stage of the disease, statistically in Norway 96.1% of women with the disease have a chance of surviving at least 5 years or more. For patients diagnosed late, i.e. in the fourth stage of the disease, the chances are significantly lower, meaning that only 26.2% of women will survive for at least 5 years or more. It should be emphasised that over the last thirty years, the five-year survival rate for women with cervical cancer in Norway has increased by 11.8%, with the highest increase recorded in the 50–69 age group [2]. This indicator may be the result of, among other things, advances in diagnosis and treatment, the organisation of the healthcare system, and public awareness campaigns promoting cancer prevention.

Mortality is an unfavourable and undesirable epidemiological indicator. In 2023, there were 80 deaths from cervical cancer in Norway. Compared to previous years, a significant downward trend can be observed in this regard [2]. Over the last 40 years, overall mortality from cancer has decreased significantly in all age groups, but in the 25–49 age group, the mortality rate has remained stable. The standardised mortality rate for women due to cervical cancer in Norway per 100,000 population in 2019–2022 was 3.0/100,000, and in 2020–2024 it decreased to 2.8/100,000 population (Fig.5) [37,42].

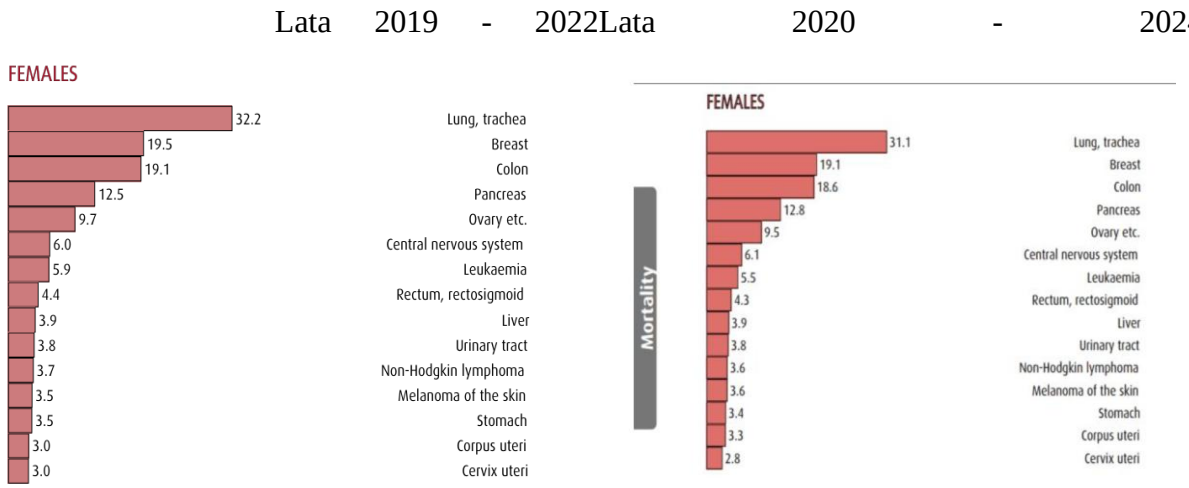

Fig. 5. Standardised mortality rate in the group of cancer diseases in women in Norway per 100,000 population in 2019–2022 and 2020–2024
Cancer in Norway 2023 / *Cancer in Norway 2024* [37,42]

Early diagnosis of cervical cancer significantly increases the 5-year survival rate. In Norway, 96% of all cases of this type of cancer are diagnosed at stage I and 26% at stage IV, and the 5-year survival rate has increased by 11.8% over 30 years, while mortality has fallen to 2.8/100,000 in 2020–2024. This situation is quite good compared to other European countries, but there is a need to consolidate efforts within the three pillars of prevention, i.e. primary, secondary and tertiary, aimed at the complete eradication of cervical cancer in the general population [37].

Conclusions

1. Norway is an example of a country where a strategy to reduce and eliminate cervical cancer in women through health education and HPV vaccination is being successfully implemented.
2. Protective vaccinations against HPV among girls and boys aged 9–14 are becoming increasingly common, as evidenced by one of the highest vaccination rates in this population globally.
3. Low incidence and mortality rates for cervical cancer indicate the effectiveness of population screening and effective treatment of early stages of this cancer.
4. Norway's experience shows that comprehensive preventive measures significantly contribute to reducing morbidity and mortality from cervical cancer. This model confirms that consistent implementation of primary and secondary prevention strategies can lead to long-term improvements in women's health and serve as a model for other countries.

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