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*J Med Screen* 2010 17: 125

DOI: 10.1258/jms.2010.009112

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## ORIGINAL ARTICLE

## Ethnic disparities in knowledge of cancer screening programmes in the UK

Kathryn Robb, Jane Wardle, Sarah Stubbings, Amanda Ramirez, Joan Austoker, Una Macleod, Sara Hiom and Jo Waller

*J Med Screen* 2010; **17**:125–131  
DOI: 10.1258/jms.2010.009112

**Objective** The aim of the study was to examine awareness of the three National Cancer Screening Programmes (breast, cervical, bowel) among white and ethnic minority groups in the UK.

**Setting** Data were from two surveys in which the screening questions were added: (i) the Office of National Statistics (ONS) *Opinions Survey*, carried out in September and October 2008; and (ii) the Ethnibus™ survey of the main ethnic minority groups in England, conducted in October and November 2008.

**Methods** The ONS sample consisted of 2216 adults selected using stratified probability sampling to obtain a population-representative sample. The Ethnibus™ sample was obtained by quota sampling and included 1500 adults from the six largest ethnic minority groups in England (Indian, Pakistani, Bangladeshi, Caribbean, African and Chinese). Participants completed questions on awareness of cancer screening programmes as part of the wider Cancer Awareness Measure (CAM) in home-based, face-to-face interviews.

**Results** Awareness of breast and cervical cancer screening was high in the white ONS participants (89% breast and 84% cervical), lower in the ONS ethnic minority sample (74% for both breast and cervical) and lowest in the Ethnibus™ sample (69% breast and 66% cervical). Ethnic disparities persisted after controlling for age, gender and occupational group. In both groups, knowledge of breast and cervical screening was lower among men and more socioeconomically deprived groups. Awareness of the new bowel cancer screening programme was less than 30% in both white and ethnic minority groups.

**Conclusions** Ethnic disparities in knowledge of breast and cervical cancer screening should be addressed. Strategies to engage ethnic minority and socioeconomically deprived groups in bowel cancer screening should be instigated to avoid the emergence of disparities.

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Accepted for publication  
15 June 2010

## INTRODUCTION

Earlier diagnosis of cancer is associated with higher survival,<sup>1</sup> and there is now broad consensus for population screening for breast, cervical and colorectal cancer.<sup>2–4</sup> In the UK, there are three organized cancer screening programmes: cervical (since 1988), breast (since 1988) and bowel (since 2006). There is no organized screening programme for prostate cancer but there is a prostate-specific antigen (PSA) 'Informed Choice Programme' that gives men who are concerned about prostate cancer the opportunity to receive balanced information about the advantages and disadvantages of PSA testing before deciding whether to have the test.

Uptake of breast and cervical cancer screening is around 80% in the UK, and while comparable figures are not yet available for the new bowel screening programme, uptake in the pilot centres was 57%.<sup>5</sup> Evidence from the breast and cervical screening programmes and the first output from participation in the bowel screening programme

suggest lower levels of participation among ethnic minority groups.<sup>6–10</sup>

The present study reports results from two UK samples on awareness of cancer screening programmes in white and ethnic minority groups. While knowledge of screening programmes does not in itself lead to uptake, it is an important first step. In addition, identifying sociodemographic characteristics of groups with lower levels of knowledge of the programmes may assist in developing strategies to improve uptake, which has been identified as a priority by the National Awareness and Early Diagnosis Initiative (NAEDI: <http://info.cancerresearchuk.org/spotcancerearly/naedi/index.htm>).

## METHODS

The data come from two surveys: (i) an Office for National Statistics (ONS) *Opinions Survey* which is sampled to be

representative of the UK population; and (ii) an Ethnibus™ survey of the main ethnic minority groups in England.

