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Incidence, Survival and Mortality in Cervical Cancer in Norway, 1956–1990

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Long-term trends in incidence, survival and mortality were examined in women with squamous cell carcinoma and adenocarcinoma of the uterine cervix, diagnosed in Norway in the 35-year period 1956–1990. During the 1970s the number of cervical smears increased substantially in Norway, although no organised screening programme was introduced. Special attention was paid to the time period 1971–1990 to evaluate the effect of the extensive spontaneous screening. In addition, the prognostic importance of clinical stage and age was explored. In the squamous cell carcinoma patients the incidence rate peaked in the time period 1971–1975, since when there has been a decrease. In the adenocarcinoma patients the incidence rate rose through the years 1976–1990. Also, the proportion of adenocarcinomas increased in this time period. The mortality rates in both histological types declined modestly through the years 1966–1990. A more favourable stage distribution was noted among the squamous cell carcinomas ($P = 0.00$), but not among the adenocarcinomas, when comparing the two diagnostic periods 1971–1975 and 1981–1985. The multivariate analysis (GLIM) revealed that stage was the most important prognostic factor in both histological types ($P = 0.00$). In the squamous cell carcinoma patients the relative rate increased ($P = 0.04$) in the last period. There was a tendency towards a poorer prognosis in younger women in this group, but age did not prove to be an important prognostic factor ($P = 0.08$).
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INTRODUCTION

THE INCIDENCE of uterine cervical cancer in Norway rose from the 1950s to the mid 1970s, after which a decline began. At present, carcinoma of the cervix is the third most frequent malignancy of the female genital tract. Annually about 400 new cases of cervical cancer are diagnosed [1], and approximately 130 women die from the disease [2].

The numbers of cytological smears have been steadily increasing since 1970, but no organised screening programme has been introduced. The decrease in incidence has been less pronounced in Norway compared to the other Nordic countries of Finland and Sweden, where organised screening programmes have been run by the governments since about 1960 [3]. The changes in incidence rates reflect the mass screening intensity in each country. The screening programmes have also had a major impact on reductions in mortality rates [4].

Squamous cell carcinoma and adenocarcinoma are the two most common cervical malignancies. The relative incidence of cervical adenocarcinoma appears to be increasing [5], whereas the incidence of squamous cell carcinoma is declining. The cytological screening programmes being implemented in several western countries during the last 40 years have been ineffective in detecting adenocarcinoma compared to its squamous counterpart [6].

The prognosis of cervical cancer has been described in several clinical series [5, 7–9]. Fewer data from unselected series are available [10–12]. Clinical stage and screening programme attendance are important factors with respect to survival. The prognostic importance of age and histological type is, however, still undetermined.

The aim of the present study was to examine long-term trends in incidence, relative survival and mortality rates in women with squamous cell carcinoma and adenocarcinoma of the uterine cervix, diagnosed in Norway in the 35-year period 1956–1990. Special attention was paid to the time period 1971–1990. In the early 1970s relatively few cervical smears were taken, while in the 1980s the spontaneous wild screening was rather extensive. In addition, the prognostic importance of clinical stage and age was evaluated.

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MATERIALS AND METHODS

Material

Since 1953 the Norwegian Cancer Registry has received information on all cancer patients in the population. The reporting system is based on pathology and cytology reports, clinical records and death certificates. This multiple reporting practice provides an accurate and complete set of data for each patient. Site, histological type, stage of disease at the time of diagnosis, residence and the 11-digit individual identification number allocated to every resident of Norway, are reported. Registration is based on a modified version of ICD-7.

The following variables were included in the present study: histological type, diagnostic period, clinical stage and age. The time span has been divided into 5-year periods. Clinical staging was done according to the International Federation of Gynaecology and Obstetrics System [13]. The patients with squamous cell carcinoma were organised into the clinical stages IA, IB, IIA, IIB, III and IV. The adenocarcinoma cases were classified into wider groups due to small numbers: I, II, III and IV. Carcinoma *in situ* patients (stage 0) were not included in the series.

