

Appendix

Age at invitation

The Norwegian Breast Cancer Screening Program (NBCSP) invites all women in the target group based on their birth cohort and the municipality they reside in, to attend one of the NBCSP's 30 screening facilities (26 stationary facilities and 4 mobile units) during the course of a defined two-year period. This implies that the women's actual age at invitation will vary considerably. For example, women born in 1937-56 and residing in the county of Sogn og Fjordane were invited for screening in the period 1 January 2005 to 31 December 2006. This means that the youngest woman (born in December 1956) invited at the beginning of the screening round in that county (January 2005) was aged 48 when invited. A further example is of women born in 1931-50 and residing in the counties of Troms and Finnmark who were invited in the period 22 May 2000 to 3 June 2002. This means that the oldest woman (born in January 1931) invited at the end of the screening round in those counties (June 2002) was aged 71.5 when invited.

When the NBCSP started as a pilot project, it was decided that all women should be invited to attend screening twice. This means that women from the counties of Akershus, Oslo, Rogaland and Hordaland who were born in 1927-28 received an additional invitation in the period 1998-99. As an example, women born in 1927-28 and residing in Akershus were invited in the period 23 March 1998 to 27 March 2000. This means that the oldest woman (born in January 1927) invited at the end of the screening round in that county (March 2000) was aged 73.3 when invited. This gives an overall age variation from 48 to 73.3 years.

Norwegian mortality studies

Kalager et al. applied the turn of the year closest to the counties' date of implementation of the NBCSP as the approximated date of invitation for the women in the invited group: see their appendix for details (1). A woman who is invited at the end of the screening round in a county will be classified as invited two years before she received her first invitation to the programme. In addition, a half-year margin of error must be added for counties that started screening in May-June because of their approximation to the next turn of year. As a result, a woman may have been classified as invited up to 2.5 years before receiving her first invitation to the programme.

Kalager et al. followed the women in relation to age up to the end of 2005 (1). I have calculated the average follow-up time from date of invitation based on information in their paper: the number of women-years in the screening group, Table 1 in their appendix, and the study period given in their Figure 1. By dividing the number of women-years by the average follow-up time for each region, we get the estimated number of women invited. The average follow-up time from invitation is thus calculated as 3.4 years (the sum of women-years divided by the sum of the number of women (2,337,322/696,866)) (Appendix, Table 1).

Norwegian overdiagnosis studies

In order to observe any decrease in cancer incidence rates in the period after the women reach the upper age limit of the NBCSP, it is a prerequisite that the women must have been invited previously. Based on population data (population as of 31 December grouped by county, 1-year age- and 1-year period groups)(2) and the date of implementation of the NBCSP in the various counties (information from the Cancer Registry of Norway), I have calculated the proportion of women-years invited in the period after end of screening in each of the three studies that evaluated overdiagnosis after the implementation of the NBCSP. All three studies include women aged 70-79 in the post-screening period, but have different length of follow-up (3-5).

Appendix Tables 2 and 3a show the population figures within the red demarcation line for the middle and right-hand panel respectively in Figure 2. Since summarial figures are applied, the women-years must be assigned to the different categories (blue/pink/yellow) based on the implementation of the NBCSP. The diagonally split cells are apportioned equally between the two adjoining categories.

Zahl & Mæhlen (3) study the four pilot counties in the period 1998-2009 (Appendix Table 2). Among women aged 70-79, 36% of the women-years have never been invited (blue), 12% are still receiving invitations (pink), and 52% have been invited previously (yellow).

Kalager et al. (4) study the period 1996-2005. Among the four pilot counties (their Region 1), 61% of the women-years have never been invited (blue), 10% are still receiving invitations (pink), and 29% have been invited previously (yellow) (Appendix Table 3a). Among the next five counties (their Region 2), 71% of the women-years have never been invited (blue), 10% are still receiving invitations (pink), and 19% have been invited previously (yellow) (Appendix Table 3b). In the last two counties (their Region 6), 90% of the women-years have never been invited (blue) and 10% are still receiving invitations (pink) among women aged 70-79 in the post-screening period (Appendix Table 3c).

Falk et al. (5) apply individual data and take into account the women's screening history. All the women studied in the post-screening period have been invited previously (yellow).