The ONS survey was carried out in September and October 2008 and used stratified probability sampling (see Robb *et al.*<sup>11</sup> for further details). In summary, 3653 households in England, Wales and Scotland were identified and an adult aged over 16 years invited to participate in a face-to-face computer-assisted interview. The interview included a range of sociodemographic questions and the following were included in the present analyses: gender; age; ethnicity and occupation (National Statistics-Socioeconomic Classification: managerial/professional; intermediate/small employers/lower supervisory; semi-routine/routine). Because of the relatively small numbers of respondents from ethnic minorities in population-based samples, ethnicity was only divided into 'white' versus 'non-white' groups for analyses.

The Ethnibus™ survey used quota sampling to recruit 1500 participants aged 18 and older living in England from the six largest ethnic groups in the UK (Indian, Pakistani, Bangladeshi, Caribbean, African and Chinese) in proportion to their representation in the UK population. The survey was conducted in October and November 2008 (see Waller *et al.*<sup>12</sup> for further details). Census 2001 data were used to randomly select postal areas in England with a high density of residents from each target ethnic group. Multilingual interviewers visited households in the selected postal areas, and eligible individuals were invited to participate in face-to-face interviews in their language of choice. Interviews included questions on gender, age group, ethnicity and occupation (a classification frequently used in market research was used: AB managerial/professional; C1 supervisory; C2 skilled manual; D semi-skilled/unskilled manual; E state pensioners or casual/lowest grade workers).

Participants completed the newly developed Cancer Awareness Measure (CAM<sup>13</sup>) in a face-to-face interview. The CAM includes questions on knowledge of the three National Cancer Screening Programmes (breast, cervical, bowel) and beliefs about the existence of other cancer screening programmes (prostate, testicular, skin, lung). For each of the seven cancers, participants were asked, 'Is there an NHS [breast] cancer screening programme?', with response options of 'Yes', 'No', 'Don't know'. If participants answered 'yes', the interviewer additionally asked, 'At what age are [women/men/people] first invited for [breast] cancer screening?'. Within the UK there is variation in the age at which people are first invited to cancer screening. Responses were coded as correct by the participant's area of residence (breast screening: 50 years; cervical screening: 25 years in England and 20 years in Wales and Scotland; bowel screening: 60 years in England and Wales and 50 years in Scotland).

## Analysis

Data were analysed using SPSS 16.0. The ONS and Ethnibus™ surveys used different sampling techniques and so it was not possible to make direct statistical comparisons. Within each survey it was possible to make comparisons such that in the ONS survey the white respondents were compared with the other ethnic groups combined, and within the Ethnibus™ survey comparisons were made

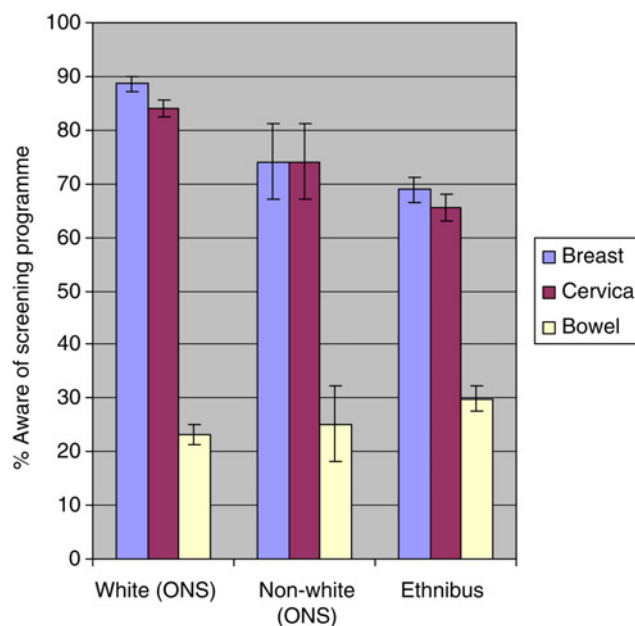
between the different ethnic groups.  $\chi^2$  tests and 95% confidence intervals were used to examine differences across ethnic groups. Multivariable logistic regression was used to explore sociodemographic predictors of awareness of cancer screening programmes among the ONS sample and the Ethnibus™ sample. In the Ethnibus™ sample, Indian respondents were used as the reference group in the multivariable analysis because they were the largest group.