In the time period 1971–1990 a total of 7429 patients were reported to have cervical cancer. Of these cases, 99.5% were histologically verified. 86.2% of the cases were squamous cell carcinomas and 7.0% were adenocarcinomas (Table 1). Only these patients were submitted to a thorough analysis. Adenosquamous lesions were not included in the adenocarcinoma group. The squamous cell carcinoma cases were organised into successive 10-year age groups (20–29, ..., 70–79, 80+), and the adenocarcinoma cases into 15-year age groups (20–34, ..., 65–79, 80+).

Methods

Incidence and mortality rates per 100 000 were computed for 10- and 15-year age groups. Direct standardisation was used for age adjustment with respect to the European standard population. Mortality data were not available in the 5-year time periods preceding 1966–1970.

The χ^2 test was used to compare the clinical stage distribution (total numbers) in the two diagnostic periods 1971–1975 and 1981–1985; $P < 0.05$ was considered statistically significant.

The analysis of survival was based on 5-year relative survival rates. The actuarial method was used for the calculations. The relative survival represented an estimate of the ratio between the proportion of survivors among the patients and the proportion of survivors in a group of the general population with the same age distribution and birth cohort, but without the disease under study [14].

The final date of follow-up was 31 December 1991. The follow-up system is based on the individual identification number. The Central Bureau of Statistics receives all death certificates and autopsy reports in Norway. Records of deaths during the observation periods were matched against files of patients with squamous cell carcinoma and adenocarcinoma.

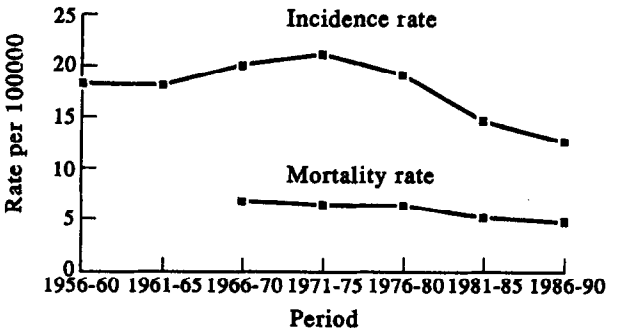

Fig. 1. Age-adjusted incidence and mortality rates per 100 000 in patients with squamous cell carcinoma of the uterine cervix in Norway, 1956–1990.

A multivariate analysis of 5-year relative survival rates was conducted using a generalised linear model (GLIM) [15]. This model allows a simultaneous analysis of the effect of several prognostic factors on survival. In the squamous cell carcinoma cases the multivariate analysis included the following variables: stage (S; IA,IB, IIA, IIB, III, IV and unknown stages), period (P; 1971–1975 and 1981–1985) and age (A; 20–29, 30–39, 40–49, 50–59, 60–69 and 70–79 years). Patients in the age groups 0–19 and 80+ were excluded from the analysis due to small numbers and to unreliable estimates of expected survival rates, respectively (n = 88). In the adenocarcinoma patients the multivariate analysis included stage (S; I, II, III and IV), period (P; 1971–1975 and 1981–1985) and age (A; 20–34, 35–49, 50–64 and 65–79). Patients in the age group 80+ and unknown stages were excluded from the analysis (n = 18). Relative rates (RR) and their 95% confidence intervals (CI) were used to measure the effects of the various prognostic factors.

RESULTS

General description—incidence rates, mortality rates and stage distribution

The age-adjusted incidence and mortality rates in cervical squamous cell carcinomas are given in Fig. 1. The incidence curve is based on a total of 11 740 cases, the mortality curve on 3150 cases, respectively. The incidence rate peaked in the time period 1971–1975, since when there has been a decrease. The mortality rate declined modestly through the years 1966–1990.

