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Participation in Cervical Screening by Older Asian and Middle Eastern Migrants in New South Wales, Australia

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ABSTRACT

Background: There is little information on the detailed patterns of cervical screening uptake in older migrant women in Australia. This linkage study was performed to assess cervical screening participation in older migrants.

Methods: We linked year 2000-2001 records for 14,228 Middle Eastern/Asian-born women 40-64 years of age, and an age and area matched random sample of 13,939 Australian-born women in the New South Wales (NSW) Admitted Patients Data Collection (APDC), which records country of birth, to screening register records. Screening behaviour after 1st July 2001 was assessed in women without a recorded prior cervical abnormality

Results: Compared to Australian-born women, women born in South Central Asia had a lower screening participation rate (odds ratio for being screened at least once within a 3 year period 0.78, 95% CI 0.70-0.88). However, participation appeared relatively higher (17%-25%) in women born in the Middle East or other parts of Asia. Screening increased with increasing socioeconomic status (SES) in Australian-born women, but this trend was not observed in the migrant women. When we broadly corrected for hysterectomy, the apparent excess of screening in women from the Middle East and other parts of Asia was substantially eliminated and in contrast, the apparent deficiency in screening in women from South Central Asia increased.

Conclusions: Older women from the Middle East, and North East and South East Asian countries appeared to have similar overall screening participation to that of Australian-born women. Women from South Central Asia appeared less likely than Australian-born women to participate in cervical screening at the recommended interval.

Keywords: Cervical cancer, Cervical screening, Record linkage, Screening in migrants

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Introduction

A number of studies in developed countries have shown lower participation rates for cervical screening in migrant women [1-7]. This is probably due to a range of underlying factors, including socio-cultural influences [8]. We have recently conducted a data linkage study to prospectively evaluate cervical screening participation by younger (<40 years of age) women born in Asia and the Middle East in comparison with that of Australian-born women of the same age [9]. A data linkage approach provided a large sam-

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ple of women for the study, high quality information on country of birth, and the possibility of investigating a range of migrant groups. Screening over a 2-3 year period was examined because the Australian National Cervical Screening Program recommends that women are screened every two years. We showed that screening uptake in women born in Asia and the Middle East was lower than that of Australian-born women [9]. Relative to Australian-born women, the odds ratio for being screened at least once within a 2-3 year period was 0.74 for Asian-born women and 0.88 for Middle Eastern-born women [9]. Research conducted in the USA has suggested age is one of the main factors influencing screening uptake in some migrant women, with younger women being more likely to be screened than older women [10]. Research in other English-speaking settings has shown that lower screening uptake observed in women born in South Asia was more pronounced in older women than younger women [1, 11]. Some studies have also demonstrated that participation rates are lowest for migrant women who migrated at an older age [12, 13]. Cultural issues and proficiency with the English language have been recognized as significant barriers to cervical screening uptake in older migrant women [14].

There is little information on the detailed patterns of cervical screening uptake in older migrant women in Australia. The aim of this study was to evaluate cervical screening in older women born in Asia or the Middle East and living in New South Wales (NSW), Australia, and to see whether their screening rates were less, relative to those in the Australian-born population, than those in younger migrant women.

Methods

Data sources and study population

We obtained de-identified linked data from the APDC and PTR through the NSW Centre for Health Record Linkage (CHeReL) [15]. The CHeReL uses probabilistic methods to match personally identifying details – such as name, date of birth, gender and residential address – from different databases to create a unique linkage key, which links records for the same person in different databases [16]. The CHeReL sends dataset-specific and project-specific linkage keys to the relevant data custodians, who provide the required data items from the required records to the investigators identified only by the project-specific linkage keys [16]. The investigators use these keys to link the different datasets. These operations accord with a recognized privacy-preserving, best-practice protocol [17]. The PTR, which has operated since 1996, records detailed information on the dates and results of cervical cytology and histology tests performed in NSW [18]. The APDC was used as a source of the women for the study and to provide information on country of birth, socioeconomic status, and age. It collects information on all inpatient separations from all public and private hospitals, day procedures centres and public nursing homes in NSW [19].

