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Short Communication

Large increase in a Dutch woman's lifetime risk of developing breast cancer

E. Paap^{a,*}, M.J.M. Broeders^{a,b}, G. van Schoor^a, J.D.M. Otten^a, A.L.M. Verbeek^{a,b}

^aDepartment of Epidemiology, Biostatistics and Health Technology Assessment, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

^bNational Expert and Training Centre for Breast Cancer Screening, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

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ABSTRACT

A large increase in the incidence of breast cancer has been observed in many countries over the last two decades. On the other hand, however, breast cancer mortality has decreased. The prominent burden of breast cancer in the female population induces a lot of discussion about incidence and mortality rates, whereas lifetime risks are less mentioned. This study provides information on the changes in risks for Dutch women with regards to being diagnosed with breast cancer (both invasive and *in situ*) or dying from this disease during the screening era.

We used the life table method to calculate lifetime risks for the period 1989–2003. The lifetime risk for developing breast cancer increased from 1 in 10 in 1989 to 1 in 7 in 2003; the risk of dying from breast cancer decreased respectively from 1 in 22 to 1 in 26. The increasing incidence is alarming but has to be seen in perspective; the decreasing mortality is promising and shows that, at most, one third of the breast cancer cases are fatal.

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1. Introduction

The prominent burden of breast cancer in the female population has resulted in a great deal of interest in all topics concerned with breast cancer. Since the implementation of service screening in many countries, the changes in both the incidence of and mortality rates from breast cancer have been widely discussed in the literature.^{1,2}

The increased incidence and decreased mortality in many European countries is demonstrated in a recent study by Héry and colleagues which reported on changes in breast cancer incidence and mortality in middle-aged and elderly women in 28 countries.³ In the Netherlands nearly 13,000 women are diagnosed with an invasive or *in situ* breast carcinoma each year.⁴

Although rates have regularly been reported in the literature, in the popular press, lifetime risk is a widely cited statis-

tic used for communicating risks to the general population.⁵ The lifetime risk represents the average risk at birth that a woman will develop breast cancer or die from breast cancer during her lifetime.⁶ We wanted to know the effect of the changes in rates on the individual lifetime risk. This study provides information on these changes in lifetime risk over the past two decades.

2. Patients and methods

2.1. Data

To calculate the lifetime risk we have used the life table method. Female breast cancer incidence, mortality and population data were obtained from the Netherlands Cancer Registry (NCR) and Statistics Netherlands for the years 1989–2003.^{4,7}

* Corresponding author. Tel.: +31 24 361 6944; fax: +31 24 361 3505.

E-mail address: e.paap@epib.umcn.nl (E. Paap).

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We used the absolute numbers of newly diagnosed breast cancer patients (invasive and carcinoma in situ) and the absolute numbers of breast cancer deaths of age groups of five years: 0–4, 5–9, ..., 90–94 and 95+. The 95+ age group included women aged 95 and older.

2.2. Life table method

In 1956, Goldberg and colleagues pioneered the life table method, which calculates the lifetime risks by means of a fictitious cohort of women from birth on the basis of life expectancy and the current incidence or mortality.⁸ This estimate of the lifetime risk can be computed if data on breast cancer morbidity, mortality and life expectancy tables are available.⁹ For determining the life table risk for breast cancer we used the method of Fay and colleagues with DevCan software, version 6.1.0, from the US National Cancer Institute.^{10–12}

We estimated the change in risk of developing or dying from breast cancer for two different age spans, namely the lifetime risk and the risk until age 75.

3. Results

The results in Fig. 1 show how the risk of developing breast cancer has changed over time. Both the lifetime risk and the risk up to 75 years of age show a considerable increase in risk over the last two decades. According to the life table method, 10.5% of all women born in 1989 will develop breast cancer, while for women born in 2003 this risk increases to 13.6%. The risk of developing breast cancer before the age of 75 increases from 7.8% in 1989 to 10.4% in 2003.

In Table 1, we converted the percentages to an individual risk. Using data from 1989, 1 in 10 women will develop breast cancer. By 2003, this has increased to 1 in 7 women. The risk of developing breast cancer before the age of 75 is 1 in 10 in 2003.

Fig. 2 and Table 1 illustrate the change in risk of breast cancer death during the screening era. The lifetime risk of dying from breast cancer declined from 4.6% (1 in 22) in 1989 to 3.9% (1 in 26) in 2003. Up to the age of 75, the risk decreased from 2.6% in 1989 to 2.2% in 2003.

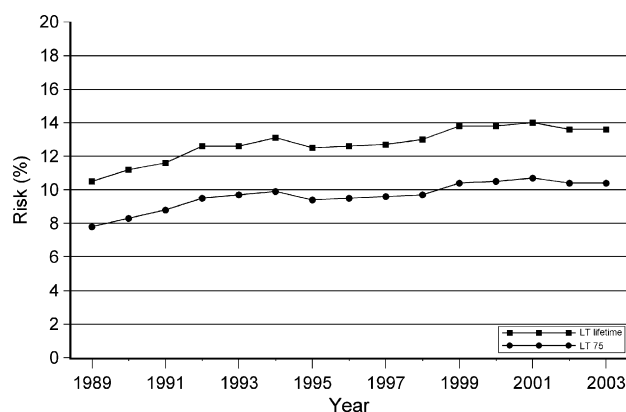


Fig. 1 – Change in risk of developing breast cancer (invasive and in situ) for the period 1989–2003 for the age groups up to 75 and for lifetime.

