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|  **National Screening Advisory Committee (NSAC)** **National Screening Unit (NSU)** |
| **Minutes Tuesday 18 November 2015** |
| Venue | Ministry of Health (MOH), Sunderland Room, Main Terminal, Wellington Airport  |
| Start time | 10.00am |
| NSAC Members  | Professor Ross Lawrenson (Chair)Dr Jane O’Hallahan (Deputy Chair) Dr Carol AtmoreAssociate Professor Brian CoxDr Joanne Dixon John Forman Dr Bryn JonesAstrid Koornneef Professor John McMillan Dr Deborah Rowe Associate Professor Diana SarfatiDr Andrew Simpson Dr Pat Tuohy  |
| Ministry of Health Attendees  | **NSU** Anne McNicholas Dr Bronwyn Rendle **Item 4: Primary HPV Screening***National Cervical Screening Programme* Helen Colebrook, Programme Manager Dr Margaret Sage, Clinical Leader *National Services Purchasing* Stephanie Chapman, Project Director  | **Item 5: BSA Mortality Evaluation** *BreastScreening Aotearoa* Dr Marli Gregory, Clinical Leader Maree Pierce, Programme Manager *Information, Quality and Equity, NSU* Dr Kerry Sexton, Manager**Item 6: Bowel Cancer Screening** *Sector Capability and Innovation*Deborah Woodley, Group Manager, Personal Health ImprovementMhairi Porteous, Manager, Bowel and  Prostate Cancer Programmes Dr Susan Parry, Clinical Director, Bowel  Screening |
| Other Attendees | **Item 6.** *Universities of New South Wales and Adelaide; and University of Otago:*Dr Stephen Morrell, Professor Richard Taylor, Dr David Roder, Bridget Robson.  |
| Apologies | Professor Jackie Cumming (NSAC) |

| **Item** | **Subject and summary** |
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| **1** | **Welcome, apologies and introductions** Ross Lawrenson welcomed the NSAC members, noting first meeting attendance of Dr Andrew Simpson, and apologies from Professor Jackie Cumming.  |
| **2** | **Declaration of conflicts of interest (COI)**COI register tabled with no additions. Item 4: Carol Atmore noted her previous position as Clinical Leader of the Bowel Screening Programme and Diana Sarfati her position on their Advisory Group  |
| **3** | **Minutes of 14 October 2015** Confirmed as a true and accurate record, subject to the addition of information noted by Brian Cox that:* ethical considerations related to policy decisions are not specifically stated in NHC criteria
* modelling of primary HPV testing does not simulate the NCSP, but the impact of a policy on a group of women born in 1997
* primary HPV testing will require consideration of information needs and the interaction between health professionals and patients regarding the meaning of a positive hrHPV test.
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| **4** | **HPV testing for primary screening in the National Cervical Screening Programme (NCSP)**Helen Colebrook summarised the feedback from public consultation undertaken during October 2015. *Submitters were generally supportive of the change. Issues raised included:* * the need to increase HPV immunisation, with about half of each public meeting time taken by issues related to this issue
* the importance of engaging men as they often act as information/decision gatekeepers in families
* a preference for co-testing (expressed by two pathologists in particular)
* a view that liquid bases cytology (LBC) sensitivity in New Zealand labs is higher than that indicated in international literature and this would impact on evaluation modelling results (expressed by one pathologist)
* the benefit of cytology screening in detection of a small number of other cancers
* requirement for adjunct cytology prior to colposcopy if HPV/16/18 positive (noting it was not clear from the consultation documents that this approach was intended)
* a preference for a pilot by a small number of submitters
* support for the five year interval by most, however, concern regarding a decrease in equity if women delay screening beyond five years, with mitigation strategies such as recall and wrap around services required. A preference for a three yearly interval was favoured by one submitter citing this as a safety check in the UK (however this safety check is expected to be implemented only in their pilot).

*Few submissions supported raising the age to 25 years** Most supported maintaining cytology screening in this age group, at least until higher immunisation rates are achieved.
* Of those who supported increasing the age, the majority were clinicians (including the Royal Australian and New Zealand College of Obstetrician and Gynaecologists (RANZCOG) New Zealand Committee.
* Community groups were more likely to express concern, with a number citing early sexual debut in New Zealand, and a history of sexual abuse as increasing an individual’s risk.
* While a number of submissions acknowledged international evidence that screening in this age group does not reduce mortality, there remained caution around change as an individual case is regarded as catastrophic.