## RESULTS

In the ONS survey, of 3652 households invited to participate, 2216 (61%) agreed to be interviewed and 2208 (60%: 968 men and 1240 women) completed questions on the cancer awareness module. Over 93% ( $n = 2064$ ) of the sample was white, and a good range of age and occupational groups was achieved (see Robb *et al.*<sup>11</sup> for further details). In the Ethnibus™ survey, 1500 adults completed the interview. Response rates were estimated by Ethnibus™ to be 48% for the October wave and 56% for the November wave. Quotas for the six ethnic minority groups were met, with an approximately even split by gender (742 men and 758 women), and a good range across age and social class groups (see Waller *et al.*<sup>12</sup> for further details).

### Awareness of cancer screening programmes

Awareness of the UK cancer screening programmes is shown in Figure 1. Knowledge of the breast and cervical screening programmes was highest in the ONS white sample (89% for breast and 84% for cervical) and lowest in the Ethnibus™ sample (69% for breast and 66% for cervical). Awareness of the bowel cancer screening programme was less than 30% across the three groups.



**Figure 1** Awareness of cancer screening programmes in the Office of National Statistics (ONS) and Ethnibus™ samples (95% CI)

Awareness of cancer screening programmes by ethnic group in the Ethnibus™ survey is presented in Table 1. Caribbean participants were the most aware of breast (84%) and cervical (78%) screening, while the Chinese respondents were the least likely to know about the programmes (57% breast, 58% cervical). For bowel screening, the Bangladeshi respondents reported the greatest awareness (40%) and the Chinese participants reported the least (17%).

### Belief in non-existent cancer screening programmes

Belief in non-existent screening programmes in the ONS and Ethnibus™ surveys is presented in Table 2. In the ONS sample, the white and non-white groups did not differ in their belief that there were prostate and testicular cancer screening programmes, but the non-white group was significantly more likely to believe there were skin (22%) and lung (27%) cancer screening programmes than the white group (skin 12% and lung 17%). Within the Ethnibus™ sample, the Caribbean participants were the most likely to believe there were screening programmes for prostate (65%), testicular (42%) and skin (32%), while the Chinese respondents were the least likely to believe there were screening programmes for prostate (24%), testicular (17%) and skin (16%). For lung cancer screening, Bangladeshi participants (39%) were the most likely to believe there was a screening programme and, again, the Chinese respondents (18%) were the least likely to believe there was a lung screening programme.

### Awareness of screening programmes in the approximate target age groups

Knowledge of existing cancer screening programmes among participants in the approximate target age group (breast 45+ years; cervical 25+ years; bowel 55+ years) was also examined. (Age groups were used because Ethnibus™ records only age ranges [e.g. 45–54 years; 55–64]. In addition, the UK countries vary in age of invitation [e.g. in England and Wales people are eligible for bowel screening from 60–69 years but in Scotland the range is 50–74 years].) In this subgroup, the white ONS group were most likely to know about breast (90%) and cervical (84%) screening, and the Ethnibus™ sample were least likely to know (74% for breast and 66% for cervical). For bowel cancer screening, the Ethnibus™ sample were more likely to say there was a programme (38%) and the white ONS group the least (29%).

Within the different ethnic groups in the Ethnibus™ survey there was also variation in knowledge among the approximate

target age subgroup. For breast screening the Caribbean respondents (94%) were the most likely to know about the programme, followed by Pakistanis (80%), Indians (71%), Chinese (63%), Africans (55%) and Bangladeshis (50%;  $\chi^2[5,432] = 40.84, P < 0.001$ ). Caribbean participants (76%) were also the most aware of cervical screening, followed by Bangladeshis (69%), Pakistanis (66%), Africans (64%), Indians (62%) and Chinese (58%;  $\chi^2[5, 1149] = 15.6, P = 0.008$ ). Bangladeshi respondents (53%) reported the greatest awareness of the bowel screening programme and Chinese respondents (0%) the least, with Caribbean (51%), Indian (46%), African (31%) and Pakistani (18%) falling between.