Table 1. Number of patients with cervical cancer by histological type in Norway, 1971–1990

Period	Squamous cell carcinoma n	(%)	Adenocarcinoma n	(%)	Other n	(%)	Total n	(%)
1971–1975	1915	(89.6)	110	(5.1)	113	(5.3)	2138	(100.0)
1976–1980	1802	(89.0)	94	(4.6)	128	(6.3)	2024	(100.0)
1981–1985	1448	(83.3)	139	(8.0)	152	(8.7)	1739	(100.0)
1986–1990	1239	(81.1)	176	(11.5)	113	(7.4)	1528	(100.0)
Total	6404	(86.2)	519	(7.0)	506	(6.8)	7429	(100.0)

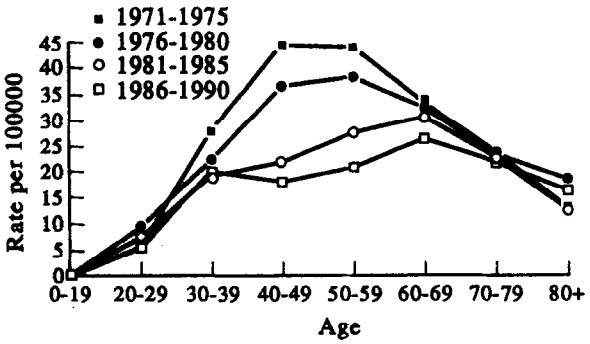

Fig. 2. Age-specific incidence rates per 100 000 by time period in patients with squamous cell carcinoma of the uterine cervix in Norway.

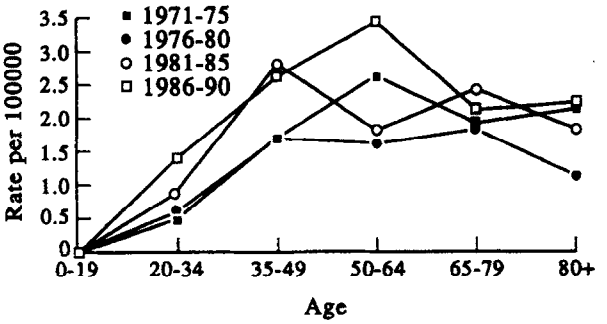

Fig. 4. Age-specific incidence rates per 100 000 by time period in patients with adenocarcinoma of the uterine cervix in Norway.

More details on the incidence rates are illustrated in Fig. 2, where incidence rates by age and time period are given (1971–1990). The decline in incidence was mainly due to decreasing rates in the age group 30–59 years. The maximum incidence rate has shifted to older age groups. In 1971–1975 the highest rate was found in women aged 40–49 years (44.2), while in 1986–1990 the incidence peaked in women aged 60–69 years (26.1).

The patients with adenocarcinoma accounted for 5.1% of all cervical cancers in 1971–1975 and 11.5% in 1986–1990 (Table 1). The age-adjusted incidence and mortality rates in adenocarcinomas are shown in Fig. 3. The incidence curve is based on a total of 885 cases and the mortality curve on 277 cases, respectively. There have been fluctuations in incidence during the entire study period. The incidence rate declined from the time period 1961–1965 until 1976–1980, after which an increase began. The mortality rate declined modestly from the time period 1966–1970. After 1971–1975, however, the curve levelled off. Age-specific incidence rates are displayed in Fig. 4. The increase in incidence rates during 1976–1990 affected all age groups.

Table 2 summarises the clinical stage distribution in squamous cell carcinoma patients by age in the two diagnostic periods 1971–1975 and 1981–1985. Most cases were classified as stage IB, 33.9% in the first period and 34.8% in the last period. In general, early staged carcinomas (IA and IB) were more frequently diagnosed in women below 50 years, whereas the more advanced stages were diagnosed in older women. A more favourable stage distribution was seen in the last period

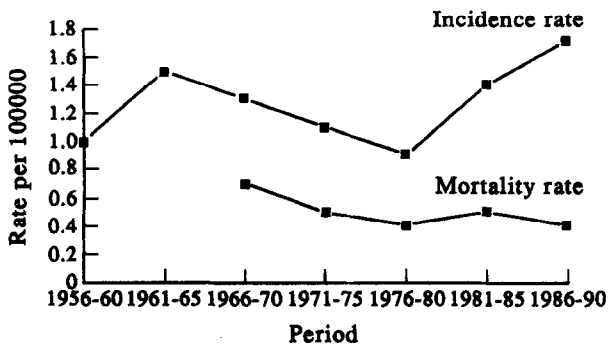

Fig. 3. Age-adjusted incidence and mortality rates per 100 000 in patients with adenocarcinoma of the uterine cervix in Norway, 1956–1990.