*NCSP Advisory Group support* The majority of members of the NSCP Advisory Group present at their most recent meeting were of the firm view that women under 25 should not be screened. However, two Group members adamantly held an opposing view; one a pathologist and the other a representative from the Women’s Health Action Group, with both also making formal submissions to that effect as part of public consultation. * The Group wanted the wording for recommendation four changed from “…*the NCSP will further assess the harms and benefit of raising the screening starting age to 25 years age…”* to “…*the NCSP will further assess the harms and benefit of maintaining LBC screening in the 20-24 year age group*…”

*NCSP Technical Reference Group (TRG) support* The TRG supports the recommendations to move the primary HPV screening, along with further consideration of maintaining cytology screening in the 20-24 year age group. *NCSP Māori Monitoring & Equity Group (MMEG) support* MMEG supports the recommendations, contingent on the additional modelling the New South Wales (NSW) Cancer Council research group are currently undertaking showing the change is positive for Māori; noting support for research around self-sampling, some concerns re potential to miss a case in 20-24 year age group, and some hesitation re moving to a five year interval if screening is delayed further by some women. MMEG requested a wording change around recommendation four (as above under NCSP Advisory Group support); and also the addition of the word “patterning” to the …text related to analyses of the incidence of cervical cancer. *Next steps*The NCSP Advisory Group, TRG and MMEG have reviewed the feedback from public consultation and the NSU recommendations. Following NSAC endorsement of the recommendations, the NSU will submit a Health Report to the Minister in December 2015, seeking approval to progress planning for implementation of primary HPV screening. *Discussion included:* Consultation with the colleges * Noted support from colleges important; and that a number had provided feedback already. Suggested that the viewpoint of the Australasian College of Pathology be specifically sought. The recent National Colposcopy Conference saw support by the majority of attendees. The RANZCOG, the Royal New Zealand College of General Practitioners (RNZCGP) and the New Zealand Medical Association (NZMA) indicated support.

Colposcopy volume increase * Not a particular concern, especially with adjunct cytology for HPV 16/18 allowing triage if needed to manage wait lists.

Self-sampling * A Request for Proposals (RFP) has gone out for research to assess the acceptability in Māori, with results expected in about two years.
* Substantial work remains to evaluate options for self-sampling for all women. Members with clinical experience indicated that it was highly likely that all women would prefer to self-sample given the opportunity. Assuming high quality of self-sampling, it was observed that it would be advantageous for the programme overall, and its acceptability for all women should be assessed, rather than just priority groups.
* The risk of over testing was raised, eg, self-sampling could see some women take a test more frequently than recommended.
* A two tier system was viewed as unacceptable if the self-sampling test quality proves lower than when a health professional takes samples; however it was also argued that lower quality samples or tests in under or never-screened women was better than not being screened at all.

Harms & Benefits of screening the 20-24 year group * Many people assume screening per se is harmless when it is not.
* Screening does rarely detect cancers in this group so some reduction in morbidity occurs but not mortality.
* Noted there is a small number of rapidly progressive cancers that occur in a selected group of young women, for whom screening is not effective.
* Additional research is being undertaken including: a case review of New Zealand cases in the 20-24 year age group, but issues exist around small numbers; a review of cancer registry data and screening history in all cases across all age groups; and the NSW cancer research group re-modelling around the 20-24 year age group.
* Noted that if New Zealand was starting a cervical programme now, it would not include 20-24 year age group.
* Political risk / significant public reaction when a women dies in this age group and this risk is arguably the only reason screening in the age group continues. Upfront acknowledgement that cases will occur is required as screening cannot prevent all cases. Also concern expressed that advice about maintaining screening in this age group should be based on best public health information and not diluted by reaction to political considerations.
* Obstetrics view is that harms are such that testing in this age group should stop.
* Suggested consideration could be given to stop screening this age group but alongside the offer of free HPV vaccine.
* Noted that maintaining cytology for transitional period will require identification of an indicator to trigger the stopping point.

Health professional / patient conversation re HPV test results * One member noted a 10% increase in cervical cancer incidence in women under 45 years over last decade, which could be regarded as either a programme failure or could reflect an actual increase in incidence. This situation prompts his concern regarding the safety of women, suggesting screening uptake may reduce because the interaction/conversation about cytology results differs to that around HPV test results, ie, will understanding that HPV infection is an STI impact on programme participation, suggesting research was needed to provide reassurance in this area.
* In contrast, it was noted that explaining HPV/STI status has not been an issue in the large Australian Compass study or its New Zealand arm, the later with approx 600 participants.
* Also noted that most smear takers are already having these conversations with women, and there is already experience explaining HPV testing/results given this is a triage step in the current pathway.
* Noted can’t keep doing LBC because of what people might think, or how they might react to being told they have an HPV infection; and it was ethically unjustifiable to delay when weight of evidence was in favour of change.