Two cohorts of older women were selected from the APDC for linkage to the PTR. One comprised 14,228 women aged 40-64 years who were admitted to hospitals between 1 July 2000 and 30 June 2001 and were born in one of 40 countries in Asia or the Middle East, defined according to the standard Australian Classification of Countries [20]. The other comprised 13,939 Australian-born women who were randomly selected to match the distribution of the overseas-born women by age and local government area of residence. There were fewer women in the Australian-born cohort than in the overseas-born cohort, because the numbers in some categories of age and local government area were insufficient to match those of the migrant women. Data from women selected in the two cohort groups were then linked to the PTR to obtain cervical screening information for the years 1996 to 2006. In parallel, the data were linked to records from the state Registry of Births, Deaths and Marriages, to allow women who had died during the analysis period to be excluded from the analysis.

The NSW Population and Health Services Human Research Ethics Committee approved the project. We used de-identified datasets to analyse screening behaviour, and the findings of the analysis are reported as aggregate results only.

Statistical analyses

Age was classified into 4 categories: 40-44, 45-49, 50-54, and 55+ yr. The age group 40-44 yr was used as the reference group for comparison because this age group has one of the highest cervical screening participation rates in NSW [21]. Country of birth was classified into one of three regions: Australia, the Middle East (including: Lebanon, Iraq, Iran, Egypt, Turkey, Syria, Yemen, Jordan, Saudi Arabia, Gaza Strip, Israel, Qatar, Oman, United Arab Emirates, Kuwait and the West Bank) and Asia. Asian countries were further classified into three sub-regions: South-East Asia (including The Philippines, Vietnam, Cambodia, Indonesia, Malaysia, Laos, Brunei, Burma, Singapore and Thailand), North-East Asia (including China, South Korea, North Korea, Taiwan, Japan, Hong Kong and Macau) and South-Central Asia (including Sri Lanka, Bangladesh, India, Pakistan, Afghanistan, Maldives and Nepal) [20]. Socioeconomic status (SES) was classified into one of five quintiles of the Australian Bureau of Statistics' index of relative socioeconomic disadvantage (IRSD) for areas based on the 2001 Australian Census [22]. The IRSD is classified according to the local government area of residence and includes attributes such as income, education, unemployment and ownership of motor vehicles [22].

The main analysis was performed after excluding women with an abnormal cervical screening test or unsatisfactory result over the period 1 July 1996 to 30 June 2001. These women were excluded because a prior abnormal or unsatisfactory test could have led to a recommendation for more frequent cervical screening during the follow-up period (2001 to 2006).

For the main analysis, women were considered to have been screened in accordance with program recommendations if they had a PTR record of screening within the period 1 July 2001 to 30 June 2003; that is, they had been screened in a 2-3 year period after they were admitted to hospital in 2000/01. (The APDC data is compiled according to the financial year, which runs from 1 July through to 30 June of the following year). The recommended screening interval is two years and a reminder letter is sent at 27 months in NSW. In supplementary analyses we assessed the relationship between region of birth and screening over longer periods (3-4 years or 5-6 years after 1 July 2001). Odds ratios for attending for screening within a defined interval were calculated according to a number of baseline variables, including age, country of birth, and SES. Unconditional logistic regression was used to calculate odds ratios (ORs) for each variable as unadjusted ORs, age-adjusted ORs and ORs adjusted for all baseline variables. We also examined the interactions between region of birth and SES, and region of birth and age, in influencing screening in a 2-3 year period. All analyses were performed using the STATA statistical package Version 11(STATA Corp, Texas USA).

Hysterectomy prevalence is higher in Australian-born women than Asian and Middle Eastern born women [23] and, while low under 40 years of age, increases with age thereafter [24]. We did not have information on hysterectomy in the APDC dataset and could not, therefore, directly exclude women without a uterus from the analysis. To broadly examine the possible effects of hysterectomy on age-specific participation in screening in the different region of birth groups, we used NSW Population Health Survey data for 2008 to obtain estimates of hysterectomy prevalence by age [24] in NSW women and data from the same survey for 2006-2009 to obtain estimates of hysterectomy prevalence by country of birth for NSW women aged 20-69 years [23]. We used these prevalence estimates to obtain age specific hysterectomy prevalence estimates for women born in Australia, the Middle East, South Central Asia and the rest of Asia, assuming that the age distribution of hysterectomy prevalence was the same in women born in different countries and estimating hysterectomy prevalence in the above region-of-birth categories from reported prevalence in women born in Lebanon for women born in the Middle East, women born in India for women born in South Central Asia and women born in China, Vietnam, Philippines and Hong Kong for women born in the rest of Asia. Numbers of women who had a hysterectomy were then estimated for each age and region of birth group and deducted from the corresponding numbers of women who were not screened during the follow-up period, and relevant analyses repeated to obtain hysterectomy corrected odds ratios.