($\chi^2 = 22.4, P = 0.00$). Most adenocarcinoma cases were classified as stage I, 57.3% in 1971–1975 and 61.2% in 1981–1985 (Table 3). No change in stage distribution, however, was seen when comparing the two time periods ($\chi^2 = 4.52, P > 0.25$).

Analysis of 5-year relative survival

The 5-year relative survival rates in patients with squamous cell carcinoma and adenocarcinoma, 1956–1990, are shown in Fig. 5. In the squamous cell carcinomas the 5-year survival rate increased until 1971–1975, after which a slight decline started. In the adenocarcinomas there has been an improvement in prognosis over the last 35 years, although not quite continuous (1971–1980). The squamous cell carcinoma patients had a better prognosis compared to the adenocarcinoma patients during 1956–1985.

In the squamous cell carcinomas more details in the two time periods, 1971–1975 and 1981–1985, are given in Table 4. The 5-year relative survival rate was 73.6% in the first period compared to 69.8% in the last period. In 1971–1975, the 5-year survival rate ranged from 99.9% in stage IA to 13.2% in stage IV, in 1981–1985 from 98.5% in stage IA to 5.1% in stage IV. The decrease in survival was mainly due to the decline in the age groups 40–49 and 70–79 years. The clinical stages IIA, IIB and IV declined the most when comparing the two diagnostic periods. The 5-year relative survival rate in the adenocarcinoma cases rose from 56.6% in 1971–1975 to 68.1% in 1981–1985 (Table 5).

Tables 6 and 7 summarise the multivariate analysis including stage, time period and age. The results are expressed as RR and their 95% CI are given, showing contrasts in importance relative to reference values of each variable. In the squamous cell carcinomas, stage was clearly the most important prognostic factor ($P = 0.00$). The relative rate increased from 1971–1975 to 1981–1985 ($P = 0.04$). There was a tendency towards a poorer prognosis in younger women, but age did not prove to be an important prognostic factor ($P = 0.08$). However, a reduced survival was noted among women in the age group 40–59 years. Also, in the adenocarcinoma patients stage proved to be an important prognostic factor ($P = 0.00$). The relative rate decreased slightly in the last period, although it was not statistically significant ($P = 0.13$). Age as a prognostic factor, however, showed rather conflicting results. Evaluation of the goodness of fit for the presented models gave satisfactory results (not shown).

DISCUSSION

In the present study all cases of cervical squamous cell carcinoma and adenocarcinoma reported to the Norwegian Cancer Registry during 1956–1990, were subjected to an analysis

Table 2. Clinical stage distribution by age and time period in patients with squamous cell carcinoma of the uterine cervix in Norway