Exit testing for 70-74 year age group * Supported raising exit age to 74 years, with pathway itself to be detailed in the clinical guidelines and noting it will vary according to a person’s screening history, eg, if HPV negative would exit around 69-70 years, otherwise if HPV positive would continue.

Co-testing * Viewed as a safer approach by some submitters, although modelling shows it is not cost effective. A submission from one pathologist estimated LBC costs would not be as high as estimated in the modelling and that their laboratory could perform five yearly interval HPV and cytology co-testing for the same cost as the current three yearly interval cytology. However, no costings were included in the submitters response. It was suggested by meeting attendees that the proposed savings could relate to the facility to extend LBC automated reading using the SurePath system to include the “no further review” option. However this approach would not apply to the approx 50% of samples tested using ThinPrep, where this level of automted reading cannot be done. It was noted that fully automated LBC is not an approved testing procedure in New Zealand.

Strengthening the recommendation related to HPV immunisation * Emphasised the importance of achieving higher HPV vaccination coverage, with the ability to ultimately achieve herd immunity noted
* Noted also that protection is also conferred beyond cervical cancer eg oral cancers; and that MMEG have expressed concern around impact on the wider whānau of not vaccinating boys.
* While noting NSAC’s expertise is around screening, members wished to strengthen the originally proposed noting point to better reflect the priority that should be given to increasing HPV immunisation levels (Pat Tuohy to assist with rewording).

 **Recommendations endorsed as below noting:** * Recommendation 1: endorsed by the committee with exception of Brian Cox who noted his support instead for co-testing and concerns regarding the impact on programme uptake associated with telling women they have an HPV infection.
* Recommendation 4: add words “…*and patterning…” (*of cervical cancer in New Zealand women aged 20-24 years)
* Recommendation 4: amend text by replacing: “…benefits of raising the screening starting age to 25 year…” with “ ...benefits of maintaining screening in women aged 20-24 years”
* Recommendation 6: amend the wording to include evaluation of the “quality” of self- sampling HPV tests; and change wording to include “ women” instead of “priority women”
* Recommendation 7: add words to end of sentence “…including exploration of self-sampling”
* Recommendation 8: amend the original noting point that “*The Ministry of Health is intensifying activity towards achieving HPV vaccination coverage levels of around 80%*” to a recommendation that “*NSAC will request that the Ministry’s HPV Immunisation Programme support the National Cervical Screening Programme by intensifying efforts to increase HPV immunisation coverage and by setting a national HPV immunisation coverage goal*.
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**NSAC endorsements:**

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| 1. |  | Agreed the NCSP will implement cervical screening using a primary HPV test with partial HPV genotyping for HPV 16/18 for women aged 25 to 69 years with: * Adjunct LBC in women who are test positive for HPV16/18. These women will have reflex LBC (using the same sample) so that cytology results are available at colposcopy. All women with HPV/16/18 will be referred to colposcopy.
* Triage LBC in women who are test positive for other hrHPV types. These women will have reflex LBC (using the same sample) with referral to colposcopy only if high grade cell changes are found. Women with no cell changes or low grade changes have a repeat HPV test 12 months later.
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| 2. |   | Agreed the screening interval changes to every five years instead of three yearly.  |
| 3 |  | Agreed the screening pathway will include exit testing of women between 70 and 74 years of age. |
| .4 |  | Agreed the NCSP will further assess the harms and benefits of maintaining screening in women aged 20-24 years, including additional analyses of:* the incidence and patterning of cervical cancer in New Zealand women aged 20-24 years
* the impact of New Zealand’s HPV vaccination levels on the incidence of high grade lesions in the 20-24 year age group, and also on LBC test performance.
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| 5 |  | Agreed the NCSP will consider maintaining LBC screening in women aged 20-24 years for a transitional period, depending on the assessment of harms and benefits of screening this age group.  |
| 6. |  | Agreed the NCSP will further evaluate the quality of self-collected HPV sample test performance, as well as the acceptability of self-sampling for women, before implementing self-sampling as a screening pathway.  |
| 7 |  | Agreed the NCSP will provide further advice on how to achieve equitable access to screening for Māori, Pacific and Asian women, including exploration of self-sampling.  |
| 8 |  | Agreed the NSAC will request that the Ministry’s HPV Immunisation Programme support the National Cervical Screening Programme by intensifying efforts to increase HPV immunisation coverage and by setting a national HPV immunisation coverage goal.  |