Appendix Table 1: Follow-up time from date of invitation, Kalager et al. (1)

Region	No. of women-years	Average no. of follow-up years	Estimated no. of persons
1	1430069	5	286014
2	305697	3	101899
3	197766	2,5	79107
4	333393	2	166696
5	21743	1,5	14495
6	48655	1	48655
Total	2337322		696866

Appendix Table 2: Follow-up time (women-years) after end of screening for the four pilot counties (Akershus, Oslo, Hordaland and Rogaland) in the period 1998-2009 (data from Statistics Norway): middle panel in Figure 2, Zahl & Mælhen (3)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
79 yrs	6080	5692	7032	6481	6299	6066	5893	5657	5614	5203	5282	5308
78 yrs	5935	7318	6742	6541	6363	6121	5855	5824	5393	5462	5502	5616
77 yrs	7605	6994	6810	6595	6340	6051	6024	5570	5633	5675	5789	5717
76 yrs	7198	7008	6815	6546	6227	6214	5747	5792	5832	5930	5875	5658
75 yrs	7195	7016	6737	6402	6391	5912	5946	5966	6088	6026	5765	5489
74 yrs	7193	6920	6574	6557	6080	6103	6121	6238	6166	5906	5598	5566
73 yrs	7088	6720	6691	6209	6243	6268	6336	6264	6025	5701	5665	5732
72 yrs	6848	6838	6363	6372	6405	6463	6365	6121	5790	5778	5827	5820
71 yrs	6965	6487	6494	6517	6587	6471	6218	5883	5869	5919	5924	6161
70 yrs	6595	6617	6649	6698	6577	6314	5971	5941	5984	5995	6224	6622

Appendix Table 3a: Follow-up time (women-years) after end of screening for the four pilot counties (Akershus, Oslo, Hordaland and Rogaland, their Region 1) in the period 1996-2005 (data from Statistics Norway): right-hand panel in Figure 2, Kalager et al. (4)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
79 yrs	5786	6094	6080	5692	7032	6481	6299	6066	5893	5657
78 yrs	6352	6345	5935	7318	6742	6541	6363	6121	5855	5824
77 yrs	6588	6146	7605	6994	6810	6595	6340	6051	6024	5570
76 yrs	6350	7833	7198	7008	6815	6546	6227	6214	5747	5792
75 yrs	8070	7414	7195	7016	6737	6402	6391	5912	5946	5966
74 yrs	7580	7380	7193	6920	6574	6557	6080	6103	6121	6238
73 yrs	7559	7379	7088	6720	6691	6209	6243	6268	6336	6264
72 yrs	7531	7232	6848	6838	6363	6372	6405	6463	6365	6121
71 yrs	7356	6982	6965	6487	6494	6517	6587	6471	6218	5883
70 yrs	7127	7077	6595	6617	6649	6698	6577	6314	5971	5941

Appendix Table 3b: Follow-up time (women-years) after end of screening for the five next counties (East- and West-Agder, Telemark, Troms and Finnmark, their Region 2) in the period 2000-2005 (data from Statistics Norway), Kalager et al. (4)

	2000	2001	2002	2003	2004	2005
79 yrs	2599	2549	2398	2474	2294	2256
78 yrs	2647	2495	2565	2374	2323	2370
77 yrs	2584	2653	2469	2411	2448	2303
76 yrs	2741	2547	2482	2514	2372	2366
75 yrs	2614	2550	2568	2437	2421	2226
74 yrs	2606	2646	2506	2471	2290	2408
73 yrs	2711	2556	2523	2334	2435	2345
72 yrs	2607	2578	2383	2506	2379	2433
71 yrs	2619	2445	2539	2423	2479	2207
70 yrs	2491	2587	2460	2526	2233	2305

Appendix Table 3c: Follow-up time (women-years) after end of screening for the last two counties (Hedmark and Vestfold, their Region 6) in the period 2004-2005 (data from Statistics Norway), Kalager et al. (4)

	2004	2005
79 yrs	1745	1523
78 yrs	1579	1662
77 yrs	1736	1654
76 yrs	1705	1677
75 yrs	1723	1674
74 yrs	1699	1652
73 yrs	1693	1623
72 yrs	1674	1834
71 yrs	1868	1576
70 yrs	1602	1659

References

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