Appendix 3

Multivariable odds ratios and rate ratios for association of sex, socio-economic circumstances and age with referral following presentation with post-menopausal bleeding, hip pain or dyspepsia.

Comparison of results from single-level and multi-level models through computation of the % attenuation of the effect of each demographic factor to assess the influence of practice-level variation on the demographic effects.

		Single level model* (no adjustment for practice)	**Multi-level model*** (random-intercept model with patients nested in practices)	
Post-menopausal bleeding		**Odds ratio† (95% CI)**	**Odds ratio† (95% CI)**	**% attenuation of effect#**
Age group, years				
	55-64	1	1	
	65-74	0.89 (0.78, 1.02)	0.87 (0.75, 1.00)	-26
	75-84	0.64 (0.55, 0.75)	0.59 (0.50, 0.69)	-19
	85+	0.39 (0.31, 0.48)	0.34 (0.27, 0.43)	-13
SEC (Townsend quintile)				
	1 - Least deprived	1	1	
	2	0.96 (0.83, 1.12)	0.99 (0.84, 1.17)	NA‡
	3	1.02 (0.87, 1.20)	0.99 (0.83, 1.18)	NA‡

	4	1.05 (0.88, 1.25)	1.00 (0.82, 1.21)	NA‡
	5 - Most deprived	1.09 (0.89, 1.33)	1.07 (0.85, 1.34)	NA‡
Hip pain		**Rate ratio† (95% CI)**	**Rate ratio† (95% CI)**	**% attenuation of effect#**
Sex				
	Male	1	1	
	Female	0.85 (0.79, 0.90)	0.84 (0.79, 0.90)	-3
Age group, years				
	55-64	1	1	
	65-74	1.19 (1.11, 1.28)	1.18 (1.10, 1.27)	2
	75-84	1.20 (1.10, 1.30)	1.16 (1.06, 1.26)	20
	85+	0.81 (0.69, 0.95)	0.78 (0.66, 0.92)	-17
SEC (Townsend quintile)				
	1 - Least deprived	1	1	
	2	0.90 (0.83, 0.98)	0.94 (0.86, 1.02)	38
	3	0.81 (0.74, 0.88)	0.84 (0.77, 0.93)	21
	4	0.78 (0.70, 0.86)	0.83 (0.75, 0.92)	26
	5 - Most deprived	0.67 (0.59, 0.76)	0.72 (0.63, 0.82)	18

Dyspepsia		**Rate ratio[†] (95% CI)**	**Rate ratio[†] (95% CI)**	**% attenuation of effect[#]**
Sex				
	Male	1	1	
	Female	0.96 (0.93, 1.00)	0.96 (0.93, 0.99)	NA[‡]
Age level				
	Under 55	1	1	
	55 and over	1.54 (1.49, 1.60)	1.57 (1.52, 1.63)	-4
Age group, years				
	<25	0.34 (0.31, 0.36)	0.32 (0.30, 0.35)	-4
	25-34	0.47 (0.44, 0.50)	0.46 (0.43, 0.48)	-4
	35-44	0.66 (0.63, 0.70)	0.64 (0.61, 0.68)	-8
	45-54	0.87 (0.83, 0.92)	0.86 (0.81, 0.90)	-16
	55-64	1	1	
	65-74	0.93 (0.87, 0.98)	0.91 (0.86, 0.97)	-17
	75-84	0.84 (0.78, 0.90)	0.84 (0.78, 0.90)	-4
	85+	0.62 (0.53, 0.72)	0.58 (0.50, 0.68)	-13
SEC (Townsend quintile)				

1 - Least deprived	1	1	
2	0.92 (0.88, 0.97)	0.94 (0.90, 0.99)	26
3	0.89 (0.84, 0.93)	0.91 (0.86, 0.96)	20
4	0.90 (0.86, 0.95)	0.89 (0.84, 0.94)	-14
5 - Most deprived	0.86 (0.81, 0.91)	0.89 (0.83, 0.94)	21

Interactions

Hazard ratios comparing SEC quintiles within each age level

Under 55s

1 - Least deprived	1	1	
2	0.96 (0.90, 1.03)	0.98 (0.92, 1.05)	51
3	0.87 (0.81, 0.93)	0.87 (0.81, 0.94)	3
4	0.84 (0.79, 0.90)	0.82 (0.77, 0.88)	-13
5 - Most deprived	0.76 (0.71, 0.82)	0.79 (0.73, 0.85)	11

55 and over

1 - Least deprived	1	1	
2	0.87 (0.81, 0.94)	0.89 (0.83, 0.95)	14

3	0.86 (0.80, 0.92)	0.89 (0.83, 0.96)	25
4	0.90 (0.84, 0.97)	0.89 (0.82, 0.96)	-16
5 - Most deprived	0.89 (0.82, 0.97)	0.92 (0.84, 1.00)	25

*Multivariable models where each demographic factor is adjusted for the other factors and co-morbidity

† Odds ratios are from logistic regression. Confidence intervals for the single level logistic models differ slightly from those in main analysis as standard errors not robust (practice clustering ignored). Rate ratios are from Poisson regression, as opposed to Cox regression used in the main analyses, as multi-level Cox regression procedures are not readily available in standard software packages. As a result, the single-level model point estimates differ slightly from those in the main analysis, but not as to alter the conclusions. Thus we might expect similar % attenuations had we compared Cox models.

% attenuation of effect of demographic factor in multi-level model = $100\% \times (\beta_0-\beta_1)/\beta_0$ where β_0 is the beta coefficient corresponding to the odds/rate ratio for the demographic factor category in the single level model, and β_1 is the same beta coefficient in the corresponding multi-level model. If the odds or rate ratio is less than 1, this reflects the shrinkage towards 0 of the relative reduction in odds or rate, which is 1 minus the odds or rate ratio. If the odds or rate ratio is greater than 1, this reflects the shrinkage towards 0 of the relative increase in odds or rate, which is the odds or rate ratio minus 1. Positive attenuation implies effect of demographic factor is explained in part by practice level variation. Negative attenuation or no attenuation implies practice level variations do not help to explain the effect of the demographic factor

‡NA = not applicable, no attenuation computed as no effect of demographic factor in single-level model