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| **5** | **A cohort and a case control analysis of breast cancer mortality: BreastScreen Aotearoa 1999-2011.** In 2012 the NSU commissioned an independent analysis of the effectiveness of the BSA programme at reducing breast cancer mortality. The evaluation was undertaken by internationally recognised researchers: * Stephen Morrell and Richard Taylor, School of Public Health and Community Medicine, Faculty of Medicine, University of New South Wales.
* David Roder, School of Population Health, Sansom Institute for Health Research, University of South Australia.
* Bridget Robson, Te Rōpū Rangahau Hauora a Eru Pōmare, University of Otago, Wellington

The report was peer reviewed by Stephen Duffy, Professor of Cancer Screening and Director of the Policy Research Unit in Cancer Awareness, Screening and Early Diagnosis, University of London. The researchers presented the study methods and key findings to NSAC. * The study used linked cancer registry, mortality, census and mammography data (from BSA) to evaluate the effects of mammographic screening on breast cancer mortality in all New Zealand women (1999-2011) in relation to expectations from international evidence.

The study findings included: * a 34% mortality reduction comparing screened with never screened women using the 2012-13 screening coverage of 71% (inception cohort study)
* a 28% mortality reduction comparing screened with never screened Maori women using the 2012-13 screening coverage of 65% (inception cohort study)
* a 40% mortality reduction comparing screened with never screened Pacific women using the 2012-13 screening coverage of 72% (case-control study)
* a dose response with generally a lower breast cancer mortality with greater screening regularity.
* a lower breast cancer mortality for screen-detected cancer than cancers detected outside the screening programme.
* more favourable prognostic indictors at diagnosis in screened women and for screen-detected cancers.

Discussion included: * Adjustment for screening selection bias using the relative risk of 1.17 from the Swedish Service Studies, particularly as to surety that this was the most appropriate figure for New Zealand and whether sensitivity analyses had been undertaken around this figure
	+ Noted the UK had used the figure in their evaluation and New Zealand is not likely to be a quantum leap from this; the Dutch reported a different figure so it is variable
	+ While there will be a population difference in New Zealand, the results remain quite powerful, and provide an indicator that can leave you not troubled by the effect of screening.
	+ Noted the study compares the programme results with Randomised Control Trial (RCT) results and takes an intention to treat approach. Without the adjustment, the crude reduction comparing ever and never screened would be around 63%, which is not plausible. With the adjustment, the reduction is in line with the RCTs and findings from other countries.
	+ The effect of the adjuster on Māori data was similar to general population
* The potential impact on selection bias or lead time bias from women ie participating in screening outside the BSA programme, eg, screened privately or participating in pilots before introduction of the BSA programme
* Whether the study was measuring efficacy or effectiveness
* Comparability with previous estimates of BSA screening on breast cancer mortality
* The extent to which evaluations of breast screening programmes can give exact results, but rather provide an indicator of effect.
	+ Noted the while can’t expect to the figures to fall exactly in line with RCT results, the confidence intervals (CIs) in this report cover the point estimates reported from trials; and the indicators for the New Zealand programme are along the same lines as other countries.
* Potential impact on results from changes in screening technology, increased awareness of breast cancer including GPs, and treatment improvements compared with the era in which RCTs were performed
* Prognostic indicators are in line with mortality results and also trials; and reassurance was noted with these results being seen across ethnic groups.
* The key issue for Māori is the need to increase screening participation rates; noting also that with Māori women are over-represented in once only attenders

The Chair commended the authors on the quality of their report and extended NSAC’s appreciation for the work they had undertaken. Further points noted included:* The NSU plans to release a plain English summary report.
* Controversy about breast cancer screening exists more around over-diagnosis. There is need to understand concepts such numbers needed to screen and absolute risk versus relative risk.
* A study is underway looking at risk of breast cancer (HRC funded) with results probably next out year.

