

## APPENDIX 1: Source of data

Table A.1 Source of data on risk factor mean level or prevalence (adults aged over 16 years) used for Table 1, by variable in HSE 1999 and 2004

Variable	Location in 1999 report	Location in 2004 report
Smoking (current %)	Table 4.1	Table 4.1
Physical activity Meets recommended guidelines of at least moderate activity for at least 30 minutes on at least 5 days per week.	Table 8.3	Table 8.2
Cholesterol (total) (mmol/l)	Table 10.3	Table 10.3
HDL – Cholesterol (mmol/l)	Table 10.3	Table 10.3
Triglycerides (mmol/l)	Table 10.22	Table 10.18
Waist/hip ratio (mean)	Table 6.10	Table 6.8
BMI (body mass index) kg/m <sup>2</sup>	Table 6.6	Table 6.6
Blood pressure Systolic (mmHg)	NA: '99 data were omron adjusted within Table 7.13 of the HSE 2004 report	Table 7.13
Blood pressure Diastolic (mmHg)	ditto	Table 7.13
Diabetes (type 1 or 2) diagnosed by a doctor (%)	Table 3.1	Table 3.9

Table A.2 Source of data on age standardised ratios of means or standardised relative risk ratios by variable in HSE 1999 and 2004 as used in Table 3 – Percentage changes in standardised risk factors

Variable	Location in 1999 report	Location in 2004 report
Smoking (current %)	Table 4.1	Table 4.1
Physical activity (%) Meets physical activity recommendations of at least moderate activity for at least 30 minutes on at least 5 days per week.	Table 8.2	Table 8.2
Cholesterol (total) (mmol/l)	Table 10.3	Table 10.3
HDL – Cholesterol (mmol/l)	Table 10.3	Table 10.3
Triglycerides (mmol/l)	Table 10.22	Table 10.18
Waist/hip ratio (% exceeding threshold 0.95 male; 0.85 female)	Table 6.10	Table 6.8
Obesity (% exceeding BMI or 30 kg/m <sup>2</sup> )	Table 6.6	Table 6.6
Blood pressure Systolic (mmHg)	HSE 1999 Table 7.2 for standardised ratio of mean (dinamap); HSE 2004 Table 7.13 for omron adjusted mean and standard error of the mean	HSE 2004 Table 7.3 for standardised ratio of mean (omron); HSE2004 Table 7.13 for omron mean and standard error of the mean
Blood pressure Diastolic (mmHg)	HSE 1999 Table 7.2 for standardised ratio of mean (dinamap); HSE 2004 Table 7.13 for omron adjusted mean and standard error of the mean	HSE 2004 Table 7.3 for standardised ratio of mean (omron); HSE2004 Table 7.13 for omron mean and standard error of the mean

## Appendix 2: Supplementary tables with full results

Table A3 General Population: Variables (with unweighted sample size in 1998/1999, 2003/2004) with prevalence, or mean, and 95% confidence interval (C.I.) around difference between the two surveys, by sex. A positive difference indicates an adverse change in the level of the risk factor. A “+” sign indicates a change of 5% or larger. An asterisk indicates the 95% CI excludes zero.

Men						Women				
Variable (N in 1998 or 1999, N in 2003 or 2004)	Measure	1999	2004	Difference	(95% C.I.)	(N in 1998/99, N in 2003 or 2004)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor (see footnote) (1999, 2004 data)</b>										
Smoking (3543, 2855)	Current smoker (%)	27	24	-3+	(-5.257, -0.743)*	(4224, 3805)	27	23	-4+	(-5.952, -2.048)*
Physical activity in last month (3558,2873)	Greater than or equal to five days per week on which there was moderate physical activity	33	37	-4+	(-6.42,-1.58)*	(4240, 3818)	21	25	-4+	(-5.901, -2.099)*
<b>Biochemical Measure (1998, 2003 data)</b>										
Cholesterol (4874,3814)	mean (mmol/l)	5.5	5.5	0	(-0.055, 0.055)	(5458, 4460)	5.6	5.6	0	(-0.055, 0.055)
HDL (4875,3814)	mean (mmol/l)	1.3	1.4	-0.1-	(-0.128,-0.072)*	(5458, 4460)	1.6	1.6	0	(-0.028,0.028)
Triglycerides (181,347)	mean (mmol/l)	1.7	1.8	0.1+	(-0.184, 0.384)	(237, 431)	1.4	1.4	0	(-0.142,0.142)
<b>Physical Measure (1998, 2003 data)</b>										
Waist/hip ratio (6095,5397)	Mean	0.91	0.92	0.01	(0, 0.02)*	(7135, 5554)	0.80	0.82	0.02	(0.01,0.03)*
BMI (3204,2444)	Mean	26.6	27.1	0.5	(0.249, 0.751)*	(3699, 3135)	26.4	26.8	0.4	(0.106, 0.694)*
Blood pressure (5401,4108)	av. Systolic	133.4	125.9	-7.5-	(-8.278, -6.722)*	(6483, 5075)	129.5	125.9	-3.6	(-4.4, -2.8)*
	av. Diastolic (mmHg)	75.4	74.3	-1.1	(-1.601, -0.599)*	(6483, 5075)	72.5	73.2	0.7	(0.27, 1.13)*
<b>Self-reported Health Status (1998, 2003 data)</b>										
Diabetes (7193,6602)	Doctor diagnosed (%)	3.3	4.3	1+	(0.33, 1.67)*	(8715, 8234)	2.5	3.4	0.9+	(0.369, 1.431)*