### Knowledge of the correct starting age for cancer screening programmes

Knowledge of the correct starting age for cancer screening programmes is presented in Table 3. Overall, knowledge was relatively poor, with respondents suggesting a broad range of starting ages (e.g. 0–70 years) for each of the screening programmes. Knowledge was greatest for breast screening, and the white ONS sample (48%) was significantly more likely to know that breast screening starts at 50 years than the non-white ONS respondents (29%;  $\chi^2[1, 1531] = 11.4, P = 0.001$ ). Fewer than 20% of participants in any group were able to report the correct starting age for cervical screening. Because the starting age for cervical screening in England only changed from 20 to 25 years in 2003, we also examined whether the results differed if we included 20 or 25 years as correct among the participants resident in England. Knowledge was higher with this alternative categorization, particularly in the Ethnibus™ sample: White ONS sample 25%; non-white ONS 23% and Ethnibus™ 44%. For starting age of bowel screening, 35% of white ONS respondents were correct while only 17% of the non-white ONS sample and 6% of the Ethnibus™ sample were correct.

### Multivariable predictors of awareness of cancer screening programmes

Multivariable logistic regressions predicting awareness of the three National Cancer Screening Programmes are presented in Table 4. Data are presented from the white and non-white ONS samples combined and the Ethnibus™ survey to examine ethnic differences in awareness while controlling for other sociodemographic factors. In the ONS survey, the non-white group was significantly less likely to know about breast screening or cervical screening than the white group while controlling for gender, age and socioeconomic status (SES). In contrast, the non-white group was significantly more likely to say that there was a bowel screening

**Table 1** Awareness of cancer screening in the Ethnibus™ sample by ethnic group (in %)

	Indian (n = 467)	Pakistani (n = 333)	Bangladeshi (n = 126)	Caribbean (n = 252)	African (n = 216)	Chinese (n = 106)	Between-group difference
Breast	69.4	62.8	74.6	84.5	62.0	56.6	$P < 0.001$
Cervical	64.5	60.4	69.8	77.8	62.5	58.5	$P < 0.001$
Bowel	31.0	24.0	40.5	35.3	30.6	17.0	$P < 0.001$

**Table 2** Belief in non-existent cancer screening programmes (in %)

	ONS sample		Non-white (Ethnibus™) sample							Between-group difference	Between-group difference
	White (n = 2064)	Non-white (n = 144)	Indian (n = 467)	Pakistani (n = 333)	Bangladeshi (n = 126)	Caribbean (n = 252)	African (n = 216)	Chinese (n = 106)			
Prostate	23.5	18.9	41.5	35.1	38.9	65.1	26.6	23.6	23.6	P < 0.001	
Testicular	14.3	18.9	31.3	30.9	38.9	42.5	36.1	17.0	17.0	P < 0.001	
Skin	11.6	22.5	27.4	30.3	31.7	32.5	23.1	16.0	16.0	P = 0.013	
Lung	17.4	26.6	25.7	22.2	38.9	32.5	31.9	17.9	17.9	P < 0.001	

ONS, Office of National Statistics

**Table 3** Knowledge of the starting age for cancer screening programmes: % (n) correct and range of estimates

	White (ONS)	Non-white (ONS)	Non-white (Ethnibus™)
Breast	47.8%* (690) Range 0–70 years	29.1%* (25) Range 1–60 years	31.3% (176) Range 10–65 years
Cervical	15.8% (204) Range 0–65 years	15.7% (13) Range 13–65 years	18.4% (111) Range 13–60 years
Bowel	34.7% (101) Range 1–70 years	16.7% (3) <sup>†</sup> Range 12–65 years	6.0% (10) Range 15–65 years