Following the meeting the researchers provided additional information by way of written response to some questions posed during the discussion. These responses were emailed to NSAC members, and are also provided as an appendix to these minutes (Appendix 1). The responses related to: * Sensitivity analyses around the adjustment for screening selection bias using the relative risk of 1.17.
* The estimation of a New Zealand based RR for breast cancer mortality of never screened with screening available compared with never-screened with no screening available for adjustment for screening selection bias.
* The impact of the bias from mammographic screening outside the BSA programme group.
* Previous estimates of breast cancer mortality reduction and the present study.
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**NSAC endorsements:**

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| *1.* |  | Noted the findings of the report *A Cohort and a Case Control Analysis of Breast Cancer Mortality: BreastScreen Aotearoa 1999-2011.*  |
| *2.* |  | Agreed that based on the independent report findings, there is evidence of a mortality benefit from participating in the BSA programme. |
| *3.* |  | Noted the NSU plans to provide the report findings to the Minister of Health by 30 November 2015. |
| *4.* |  | Noted following Ministerial agreement, the NSU plans to publicly release the report findings, either in late 2015 or early 2016.  |
| *5.*  |  | Agreed that they support the public release of the report findings.  |

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| ***6***  | **Bowel cancer screening** *Flexible sigmoidoscopy* Brian Cox presented a preliminary assessment of a national one-off flexible sigmoidoscopy bowel screening programme which supports its introduction as a national programme. * + The related paper provided prior to the meeting is confidential to NSAC, pending publication

Diana Sarfati presented examples of modelling studies looking at one-off flexible sigmoidoscopy and immunochemical faecal occult blood (FIT), with the findings generally showing * + Both FIT and one-off flex sig based programmes are cost effective compared with no screening.
	+ FIT-based programmes are expected to have a greater impact on mortality than single flex sig based, and also a greater impact on colonoscopy capacity.
	+ The combination of both (where assessed) provides greater benefit than either alone, but also has a greater impact on resources.
* The presentation and relevant published papers will be provided to NSAC members

*Bowel Cancer Screening Pilot and Programme – Update* Noted that NSAC’s role at this stage is to be aware of the Bowel Screening Pilot progress, with governance expected to move to NSAC once a national programme is in place**.** Mhairi Porteous and Susan Parry provided a progress update on the Pilot and the proposal for a national programme * The four year Waitemata DHB pilot started in 2012, with an extension through to Dec 2017.
* A business case for a national programme is expected to go forward by the end of the year, with a staggered rollout anticipated from early 2017.
* Overall results from the pilot were presented, as well as analyses regarding the estimated number of additional colonoscopies the programme will generate across DHBs.

Discussion included: * The significant inequities in pilot participation levels.
* Inequities are reducing as additional initiatives are introduced, but still a substantial issue.
* The importance of addressing inequity from the outset of a national programme’s introduction was noted, including for example, incentivising DHBs through their contracts.
* The importance of applying the NHC screening criteria from the start of the programme was also noted.
* The proposal to manage colonoscopy volumes through shifting the FIT cut off level above that used in the pilot.
* It was estimated that lifting the cut off from 75ug to 200ug would mean colonoscopy volumes would be achievable. The programme would still detect 80% of cancers that would have been detected using the pilot threshold (a better performance than would be achieved from the guaiac faecal occult blood tests).
* The cut off-level could be moved down once the programme was in place and when DHB capacity increases.
* Substantial concern was expressed regarding plans to provide FIT results to GPs as either screen positive or negative, rather than reporting the actual measurement.
* The ethics of withholding full information was questioned, given people have consented to be screened and the information is materially important. New Zealanders’ expectation is that health information is “theirs”.
* Will end up with a group of people with known elevated risk compared to others, but with the GP and the patient not being aware of this information. Under the patient code of rights they are entitled to be advised of this result, especially given the cut off differs from that used in the pilot.
* The pubic conversation is already in place around thresholds for prioritisation, eg elective surgery.
* The proposed approach to providing results as positive or negative was viewed as a significant risk. A better approach was believed to be to tell the patient the result and talking through what it may mean, with the opportunity for action, eg, being alert to or acting on symptoms.
* In the future there could be potential to establish a tailored risk scoring approach that includes consideration of other risk factors, eg, BMI, gender and family history.
* It was observed that other countries have resolved this issue in different ways, particularly around reporting results from guaiac faecal occult blood test, and there is a substantial related literature.