Period	Age	Stage IA n	(%)	IB n	(%)	IIA n	(%)	IIB n	(%)	III n	(%)	IV n	(%)	Unknown n	(%)	Total n	(%)
1971–1975																	
	0–19	—	—	1	(100.0)	—	—	—	—	—	—	—	—	—	—	1	(100.0)
	20–29	37	(44.6)	31	(37.3)	6	(7.2)	5	(6.0)	2	(2.4)	1	(1.2)	1	(1.2)	83	(100.0)
	30–39	101	(35.1)	122	(42.4)	20	(6.9)	21	(7.3)	17	(5.9)	5	(1.7)	2	(0.7)	288	(100.0)
	40–49	136	(29.2)	176	(37.8)	38	(8.2)	61	(13.1)	43	(9.2)	12	(2.6)	—	—	466	(100.0)
	50–59	54	(10.2)	189	(35.5)	55	(10.3)	117	(22.0)	94	(17.7)	22	(4.1)	1	(0.2)	532	(100.0)
	60–69	16	(4.7)	90	(26.3)	55	(16.1)	81	(23.7)	70	(20.5)	26	(7.6)	4	(1.2)	342	(100.0)
	70–79	4	(2.4)	34	(20.4)	37	(22.2)	29	(17.4)	38	(22.8)	24	(14.4)	1	(0.6)	167	(100.0)
	80+	2	(5.6)	6	(16.7)	5	(13.9)	6	(16.7)	12	(33.3)	4	(11.1)	1	(2.8)	36	(100.0)
	Total	350	(18.3)	649	(33.9)	216	(11.3)	320	(16.7)	276	(14.4)	94	(4.9)	10	(0.5)	1915	(100.0)
1981–1985																	
	0–19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20–29	51	(46.4)	47	(42.7)	4	(3.6)	4	(3.6)	3	(2.7)	—	—	1	(0.9)	110	(100.0)
	30–39	100	(37.9)	107	(40.5)	13	(4.9)	19	(7.2)	13	(4.9)	10	(3.8)	2	(0.8)	264	(100.0)
	40–49	62	(29.0)	78	(36.4)	14	(6.5)	26	(12.1)	24	(11.2)	4	(1.9)	6	(2.8)	214	(100.0)
	50–59	34	(12.5)	104	(38.1)	24	(8.8)	57	(20.9)	35	(12.8)	17	(6.2)	2	(0.7)	273	(100.0)
	60–69	27	(7.8)	112	(32.6)	42	(12.2)	63	(18.3)	76	(22.1)	22	(6.4)	2	(0.6)	344	(100.0)
	70–79	15	(7.8)	46	(24.0)	14	(7.3)	31	(16.1)	56	(29.2)	29	(15.1)	1	(0.5)	192	(100.0)
	80+	1	(2.0)	10	(19.6)	2	(3.9)	6	(11.8)	21	(41.2)	9	(17.6)	2	(3.9)	51	(100.0)
	Total	290	(20.0)	504	(34.8)	113	(7.8)	206	(14.2)	228	(15.7)	91	(6.3)	16	(1.1)	1448	(100.0)

of incidence and survival. In addition, age-adjusted mortality rates were given in the time period 1966–1990. During the 1970s the number of cervical smears increased substantially in Norway, although no organised mass screening was introduced. In 1970 about 110 000 smears were taken, in 1980, 475 000 smears and in 1990, 550 000 smears (personal communication). To evaluate the effectiveness of the spontaneous screening more details were given in the time period 1971–1990.

Since the late 1960s the incidence rates of cervical cancer have been declining in all Nordic countries except in Norway, where a decrease started some 10 years later. Organised mass screening programmes for cervical cancer with varying target groups and intervals between screening were introduced gradually in the other Nordic countries during the 1960s and the early 1970s. Since then, nationwide programmes have been implemented in Finland, Iceland and Sweden. In Denmark about 40% of the population has been subjected to organised mass screening. In Norway, only one county, covering less than 5% of the population, has had an organised programme [16]. Differences in incidence rates from the mid 1960s to the late 1970s, have been attributed to the different screening practices [3], and have been interpreted as evidence of the efficacy of organised screening as compared with spontaneous screening. In Iceland, with the highest screening intensity (screening for all women aged 25–70

Table 3. Clinical stage distribution by age and time period in patients with adenocarcinoma of the uterine cervix in Norway

Period	Age	Stage I n	(%)	II n	(%)	III n	(%)	IV n	(%)	Unknown n	(%)	Total n	(%)
1971–1975													
	20–34	10	(90.9)	1	(9.1)	—	—	—	—	—	—	11	(100.0)
	35–49	22	(84.6)	4	(15.4)	—	—	—	—	—	—	26	(100.0)
	50–64	22	(50.0)	11	(25.0)	5	(11.4)	6	(13.6)	—	—	44	(100.0)
	65–79	6	(26.1)	4	(17.4)	8	(34.8)	5	(21.7)	—	—	23	(100.0)
	80+	3	(50.0)	—	—	1	(16.7)	2	(33.3)	—	—	6	(100.0)
	Total	63	(57.3)	20	(18.2)	14	(12.7)	13	(11.8)	—	—	110	(100.0)
1981–1985													
	20–34	17	(89.5)	2	(10.5)	—	—	—	—	—	—	19	(100.0)
	35–49	36	(75.0)	7	(14.6)	2	(4.2)	1	(2.1)	2	(4.2)	48	(100.0)
	50–64	17	(56.7)	6	(20.0)	3	(10.0)	3	(10.0)	1	(3.3)	30	(100.0)
	65–79	12	(35.3)	7	(20.6)	8	(23.5)	6	(17.6)	1	(2.9)	34	(100.0)
	80+	3	(37.5)	2	(25.0)	2	(25.0)	1	(12.5)	—	—	8	(100.0)
	Total	85	(61.2)	24	(17.3)	15	(10.8)	11	(7.9)	4	(2.9)	139	(100.0)