Footnote: The HSE reports for 1999 and 2004 provide 1998 and 2003 data for comparison respectively, for variables that were not collected in the general population i.e. those collected by nurses.

Table A4 Irish population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (536, 496)	Current smoker (%)	39	30	-9+	(-15.027, -2.973)*	(707, 653)	33	26	-7+	(-12.037, -1.963)*
Physical inactivity in last month (537, 497)	Greater than or equal to five days per week on which there was moderate physical activity	35	39	-4+	(-10.119, 2.119)	(708, 656)	26	29	-3+	(-7.944, 1.944)
<b>Biochemical Measure</b>										
Cholesterol (326, 244)	mean (mmol/l)	5.4	5.4	0	(-0.197, 0.197)	(439, 300)	5.4	5.6	0.2	(-0.02, 0.42)
HDL (326, 244)	mean (mmol/l)	1.3	1.4	-0.1-	(-0.156, -0.044)*	(439, 300)	1.6	1.6	0	(-0.071, 0.071)
Triglycerides (191, 113)	mean (mmol/l)	2.1	1.5	-0.6-	(-0.956, -0.244)*	(258, 145)	1.5	1.3	-0.2-	(-0.382, -0.018)*
<b>Physical Measure</b>										
Waist/hip ratio (408, 311)	Mean	0.92	0.93	0.01	(-0.004, 0.024)	(540, 405)	0.81	0.83	0.02	(0.006, 0.034)*
BMI (481, 420)	Mean	26.7	27.2	0.5	(-0.296, 1.296)	(631, 555)	26.5	26.7	0.2	(-0.515, 0.915)
Blood pressure (338, 240)	av. Systolic	132.5	131.5	-1	(-3.944, 1.944)	(460, 328)	127.6	124.6	-3	(-6.154, 0.154)
	av. Diastolic (mmHg)	75.5	73.9	-1.6	(-3.848, 0.648)		72.2	73.2	1	(-0.752, 2.752)
<b>Self-reported Health Status</b>										
Diabetes (537, 497)	Doctor-diagnosed (%)	4.2	3.6	-0.6+	(-3.197, 1.997)	(708, 656)	2.4	2.3	-0.1	(-1.77, 1.57)

Table A5 Chinese population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (297, 345)	Current smoker (%)	17	21	4+	(-2.189, 10.189)	(359, 372)	9	8	-1+	(-5.287, 3.287)
Physical activity in last month (301, 348)	Greater than or equal to five days per week on which there was moderate physical activity	23	30	-7+	(-13.921, -0.079)*	(361, 375)	18	17	1+	(-4.718, 6.718)
<b>Biochemical Measure</b>										
Cholesterol (149, 101)	mean (mmol/l)	5.1	5.1	0	(-0.254,0.254)	(175, 108)	5.1	5.1	0	(-0.258,0.258)
HDL (149, 101)	mean (mmol/l)	1.3	1.3	0	(-0.084,0.084)	(175, 108)	1.6	1.7	-0.1-	(-0.199,-0.001)*
Triglycerides (77, 32)	mean (mmol/l)	1.6	1.6	0	(-0.428,0.428)	(101, 46)	1.5	1.1	-0.4-	(-0.677,-0.123)*
<b>Physical Measure</b>										
Waist/hip ratio (196, 182)	Mean	0.88	0.87	-0.01	(-0.034,0.014)	(249, 185)	0.81	0.81	0	(-0.014,0.014)
BMI (284, 307)	Mean	24.1	24.1	0	(-0.64,0.64)	(339, 308)	23.6	23.2	-0.4	(-1.066,0.266)
Blood pressure (173, 153)	av. Systolic	127.7	125.2	-2.5	(-6,1)	(219, 166)	122.8	115.1	-7.7-	(-11.095,-4.305)*
	av. Diastolic (mmHg)	75	74.1	-0.9	(-3.486,1.686)		71.6	70	-1.6	(-3.621,0.421)
<b>Self-reported Health Status</b>										
Diabetes (301, 348)	Doctor-diagnosed (%)	4.2	3.8	-0.4+	(-3.651,2.851)	(361, 375)	2.6	3.3	0.7+	(-1.972,3.372)