Results

As would be expected as a result of the matching process used, the two cohorts of women were almost identical in their distributions by age and SES (Table 1). Women born in the Middle East, however, were somewhat older and of lower SES than Asian-born women. After excluding women who died in the period 2000 to 2006 (1,156 women) and women with a history of any abnormal or unsatisfactory cervical screening test in the period 1996 to 2001 (2,505 women), there were 12,114 Australian-born women and 12,392 migrant women available for analysis. Of these women, 5,523 and 4,971 respectively had at least one cervical screen in the period 2001/02 to 2002/03.

Women from the Middle East and Asia had higher mean numbers of cervical screening tests in 2001/02-2002/03 than did Australian-born women: on average their numbers of screening tests were 0.53 and 0.55 respectively, compared with 0.49 in Australian-born women (Table 2). The crude ORs for being screened in this period, relative to Australian-born women, were 1.10 (95% confidence interval (CI) 1.02-1.18) for migrants from the Middle East and 1.18 (95% CI 1.12-1.25) for migrants from Asia (Table 2). Adjustment for age and SES had little effect on the OR for migrants from Asia but increased the OR for women from the Middle East such that the two ORs were almost the same (1.16 and 1.17 respectively) and appreciably higher than in Australian-born women. However, when cervical screening was examined in subgroups of Asian women, the fully adjusted OR for being screened, relative to Australian-born women, was appreciably lower for women from South-Central Asia, OR 0.78 (95% CI 0.69-0.87), than for women from other parts of Asia (ORs of 1.25 and 1.24 for South East and North East Asia respectively) and the Middle East (OR 1.17).

The ORs for screening fell progressively with increasing age. Relative to women 40-44 years of age, ORs for screening in women aged 45-49, 50-54 and 55+ years were some 16% to 46% lower, after adjusting for SES and age (Table 2). The odds of cervical screening were highest in those in the highest SES quintile (the reference category) and lower in all other SES quintiles, without any consistent fall across the four quintiles of lower SES. Similar relationships between region of birth and screening were obtained when the analysis was repeated for cervical screening behaviour over longer periods, 2001/02-2003/04 and 2001/02-2005/06, which represent intervals of 3-4 and 5-6 years after the year 2001/02. Relative to Australian-born women, the adjusted ORs for Middle Eastern women being screened at least once in the periods 2001/02-2003/04 and 2001/02-2005/06 were 1.22 (95% CI 1.13-1.31) and 1.32 (95% CI 1.22-1.42) respectively. The corresponding ORs for Asian-born women were 1.19 (95% CI 1.12-1.26) and 1.23 (95% CI 1.16-1.30). However, as for the main analysis, the odds of being screened appeared lower in women born in South-Central Asia, with an OR of 0.83 (95% CI 0.74-0.93) and 0.88 (95% CI 0.79-0.99) respectively.

To examine the effect of hysterectomy on the differentials in screening uptake by region of birth, we re-categorized region of birth into Australia, Middle East, South Central Asia and other Asian countries. Relative to Australian-born women, the crude ORs uncorrected and corrected for hysterectomy prevalence were respectively 1.10 (95% CI 1.02-1.18) and 0.90 (95% CI 0.83-0.97) for women from the Middle East, 0.77 (95% CI 0.69-0.87) and 0.64 (95% CI 0.57-0.72) for women from South Central Asia and 1.28 (95% CI 1.21-1.36) and 1.01 (95% CI 0.95-1.07) for women from other Asian countries. Thus the correction for hysterectomy substantially eliminated the apparent excess of screening in women from the Middle East and other parts of Asia and increased the apparent deficiency in screening in women from South Central Asia.