**Action:** It was agreed that the Chair would write a letter submitting a formal response to the Bowel Screening Programme about the risks around how FIT results are presented and also issues of equity.  |
| **8** | **Other business** Topics NSAC will likely consider next year include: * Down syndrome: the current quality improvement programme around the ultrasound scan and the likely introduction of non-invasive prenatal testing (NIPT), which tests cell free fetal DNA in maternal blood.
* The 2014 Ministry guidelines for the screening, diagnosis and management of gestational diabetes, with a previous request that NSAC consider the screening guidelines.

Meeting dates for 2016 confirmed: * Wed 16 March
* Wed 6 July
* Wed 9 November
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|  | The meeting closed at 4.30pm. |

**Appendix 1. A cohort and a case control analysis of breast cancer mortality: BreastScreen Aotearoa 1999-2011.** Authors: Stephen Morrell, Richard Taylor, David Roder, Bridget Robson.

Authors response to some points discussed during the teleconference on the BSA breast cancer mortality evaluation (emailed to NSAC members 26 Nov 2014)

**1. Incorporation of variance of relative risk (RR) from Swedish service studies in screening selection bias adjustment**

The RR of 1.17 had 95% CIs that were integrated into calculations of the CIs around the screening selection bias adjusted estimates. This was accomplished by extracting the standard error (variance) from the published CIs for 1.17. This is documented in the report Methods section 2.1.11.1. Note that the formula for calculating the variance of RRadj includes the variance of Dr (RR from Swedish service studies). The adjusted relative risk is:

*RRadj =Dr(pRRder + 1 − p)*

The variance for *RRadj* is calculated from:

*V{ln(RRadj)} = V{ln(Dr)} + p2(RRder)2V{ln(RRder)}*

*(pRRder+1-p)2*

**2. Estimation of a NZ-based RR for breast cancer mortality of never-screeners with screening available compared to never-screeners with no screening available for adjustment for screening selection bias**

Such calculations could be accomplished by comparing cumulated breast cancer mortality over 4 years from breast cancer cases diagnosed over 1996-1998 to 4-year cumulated mortality from breast cancer cases diagnosed in never-screened women over 2005-2007. The 1996-98 period dates from the advent of mandatory pathology notification up to just prior to the operation of BSA, and avoids the major treatment improvements that were introduced from the late-1980s to mid-1990s. The 2005-07 period captures the 45-69 year age range. 5 year cumulated mortality would require breast cancer incidence, mortality and screening linkage to 2012.

However, the resulting estimate would likely be biased since the comparison is not contemporaneous and never-screeners with breast cancer diagnosed in 2004-06 would experience a different clinical environment than never-screeners in 1996-98. Furthermore, separate analyses would need to be undertaken for Maori and Pacific women since external RRs are likely to be more fraught for ethnic sub-groups than for others – yet numbers may be insufficient.

**3. Mammographic screening in the never screened by BSA group**

Bias from mammographic screening outside of the service program has occurred commonly in controls in the randomised trials and comparative populations not offered screening in service studies, although the magnitude of this screening is often difficult to determine. Such bias reduces the apparent effectiveness of mammographic screening. IARC estimated that after correcting for these biases in the trials the effect of actual screening on breast cancer mortality among screening participants was 35% reduction (compared to 20-30% reduction from intention to treat analyses).

Some of the never screened (by BSA) women in the analyses may have had screening mammography before commencement of the program in 1999 or during the study period, although the magnitude of the screening and the consequent reduction in BSA screening effectiveness is difficult to quantify.

No women with breast cancer diagnosed before 1999 were included in the study, and there is no effect of lead time bias from screen detected cancers prior to 1999 affecting the study as the

investigations compares breast cancer outcomes in women variously exposed to screening mammography without regard to time of diagnosis.

**4. Comparability with previous estimations of effects of BSA screening on breast cancer mortality in NZ**

Estimations of breast cancer mortality reductions from service screening in New Zealand are given in:

Cox B. The effect of service screening on breast cancer mortality rates. European Journal of Cancer Prevention 2008, 17:306–311.

This study uses breast cancer deaths in NZ 1995-99 along with published effects of mammography screening from other programmes and national settings on breast cancer mortality to estimate potential preventable breast cancer deaths from screening in New Zealand.

The present study is an empirical investigation using cohort and case control analyses of actual breast cancer mortality in relation to recorded BSA screening conducted within a population service screening epoch. The actual mortality reduction in ever screened (by BSA) compared to never screened is 64%, and 62% when adjusted for age and ethnicity. The only data manipulation undertaken was to adjust for screening selection bias so that data can be compared with trial results which then show a 32% breast cancer mortality reduction for ever compared to never screening