ONS, Office of National Statistics

\*Significant difference  $\chi^2(1, 1531) = 11.38, P = 0.001$ <sup>†</sup>Too few counts per cell to test statistical difference

programme than the white group. In the Ethnibus™ survey, Caribbean respondents were significantly more aware of breast and cervical screening than the reference group (Indians), and the Chinese group was significantly less aware of breast screening than the reference group. For bowel screening, Bangladeshi respondents reported significantly greater awareness while Chinese and Pakistani participants were significantly less aware than the reference group.

Women were more likely to know about cancer screening programmes than men, although this did not reach significance for bowel screening in the Ethnibus™ sample. Older people tended to be more aware than younger people, although this was not true for awareness of cervical screening in the Ethnibus™ sample or among the oldest group in the ONS sample. Higher occupational groups were more likely to be aware of breast and cervical screening programmes. In the ONS sample, higher occupational groups appeared to be less aware of bowel screening and there was no association between occupational group and awareness of bowel screening in the Ethnibus™ sample.

### Post hoc analysis adjusting for belief in non-existent screening programmes

The finding in the ONS sample that ethnic minority and lower occupational groups had greater awareness of bowel screening (Table 4), in contrast to the results for awareness of breast and cervical screening, was surprising. We speculated that this seemingly greater 'awareness' may simply be due to a greater propensity to believe in the existence of screening programmes in these groups. We therefore created a measure, 'propensity to believe in screening programmes', which was scored by allocating a point for believing in testicular, skin and lung screening programmes (we did not include prostate because the distinction between a screening programme and the PSA 'Informed Choice Programme' is subtle). This resulted in a score ranging from 0 to 3 with those scoring 0 not believing in any non-existent screening programmes and those scoring 3 believing there are testicular, skin and lung screening programmes. In the ONS sample, including the measure of 'propensity to believe in screening programmes' in the multivariable analysis did not change the pattern of results for awareness of breast and cervical screening; however, for awareness of

**Table 4** Multivariable logistic regressions predicting awareness of the three National Cancer Screening Programmes [odds ratios (95% CI)]