To assess the interaction between region of birth and SES, we constructed a composite variable for region of birth and SES which was included in the fully adjusted model in place of the separate variables. There were eight categories in this variable: High SES and low SES Australian born women and high SES and low SES women born in each of South Central Asia, other parts of Asia and the Middle East (Table 3). High SES Australian-born women were the reference category. Relative to Australian-born women of high SES, Australian-born women of low SES had a reduced OR for screening - 0.69 (95% CI 0.64-0.74) age adjusted. Similarly, the OR for high SES women born in South Central Asia was higher at 0.74 (95% CI 0.64-0.85) than that in low SES women, 0.57 (95% CI 0.47-0.70). For migrant women from other parts of Asia and the Middle East, however the adjusted ORs for screening in low SES women, respectively 1.04 (95% CI 0.97-1.11) and 1.00 (95% CI 0.86-1.07), were similar to those in high SES women, 1.05 (95% CI 0.98-1.14) and 0.96 (95% CI 0.98-1.14). When a region of birth (in these four categories) by SES interaction term was fitted to the fully adjusted model, its *P*-value was <0.001.

To assess the interaction between region of birth and age, we similarly constructed a composite variable, which included 12 categories; Australian women 40-49 years, 50-59 years and 60-64 years of age, and the same age strata for Middle Eastern women, South Central Asian women and other Asian women (Table 4). SES adjusted ORs for screening, relative to Australian-born women 40-49 years of age, fell for all regions of birth as age increased and reached similar levels in women 50-64 years of age from each region: ORs from 0.56 to 0.64. When a region of birth by age group interaction was fitted to the SES adjusted model, the *P*-value for interaction was <0.01.

We also examined the effect of correction of the crude ORs by region of birth and age for hysterectomy prevalence (Table 4). Essentially all age-specific ORs in migrant women fell a little with correction for hysterectomy while those for the older age groups of Australian-born women rose. With the correction, it appears that the ORs for screening in Middle Eastern and other Asian women 50-59 and 60-64 years are less, and may fall more rapidly with age, than those in the corresponding age groups of Australian-born women. The pattern of ORs for women born in South Central Asia was largely unchanged by the hysterectomy correction.

Discussion

We used record linkage to evaluate cervical screening in older migrant women from the Middle East and Asia in comparison with Australian-born women. Hospital separation records were used to identify the cohorts studied. Comparisons of screening participation in migrant women with that in Australian-born women were complicated by inability to remove women who had a hysterectomy from the population. When we broadly corrected for hysterectomy prevalence by region of birth and age, women from Middle Eastern and North Eastern and South Eastern (other) Asian countries appeared have similar overall screening participation to Australian-born women. In women born in South Central Asia, however, participation was clearly less, whether adjusted for hysterectomy or not. Low SES Australian-born women were less likely to screen then high SES Australian-born women. This SES differential was not evident in women born in the Middle East or women born in other Asian countries but may have been present in women born in South Central Asia. After broad correction for hysterectomy it appeared that screening participation fell more steeply with increasing age in Middle Eastern and in other Asian women than it did in Australian-born women. In contrast it appeared to fall little if at all with increasing age in South Central Asian women.

It is a limitation of this study that we only broadly adjusted for hysterectomy. At the time of analysis we only had information on prevalence of hysterectomy in a comparatively small number of country-of-birth categories [23] and by age [24], but not by region of birth and age together, for NSW in the period covered by this study. Thus our adjustments for hysterectomy were only approximate; but they had the expected effect. That is, by increasing the screening rate more in Australian born women than in overseas born women, because of higher hysterectomy rates in older Australian-born women [24], the odds ratios for screening in Australian-born women 50-59 and 60-64 years of age increased to be above those in women born in the Middle East and other Asian countries. As a result, our findings for older women became more similar to those we have observed in younger women [9] and to those obtained in other developed country settings, which have generally shown that both younger and older migrant women are less likely than native-born women to participate in cervical screening [1-3, 10, 11].