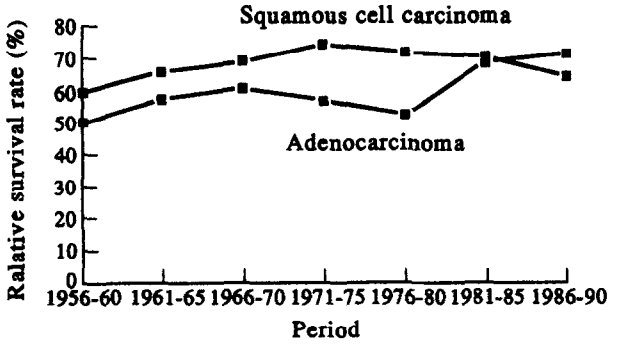

Fig. 5. Five-year relative survival rates in patients with squamous cell carcinoma and adenocarcinoma of the uterine cervix in Norway, 1956–1990.

years at 2- to 3-yearly intervals), the decrease was largest after an initial increase. The contrast between Finland and Norway was particularly interesting. Despite the fact that the relative number of cervical smears taken was similar in the two countries, there was an increasing trend in Norway, while the incidence rates decreased considerably in Finland.

In Norway, the cervical cancer incidence rose until 1971–1975, after which a decline started. The decrease was mainly confined to the age group 30–59 years. The extensive spontaneous screening has been concentrated to frequent testing of relatively young women. A high percentage of older women have never taken a smear. The reduction in incidence rates probably reflects the use of cervical cytology. The decline in incidence is, however, protracted and far from proportionate to what might be expected from an efficient utilisation of the available cytological capacity.

The decrease in incidence rates did not concern the youngest age group, 20–29 years. Since the incidence of cervical cancer is much lower in this age group compared to the older age groups, it may have been difficult to detect the few cases by spontaneous screening. An effect of screening may, however, imply a relatively high detection rate of micro invasive cancers that otherwise first would have been diagnosed at an older age and at advanced stages [17].

Lund *et al.* [18] have reported previously on increasing incidence rates among carcinoma *in situ* cases during the 1960s and 1970s in Norway. In the present study the stage 0 carcinomas were not included. The carcinoma *in situ* inclusion criteria did not, however, change substantially during the study period (1971–1990). Nevertheless, a more accurate diagnosis has probably removed carcinoma *in situ* cases to the group of early staged carcinomas, contributing to the relatively high incidence rates.

An increasing relative incidence of adenocarcinoma of the

Table 5. Five-year relative survival rates (%) in patients with adenocarcinoma of the uterine cervix in Norway, by clinical stage, age and time period

Period	Age	Stage I	II	III	IV	Unknown	Total
1971–1975							
	20–34	80.3	0.0	—	—	—	73.0
	35–49	87.2	50.3	—	—	—	81.5
	50–64	89.1	38.0	0.0	0.0	—	54.3
	65–79	79.1	30.6	0.0	0.0	—	26.4
	80+	0.0	—	0.0	0.0	—	0.0
	Total	84.1	37.3	0.0	0.0	—	56.6
1981–1985							
	20–34	88.5	100.3	—	—	—	89.7
	35–49	89.6	43.2	50.4	0.0	100.6	79.8
	50–64	85.4	52.0	0.0	0.0	104.6	62.2
	65–79	58.9	80.8	15.4	0.0	124.1	45.5
	80+	66.4	0.0	0.0	0.0	—	27.4
	Total	84.2	60.3	16.1	0.0	106.6	68.1

Table 4. 5-year relative survival rates (%) in patients with squamous cell carcinoma of the uterine cervix in Norway, by clinical stage, age and time period