	ONS (white and non-white) sample (n = 2208)			Non-white Ethnibus™ sample (n = 1500)		
	Breast	Cervical	Bowel	Breast	Cervical	Bowel
<b>Ethnicity (ONS only)</b>						
White	1.00	1.00	1.00	–	–	–
Non-white	<b>0.43 (0.27, 0.69)</b>	<b>0.47 (0.30, 0.75)</b>	<b>1.60 (1.04, 2.46)</b>	–	–	–
<b>Ethnicity (Ethnibus only)</b>						
Indian	–	–	–	1.00	1.00	1.00
Pakistani	–	–	–	0.77 (0.57, 1.04)	0.87 (0.64, 1.18)	<b>0.71 (0.52, 0.98)</b>
Bangladeshi	–	–	–	1.46 (0.92, 2.30)	1.48 (0.96, 2.30)	<b>1.54 (1.02, 2.32)</b>
Caribbean	–	–	–	<b>2.57 (1.72, 3.85)</b>	<b>2.13 (1.47, 3.07)</b>	1.18 (0.85, 1.64)
African	–	–	–	0.73 (0.51, 1.03)	0.94 (0.67, 1.33)	1.00 (0.70, 1.42)
Chinese	–	–	–	<b>0.55 (0.35, 0.86)</b>	0.73 (0.47, 1.14)	<b>0.45 (0.26, 0.77)</b>
<b>Gender</b>						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	<b>2.14 (1.61, 2.84)</b>	<b>2.38 (1.85, 3.05)</b>	<b>1.46 (1.18, 1.82)</b>	<b>2.01 (1.60, 2.52)</b>	<b>2.55 (2.04, 3.20)</b>	1.10 (0.88, 1.38)
<b>Age (years)</b>						
16–24/18–24	1.00	1.00	1.00	1.00	1.00	1.00
25–34	1.36 (0.76, 2.43)	<b>2.37 (1.32, 4.25)</b>	1.03 (0.59, 1.81)	1.00 (0.72, 1.37)	0.91 (0.67, 1.25)	1.04 (0.75, 1.44)
35–44	<b>1.97 (1.10, 3.52)</b>	<b>2.60 (1.47, 4.59)</b>	0.78 (0.45, 1.37)	1.10 (0.78, 1.53)	1.12 (0.81, 1.57)	1.16 (0.82, 1.62)
45–54	<b>2.32 (1.26, 4.27)</b>	<b>2.80 (1.55, 5.08)</b>	0.74 (0.42, 1.32)	<b>1.68 (1.12, 2.52)</b>	1.38 (0.94, 2.03)	0.99 (0.67, 1.46)
55+	<b>2.78 (1.64, 4.72)</b>	1.38 (0.85, 2.25)	<b>1.69 (1.02, 2.80)</b>	1.34 (0.91, 1.98)	1.40 (0.96, 2.05)	<b>1.56 (1.08, 2.26)</b>
<b>Occupational status*</b>						
Lower	1.00	1.00	1.00	1.00	1.00	1.00
Mid	<b>1.62 (1.16, 2.28)</b>	<b>1.94 (1.44, 2.61)</b>	<b>0.66 (0.50, 0.85)</b>	<b>1.38 (1.07, 1.77)</b>	<b>1.67 (1.30, 2.13)</b>	1.00 (0.78, 1.28)
Higher	<b>2.04 (1.45, 2.87)</b>	<b>2.51 (1.85, 3.40)</b>	<b>0.73 (0.57, 0.94)</b>	<b>1.51 (1.02, 2.24)</b>	<b>1.56 (1.07, 2.29)</b>	0.98 (0.67, 1.45)

ONS, Office of National Statistics

\*In the ONS samples: lower = semi-routine/routine; mid = intermediate/small employers/lower supervisory; higher = managerial/professional. In the Ethnibus™ sample: lower = DE; mid = C1, C2; higher = AB

Note: Emboldened figures represent significant differences

bowel screening there was no longer any association between either ethnicity or occupational status and bowel screening awareness. Within the Ethnibus™ sample, adjusting the multivariable analysis for 'propensity to believe in screening programmes', the relationship between occupational status and awareness of bowel screening remained non-significant, and the relationship between occupational status and awareness of breast and cervical screening remained significant. In addition, the Caribbean respondents remained significantly more aware of breast and cervical screening than the reference group (Indians) after adjusting for 'propensity to believe in screening programmes'.

## DISCUSSION

These results show disparities in awareness of the established breast and cervical screening programmes, with almost 20% fewer ethnic minority respondents being aware of breast or cervical screening than the white respondents. As noted in the introduction, awareness does not necessarily lead to uptake but it is interesting to find that both awareness and

uptake are lower in ethnic minority groups.<sup>6–10</sup> Improving knowledge about breast and cervical screening may be an important step in improving uptake.

Awareness of bowel screening – the newest addition to the National Cancer Screening Programmes – was remarkably low. Surprisingly the ethnic minority samples appeared to have slightly greater awareness of bowel screening than the white ONS sample. However, when we adjusted the analysis for belief in non-existent screening programmes (testicular, skin, lung), there was no longer an association between ethnicity and awareness of bowel screening. This suggests that ethnic minority groups may have had a greater propensity to believe in the existence of any cancer screening programme than the white sample, and that this accounted for their apparently higher awareness of the bowel screening programme. It seems that unlike the more established screening programmes of breast and cervical, there are currently no ethnic disparities in awareness of bowel screening.