The apparently persisting higher screening rate after adjustment for hysterectomy in women 40-49 years of age born in the Middle East and other Asian countries than in women of the same age born in Australia needs some explanation. There are some possible reasons for it. First our adjustment for hysterectomy may not have adjusted fully for the effect of the difference in hysterectomy prevalence between Australian-born and migrant women on the screening rates. Second, screening in women sampled from the APDC may not correctly reflect screening in the general population. In particular, it is possible that migrant women who have been hospitalized become more accustomed to Australian health services than those who have not been hospitalized and may, therefore, be more likely to participate in cervical screening. This has been suggested as an explanation for differences between women sampled through the MDC and through the APDC in the ORs for screening in migrant women relative to Australian-born women, which we have reported in the previous study [9]. Third, there is evidence of effects of co-morbidities on cervical screening rates. Some researchers have found that in older women co-morbidities or "poor health" is associated with increased screening participation [25, 26]. There is also evidence that older female patients may be more likely to accept cervical cytology testing in clinical settings [27]. However, other studies have observed that the screening rate decreased as co-morbidities increased (except that women diagnosed with hypertension had a higher screening rate) [28], or that there was a U-shaped association between the level of co-morbidities and appropriate cervical screening [29]. While there is confusion about the effect of co-morbidities on cervical screening, it would have been highly desirable to have adjusted for them in our analysis. We did not request details of diseases treated, however, when requesting the APDC data-set, and were thus not able to examine the effect of co-morbidities on screening participation or adjust for it in our analyses.

In women born in South Central Asia, participation was clearly less than in Australian-born women and probably less than in women born in the Middle East and other Asia, whether adjusted for hysterectomy or not. Previous studies have also shown that migrant women from South Central Asia have much lower participation in cervical screening than other migrant women [5, 11, 30-32]. The reasons for this difference are not clear. It is not explained by lower SES because it is present after adjusting for SES [11] and (Table 3). It could, perhaps, reflect low levels of screening in the countries of origin because screening rates in South Central Asian countries are low. For example only 2.6% women from Pakistan had ever received a Pap test and in Sri Lanka only 2.2% women have reported having a Pap test over the last 5 years [33]. In India only 5.3% of eligible women aged 25-64 years had Pap smear in the last 3 years, in Nepal reported rates were 3.5 %, and the lowest rates were reported in Bangladesh at 1% (regardless of income) [33]. These compare with reported rates in women in the same age range in Israel (44.3%), Malaysia (30.5%), China (23.1%) [33]; and cervical screening in the last 3 years has been reported to be about 23% in Kuwait [34].

When we adjusted for hysterectomy, it appeared that screening in women from Middle Eastern and other Asian countries fell more substantially with age than it did in Australian born women. This may also be true in migrant women from East Asia and the Pacific, the Middle East and North Africa and South Asia in Canada [29], whose relative risks for non-screening at 50-66 years of age, relative to 35-49 years of age, were 1.20, 1.16 and 1.30 respectively compared with relative risks of 1.06 in women born in USA, Australia and New Zealand and 1.10 in women born in Western Europe. This could be explained, perhaps, by resurgence in cultural factors that inhibit screening participation once migrant women cease childbearing. Alternatively, it may be explained by migration at an older age, which can occur in Australia as a result of the priority given to family reunion in Australian immigration policy [35]. Previous work has shown that participation in cervical screening is least in women who migrated at an older age [12, 13].

There was stronger evidence that region of birth modified the effect of SES on screening participation than it modified the effect of age. As in younger women [9], there was clearly less screening in lower SES than higher SES Australian-born women; whereas this pattern was not evident in women in the Middle East and other Asia and was only weakly evident in South Central Asian women. While not directly comparable, results from a similar study in Canada [11] do not appear to support this finding. In that study [11], lower screening participation was observed in low SES women in all migrant groups, including those from lower income countries including East Asia and the Pacific, Middle East and North Africa and South Asia, and those from higher income countries including USA, Australia and New Zealand and Western Europe.

The large sample size and use of screening records to characterize screening behaviour are strengths of this study. Much similar work, with the studies of Lofters and colleagues being notable exceptions [11, 29], has depended on small survey samples and self reported screening. The large sample size allowed us to examine interactions between region of birth and age and, separately, SES; which would not be informative in studies with small sample sizes.