Period	Age	Stage IA	IB	IIA	IIB	III	IV	Unknown	Total
1971–1975									
	0–19	—	100.2	—	—	—	—	—	100.2
	20–29	100.2	87.3	66.8	40.1	50.1	0.0	0.0	85.7
	30–39	99.5	83.2	75.4	43.1	35.5	0.0	100.5	81.3
	40–49	100.5	89.7	77.2	69.8	42.4	25.3	—	83.2
	50–59	98.8	85.9	78.6	71.2	32.9	14.1	0.0	70.8
	60–69	101.0	90.1	80.2	63.9	30.9	12.5	26.8	64.1
	70–79	131.1	78.4	63.9	67.0	46.8	11.0	0.0	57.3
	80+	0.0	0.0	0.0	74.3	17.6	0.0	0.0	17.5
	Total	99.9	86.4	75.1	66.3	35.6	13.2	32.9	73.6
1981–1985									
	0–19	—	—	—	—	—	—	—	—
	20–29	100.2	78.9	25.1	50.1	33.4	—	100.2	84.7
	30–39	98.4	84.5	77.2	42.3	15.5	0.0	100.5	79.9
	40–49	99.4	85.5	64.9	54.5	29.5	25.3	67.3	76.5
	50–59	102.9	89.8	72.9	63.1	35.3	6.1	51.4	71.9
	60–69	98.5	82.0	76.6	61.1	35.1	9.7	0.0	63.3
	70–79	73.0	68.1	34.6	58.9	42.2	0.0	0.0	46.5
	80+	165.9	67.3	142.8	30.4	47.9	0.0	0.0	44.2
	Total	98.5	83.3	68.2	57.9	35.4	5.1	55.9	69.8

Table 6. Relative rates (RR) and their 95% confidence intervals (CI) in cervical squamous cell carcinoma patients, according to stage, period and age

Variable	RR	(CI)	P value*
Stage			0.00
IA	1.00		
IB	40.51	(5.26, 311.85)	
IIA	84.26	(10.84, 654.71)	
IIB	128.38	(16.64, 990.73)	
III	285.20	(37.00, 2198.32)	
IV	645.80	(85.15, 5015.97)	
Unknown	165.64	(19.67, 1394.83)	
Period			0.04
1971–1975	1.00		
1981–1985	1.17	(1.01, 1.36)	
Age			0.08
20–29	1.00		
30–39	0.93	(0.61, 1.44)	
40–49	0.64	(0.42, 0.99)	
50–59	0.69	(0.46, 1.05)	
60–69	0.73	(0.48, 1.11)	
70–79	0.78	(0.50, 1.22)	

(Model: S+P+A, deviance = 70.3, degrees of freedom = 69). *Log-likelihood ratio test of significance.

uterine cervix has been reported [5]. In the present study both the proportion of adenocarcinomas and the age-adjusted incidence rate rose during 1976–1990. The cervical smear test has principally been aimed at detecting precursors of squamous cell carcinoma, thus inhibiting the development of invasive tumours. Traditionally, the adenocarcinomas, mostly growing intracervically, have been more difficult to detect by the conventional smear procedure [6]. The increase of the adenocarcinomas relative to the squamous cell carcinomas could in part be explained by the widespread use of cytological smears which has flourished since the early 1970s.

Eide [17] reports a consistent decline in incidence rates in undifferentiated cancer of the cervix in Norway, 1970–1984, whereas the incidence rates in adenocarcinomas increased by 38% in the same time period. It seems that undifferentiated cancers are more consistently being classified as adenocarcinomas in recent years. Changes in histology classification may have contributed to the rise in incidence of cervical adenocarcinoma.

Table 7. Relative rates (RR) and their 95% confidence intervals (CI) in cervical adenocarcinoma patients, according to stage, period and age

Variable	RR	(CI)	P value*
Stage			0.00
I	1.00		
II	4.37	(2.43, 7.87)	
III	16.04	(7.65, 33.66)	
IV	104.84	(0.00, 1.65e+10)	
Period			0.13
1971–1975	1.00		
1981–1985	0.62	(0.37, 1.03)	
Age			0.89
20–34	1.00		
35–49	0.89	(0.36, 2.19)	
50–64	1.17	(0.48, 2.87)	
65–79	1.18	(0.44, 3.19)	

(Model: S+P+A, deviance=12.82, degrees of freedom=18). *Log-likelihood ratio test of significance.