Caribbean respondents showed levels of awareness for breast and cervical screening that were very similar to the general population levels, while Chinese respondents were

the least aware. One explanation for Caribbean participants' high levels of awareness is that English is their main language spoken at home, unlike the other ethnic minority groups (see Waller *et al.*<sup>12</sup>). However, when we repeated the multivariate analysis controlling for language spoken at home, the results were broadly the same, suggesting that factors other than language, deprivation, gender and age must account for the differences. While it remains unclear what explains these ethnic differences, the results highlight the importance of distinguishing among ethnic minority groups to target interventions.

Overall, women tended to be more aware of cancer screening programmes than men, which is perhaps not surprising given that women have been offered routine screening for breast and cervical cancer for over 20 years, whereas most men in the sample would not have had personal experience of any of the screening programmes. Also, older people tended to be more aware compared with younger participants. Again, older people are more likely to have direct experience of screening, especially for breast and bowel cancer.

There were significant socioeconomic inequalities in awareness of breast and cervical screening – independent of the effect of ethnicity – with higher occupational status being associated with greater awareness, again reflecting the observed inequalities in participation.<sup>14,15</sup> Interestingly, the same was not true for bowel cancer screening where there was no association with occupational status in the Ethnibus<sup>TM</sup> sample and higher occupational groups appeared to be less aware in the ONS sample. Adjusting the multivariable analysis to include propensity to believe in screening programmes showed that there was no association between occupational status and awareness of bowel screening in either the ONS or Ethnibus<sup>TM</sup> samples. This indicates that the lower occupation groups in the ONS sample may not have been more 'aware' of bowel screening but rather had a greater propensity to believe that the National Health Service screens for multiple cancer types, including bowel cancer. It may be that the inequalities in awareness seen for breast and cervical screening are not yet apparent for bowel screening. One possible explanation is that because bowel screening was more recently introduced, disparities in knowledge have not yet emerged. Tichenor *et al.*'s<sup>16</sup> 'knowledge gap' theory posits that although people from higher SES groups tend to acquire information faster than lower SES groups, when information is first available there are few disparities. This could explain our finding of disparities in awareness for the longer-established screening programmes but not for the relatively new bowel cancer screening programme. The model would also predict that as more information about bowel screening is disseminated, higher SES groups will benefit more and therefore the same SES disparities in knowledge will emerge. A worrying consequence of this could be that the introduction of bowel screening, while reducing bowel cancer mortality in all groups, may widen inequalities as it is disproportionately taken up by higher SES groups. We are not aware of any concerted national strategy to reduce inequalities in the bowel screening programme, although efforts may be underway locally.

There are limitations to the analyses. The ONS and Ethnibus<sup>TM</sup> surveys used different sampling techniques and so it is not appropriate to make direct comparisons

between them. It is possible that the observed differences were an artefact of the different sampling strategies, although similar disparities were found when the white ONS group was compared with the non-white ONS group. Furthermore, because Ethnibus<sup>TM</sup> used quota sampling, rather than random probability sampling, respondents may not be representative of the broader ethnic minority population in the UK. Despite this limitation we were able to make between-ethnic-group comparisons, which is seldom possible in population-based surveys where typically only about 10% of respondents are from ethnic minority groups.

## CONCLUSION

Ethnic disparities in awareness of breast and cervical screening need to be addressed. These results indicate that groups from Caribbean backgrounds tend to have good knowledge of screening programmes, but this is not the case for most other ethnic minority groups. Increasing public awareness about bowel cancer screening may enhance acceptance of this new screening programme. Following the 'knowledge gap' hypothesis, health educators may wish to consider specifically directing information at ethnic minority and lower socioeconomic groups in an effort to head off disparities before they emerge. Across all three screening programmes, awareness-raising strategies should be particularly targeted at ethnic minority and more deprived groups.

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## ACKNOWLEDGEMENTS

Development of the Cancer Awareness Measure was funded by Cancer Research UK. The Department of Health paid the fieldwork costs. The co-authors wish to acknowledge with appreciation the contribution made to this paper by Joan Austoker, who passed away on 19 January 2010.

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