Our study has several limitations. First we were only able to approximately adjust for hysterectomy in our study populations since we had access to only limited information on the distributions of hysterectomy prevalence by population characteristics. Second, we had few relevant covariates in the APDC data set. For example, we were not able to adjust for smoking and parity, which are known to be related to both risk of developing cervical cancer and cervical screening uptake. We attempted linkage to the Midwives Data Collection (MDC), as we did for younger women in a previous analysis using the APDC dataset [9], to obtain information on parity. However, this was not helpful since the MDC dates back only to 1994 and few of its records linked to the older women in this study. Our experience with previous work on younger women [9], though, suggests that neither adjustment for smoking nor parity would have a substantial effect on the associations of region of birth with screening.

Our results suggest that migrant women from the Middle East and North Eastern and South Eastern Asia in NSW have cervical screening rates at 40+ years of age that are overall quite similar to those in Australian-born women. It is uncertain, however, whether this finding, which differs from what we have observed in younger women is an artefact of inadequate adjustment for hysterectomy prevalence or due to studying screening in women with a history of recent hospitalization. These results also suggest that, with approximate adjustment for hysterectomy, screening in women from the Middle East and North Eastern and South Eastern Asia fell more rapidly with increasing age than it did in Australian-born women. While the reasons for this greater fall are not known, it may indicate a need for special attention to cervical screening in these women. Like younger women, older women born in South Central Asia also have a lower cervical screening rate compared to Australian-born women, which also needs attention.

The peak age of developing invasive cervical cancer is Australia is 45-50 years and above [36] and therefore, population-based screening will be required for the foreseeable future in spite of introduction of HPV vaccination. Australia's "Renewal" of the National Cervical Screening Program is currently reviewing the technologies, age range and interval of cervical screening in context of HPV vaccination [37]. One of its major aspects will be identification of strategies to "improve participation among under-screened women in the program [which] may include consideration of social marketing and health promotion approaches, access to health services, cultural appropriateness of service models and specific proposals to engage under-screened subgroups" [37]. Our findings provide important context for the formulation of such future strategies to reduce disparities in cervical screening uptake in Australia.

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Table 1: Characteristics of the cohorts of Australian-born and migrant women selected from the NSW Admitted Patients Data Collection (APDC) for fiscal year 2000/01

Characteristics	Australian-born women		All migrant women		Asian-born women		Middle Eastern-born women	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Age								
40-44	4284	30.7	4359	30.6	3260	33.0	1099	25.3
45-49	3424	24.6	3507	24.6	2484	25.1	1023	23.6
50-54	2758	19.8	2800	19.7	1926	19.5	874	20.1
55+	3473	24.9	3562	25.0	2218	22.4	1344	31.0
Socioeconomic Status								
1 (Highest SES quintile)	3541	25.4	3615	25.4	2771	28.0	844	19.5
2	2418	17.4	2448	17.2	1914	19.4	534	12.3
3	2196	15.8	2222	15.6	1327	13.4	895	20.6
4	2264	16.2	2324	16.3	1550	15.7	774	17.8
5 (Lowest SES quintile)	3520	25.3	3619	25.4	2326	23.5	1293	29.8

Table 2: Women's mean number of smears and odds ratios for having one or more smears relative to no smear within a two-three period year by region of birth, age and socioeconomic status (SES)

Characteristics	Mean Number of Smears	95% CI	Screened/ Unscreened†	Crude OR	95% CI	Age adjusted OR	95% CI	Age and SES adjusted OR	95% CI
Region of birth									
Australia	0.49	0.48-0.50	4971/7143	1	-	1		1	
The Middle East	0.53	0.51-0.55	1640/2148	1.10	1.02-1.18	1.14	1.06-1.23	1.17	1.09-1.26
Asia	0.55	0.54-0.57	3883/4721	1.18	1.12-1.25	1.17	1.11-1.24	1.16	1.09-1.22
P-value	*<0.001*			*<0.001*		*<0.001*		*<0.001*	