Table 1 – Individual risks of developing breast cancer and dying from breast cancer for a woman born in 1989 and for a woman born in 2003

	Risk of developing breast cancer		Risk of dying from breast cancer	
	1989	2003	1989	2003
Lifetime risk	10.5% 1 in 10	13.6% 1 in 7	4.6% 1 in 22	3.9% 1 in 26
Risk before the age of 75	7.8% 1 in 13	10.4% 1 in 10	2.6% 1 in 38	2.2% 1 in 45

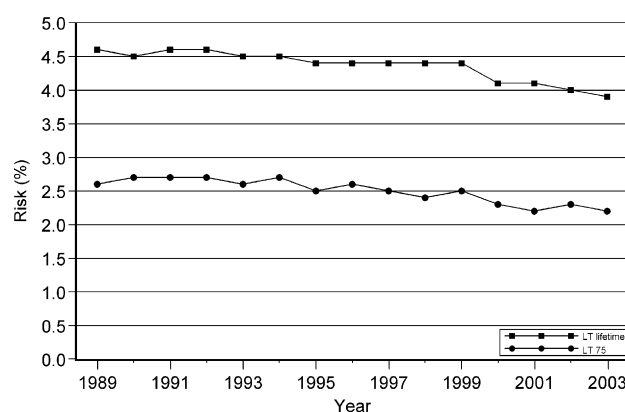


Fig. 2 – Risks of dying from breast cancer for the age groups up to 75 and for lifetime during the screening era.

4. Discussion

The results of our study show a large increase in the female lifetime risk of developing breast cancer over the last two decades. Although this increase is obvious, the reasons for it are still debated. One factor that can be associated with the increase is that women live longer and die less often from other causes.⁵ A second possible explanation is the change of exposure to risk factors over the past decades - for example, change in risk factors related to pregnancy, obesity and mammographic density.^{13,14} Soerjomataram and colleagues observed a strong correlation between the overall excess incidence of breast cancer and the average age of the mother at first birth.¹⁵ Besides a high average of mean age at first birth, populations in countries with a high breast cancer risk tend to have a clustering of other risk factors, for example, younger age at menarche and a higher body mass index.¹⁶ Furthermore, the increase in lifetime risk is often mentioned as an effect of the introduction of service screening, which started in the Netherlands in 1989.¹⁷ For example, overdiagnosis due to service screening has been noted as a possible reason.^{18,19} It is, however, unlikely that the increase in incidence is entirely attributed to screening.¹⁵ Even if this debate about the reasons for the increased incidence is solved, the question to what extent breast cancer could be prevented will remain.

In Europe, breast cancer incidence shows an increasing trend in many countries.^{3,17} Ferlay and colleagues have demonstrated that, in 2006, the Netherlands, after Belgium and

Ireland, had the highest incidence rate in Europe.² This high incidence rate reflects a high lifetime risk for breast cancer compared to other European countries.

Some remarks on the level of the current lifetime risk have to be made. The risk estimate is based on the entire female population and is therefore an average. Individual lifetime risks depend on the presence or absence of risk factors in the individual woman. In addition, surviving to an increased age results in a lower lifetime risk in the remainder of a woman's life.^{5,20,21} According to the Dutch Cancer Society the current lifetime risk of developing an invasive breast cancer for a Dutch woman is 1 in 8. The remaining lifetime risk for a woman aged 50 is 1 in 9 and for a woman aged 60, 1 in 12.²² The risk of developing breast cancer before the age of 75 (1 in 10) is considerably lower than the lifetime risk, because breast cancer incidence increases with age.

Besides an increased chance of developing breast cancer, the results demonstrate a decrease in risk of dying from breast cancer. The risk of dying before the age of 75 is even lower. The low mortality risk compared to the high incidence risk can be credited to diagnosis of breast cancer in an early stage and to improved therapy.¹

The implementation of the breast cancer service screening in the Netherlands has introduced, among other things, an increase of carcinoma *in situ* over the last two decades.²³ In calculating lifetime risks of developing breast cancer, we included patients with a carcinoma *in situ* because these women are treated in the same way as women with a small invasive carcinoma.^{23,24} It should be pointed out that in using the numbers from the Netherlands Cancer Registry, women who develop a second breast cancer with a different morphology are counted twice. Inclusion of the carcinoma *in situ* in our calculations will overestimate the risk of developing breast cancer because some of these women develop an invasive carcinoma later in life. A rough estimate of this overestimation is that the risk of developing breast cancer decreases by 0.2%, which would lead to an individual life table risk of 1 in 7.5.

In conclusion, the breast cancer incidence has increased to a high level and currently 1 in 7 Dutch women will develop breast cancer sometime during their life. Although the incidence has increased, the mortality has decreased during the last two decades and at the moment the risk of dying is 1 in 26.

Conflict of interest statement

None declared.

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