The cervical cancer mortality rates have shown a decreasing trend in all Nordic countries since the early 1950s. In Norway, with practically no organised screening, the downward trend in mortality has been slowest [4]. Both the mortality rates of squamous cell carcinoma and adenocarcinoma decreased modestly through the years 1966–1990. The present findings reaffirmed that the disorganised screening in Norway has so far had little effect on the mortality rates.

An early outcome of a successful screening programme has been a change in stage distribution, i.e. more cases are detected in earlier stages [19]. A more favourable stage distribution does not, however, prove that the screening programme is responsible for a lower mortality among the cases detected. In the present study a more favourable stage distribution was noted among the squamous cell carcinoma, but not among the adenocarcinoma patients when comparing the two time periods. The extensive spontaneous screening for cervical cancer in Norway seemed to have brought a change towards the less advanced disease categories in the squamous cell carcinoma group.

As opposed to what might be expected from the more favourable stage distribution, the present analysis demonstrated that the favourable long-term trend in survival in squamous cell carcinomas changed in the mid 1970s. Although no nationwide screening programme has been conducted previously in Norway, there has been a widespread opportunistic screening. Screening might preferentially detect slowly progressing diseases with a relatively long preclinical phase and a relatively good prognosis [20]. Thus the peak in survival rates in 1971–1975 and the slight decline in the years thereafter, may be explained by length bias sampling.

van der Graaf *et al.* [12] recently reported on an analysis of cervical cancer survival in the Netherlands during 1970–1985. Similar to our results, these authors also found a peak in survival estimates (1976–1980) and a subsequent decline. In the Netherlands organised screening started in 1976. Other studies, however, report a favourable effect of diagnostic period [11].

The prognosis of patients with adenocarcinoma has improved over the last 35 years, although not quite continuously. The improvement during the 1960s has been attributed to a more aggressive surgical treatment [21]. In the squamous cell carcinoma group the main principles of treatment have remained the same through 1971–1990, although there have been some minor changes.

It has been suggested that adenocarcinoma and squamous cell carcinoma of the uterine cervix are distinct diseases, with a different biology, epidemiology and clinical characteristics [22]. Some authors have indicated that cervical adenocarcinomas share some risk factors with endometrial cancer [23, 24]. Horowitz *et al.* [25] report on different socioeconomic profiles for patients in the two histological groups. The adenocarcinoma cases appear to be of a more affluent socioeconomic background. According to some investigators cervical adenocarcinomas behave more aggressively and have a decreased survival compared with squamous cell carcinomas [26]. Other authors have reported no differences in survival between the two histological subtypes. In the present series the adenocarcinoma patients had an inferior prognosis; expressed both as crude rates (1956–1985)

and as rates for the various clinical stages (1971–1975 and 1981–1985).

A great deal of information is available emphasising the prognostic importance of clinical stage in cervical cancer. The clinical stage of the tumour has been reported to be the most important clinical factor with respect to survival [27]. In the present study the more advanced clinical stages proved a higher case fatality, consistent with other reports [10, 11]. Particularly advanced stage adenocarcinomas (III and IV) presented a very poor prognosis.

The incidence of cervical cancer and the mortality from the disease are increasing in younger women [28]. The influence of age on survival, however, is still undetermined. Earlier Norwegian studies have found no difference in survival between various age groups [29]. Other authors have noted a more favourable outcome in younger patients, whereas relatively recent reviews have suggested a poorer prognosis in young females [30–32]. In the present series there was a tendency towards a poorer prognosis in younger women. There has been speculation about a more aggressive tumour growth and faster progression in younger females. Aetiological factors such as human papillomavirus, more strongly expressed among younger females, might contribute. In addition, oral contraceptive use and cigarette smoking are factors that may interact with human papillomaviruses in the progression of the disease. The exact reasons for the worse prognosis, however, remain obscure.

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