Table 2: Cond…

South East Asia	0.57	0.55-0.59	1913/2178	1.26	1.18-1.36	1.23	1.15-1.32	1.25	1.17-1.35
North East Asia	0.60	0.58-0.63	1478/1626	1.31	1.21-1.41	1.30	1.20-1.41	1.24	1.14-1.34
South Central Asia	0.40	0.37-0.44	492/917	0.77	0.69-0.87	0.79	0.70-0.88	0.78	0.70-0.88
Age									
40-44	0.58	0.57-0.60	3646/3817	1	-	1	-	1	-
45-49	0.54	0.53-0.56	2694/3332	0.85	0.79-0.91	0.85	0.79-0.91	0.84	0.78-0.90
50-54	0.51	0.49-0.53	2044/2850	0.75	0.70-0.81	0.75	0.70-0.81	0.74	0.69-0.79
55+	0.41	0.40-0.43	2110/4013	0.55	0.51-0.60	0.55	0.51-0.60	0.54	0.50-0.58
P-value for trend	*<0.001*			*<0.001*		*<0.001*		*<0.001*	
Socioeconomic Status									
1 (Highest SES quintile)	0.57	0.55-0.59	2936/3312	1	-	1	-	1	-
2	0.54	0.52-0.56	1873/2345	0.90	0.83-0.97	0.90	0.83-0.97	0.90	0.83-0.97
3	0.48	0.46-0.50	1547/2314	0.76	0.70-0.82	0.74	0.68-0.80	0.74	0.68-0.80
4	0.46	0.44-0.48	1571/2473	0.72	0.66-0.78	0.70	0.64-0.76	0.70	0.64-0.76
5 (Lowest SES quintile)	0.51	0.50-0.53	2565/3568	0.81	0.76-0.87	0.78	0.73-0.84	0.78	0.73-0.84
***P*-value for trend**	<0.001			<0.001		<0.001		<0.001	

Table 3: Women's odds ratios for being screened within a two-three year period by region of birth and socioeconomic status

Region of birth and socioeconomic status	**Screened**	**Unscreened**	**Crude OR**	**95% CI**	**Age adjusted OR**	**95% CI**
High SES Australian-born	3155	3936	1*	-	1*	-
Low SES Australian-born	1816	3207	0.71	0.66-0.76	0.69	0.64-0.74

Table 3: Cond…

High SES Middle Eastern born	857	1122	0.95	0.86-1.05	1.00	0.86-1.07
Low SES Middle Eastern born	783	1026	0.95	0.86-1.06	0.96	0.98-1.14
High SES South Central Asian born	337	580	0.74	0.64-0.85	0.74	0.64-0.85
Low SES South Central Asian born	155	337	0.57	0.47-0.70	0.57	0.47-0.70
High SES other Asian born	2009	2333	1.07	1.00-1.16	1.04	0.97-1.11
Low SES other Asian born	1382	1471	1.17	1.07-1.28	1.06	0.99-1.14

*__Reference category for all odds ratios__

Table 4: Women's odds ratios (ORs) for being screened within a two-three year period by region of birth and age, uncorrected and corrected for estimated age and region of birth specific hysterectomy prevalence

Region of birth and age group	Crude OR	95% CI	SES adjusted OR	95% CI	Crude OR corrected for hysterectomy	95% CI
Australia 40-49 years	1*	-	1*	-	1*	-
Australian 50-59	0.75	0.70-0.82	0.74	0.69-0.80	0.99	0.91-1.08
Australian 60+	0.57	0.50-0.64	0.56	0.50-0.63	0.88	0.76-1.00
Middle East 40-49 years	1.24	1.12-1.37	1.28	1.15-1.42	1.10	0.99-1.23
Middle East 50-59	0.82	0.73-0.92	0.98	0.74-0.93	0.80	0.71-0.90
Middle East 60+	0.50	0.42-0.61	0.64	0.42-0.61	0.50	0.41-0.61
South Central Asia 40-49 years	0.77	0.66-0.90	0.77	0.65-0.90	0.69	0.59-0.81
South Central Asia 50-59	0.55	0.45-0.67	0.53	0.44-0.65	0.54	0.44-0.66
South Central Asia 60+	0.58	0.43-0.77	0.57	0.43-0.76	0.63	0.46-0.85
Other Asia 40-49 years	1.25	1.16-1.35	1.24	1.14-1.34	1.09	1.01-1.18
Other Asia 50-59	1.01	0.92-1.12	0.98	0.89-1.09	0.95	0.86-1.05
Other Asia 60+	0.66	0.56-0.77	0.64	0.55-0.75	0.64	0.54-0.74

*__Reference category for all odds ratios__