Table A6 Indian population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (620, 547)	Current smoker (%)	23	20	-3+	(-8,2)	(651, 630)	6	5	-1+	(-3.676,1.676)
Physical activity in last month (626, 549)	Greater than or equal to five days per week on which there was moderate physical activity	33	30	3+	(-2.587,8.587)	(657, 634)	17	23	-6+	(-10.544,-1.456)*
<b>Biochemical Measure</b>										
Cholesterol (379, 234)	mean (mmol/l)	5.4	5.3	-0.1	(-0.33,0.13)	(376, 256)	5.0	5.1	0.1	(-0.069,0.269)
HDL (379, 234)	mean (mmol/l)	1.3	1.3	0	(-0.056,0.056)	(376, 256)	1.4	1.4	0	(-0.056,0.056)
Triglycerides (187, 84)	mean (mmol/l)	2.3	1.7	-0.6-	(-1.061,-0.139)*	(179, 95)	1.5	1.4	-0.1+	(-0.314,0.114)
<b>Physical Measure</b>										
Waist/hip ratio (467, 310)	Mean	0.92	0.92	0	(-0.014,0.014)	(461, 345)	0.81	0.82	0.01	(-0.003,0.023)
BMI (527, 482)	Mean	25.2	25.8	0.6	(0.014,1.186)*	(572, 546)	25.9	26.2	0.3	(-0.311,0.911)
Blood pressure (401, 265)	av. Systolic	130.8	127.3	-3.5	(-6.284,-0.716)*	(418, 320)	123.8	119.2	-4.6	(-7.469,-1.731)*
	av. Diastolic (mmHg)	76.5	75.2	-1.3	(-3.109,0.509)		72.1	73.7	1.6	(0.067,3.133)*
<b>Self-reported Health Status</b>										
Diabetes (626, 550)	Doctor-diagnosed (%)	7.7	10.1	2.4+	(-1.151,5.951)	(657, 634)	4.7	5.9	1.2+	(-1.43,3.83)

Table A7 Pakistani population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (605, 423)	Current smoker (%)	26	29	3+	(-3.051,9.051)	(634, 497)	5	5	0	(-2.929,2.929)
Physical activity in last month (620, 429)	Greater than or equal to five days per week on which there was moderate physical activity	29	28	1	(-5.058,7.058)	(643, 508)	16	14	2+	(-2.542,6.542)
<b>Biochemical Measure</b>										
Cholesterol (301, 137)	mean (mmol/l)	5.0	5.3	0.3+	(0.07,0.53)*	(281, 143)	4.8	5.1	0.3+	(0.103,0.497)*
HDL (301, 137)	mean (mmol/l)	1.1	1.2	-0.1-	(-0.171,-0.029)*	(281, 143)	1.4	1.4	0	(-0.071,0.071)
Triglycerides (108, 38)	mean (mmol/l)	2.1	2.1	0	(-0.478,0.478)		NA	NA	NA	NA
<b>Physical Measure</b>										
Waist/hip ratio (387, 197)	Mean	0.9	0.92	0.02	(0.005,0.035)*	(403, 224)	0.82	0.84	0.02	(0.005,0.035)*
BMI (556, 346)	Mean	25.4	25.9	0.5	(-0.106,1.106)	(550, 391)	26.5	27.1	0.6	(-0.155,1.355)
Blood pressure (319, 162)	av. Systolic	127.0	124.2	-2.8	(-5.799,0.199)	(362, 508)	120.8	117.1	-3.7	(-6.307,-1.093)*
	av. Diastolic (mmHg)	72.7	73.8	1.1	(-1.037,3.237)	(362,508)	69.9	73.2	3.3	(1.557,5.043)*
<b>Self-reported Health Status</b>										
Diabetes (620, 433)	Doctor-diagnosed (%)	8.7	7.3	-1.4+	(-5.228,2.428)	(643, 508)	5.3	8.6	3.3+	(-0.084,6.684)

Table A8 Bangladeshi population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (520, 396)	Current smoker (%)	44	40	-4+	(-10.734,2.734)	(549, 453)	1	2	1+	(-0.826,2.826)
Physical activity in last month (533, 408)	Greater than or equal to five days per week on which there was moderate physical activity	24	26	-2+	(-8.073,4.073)	(563, 477)	10	11	-1+	(-5.095,3.095)
<b>Biochemical Measure</b>										
Cholesterol (198, 87)	mean (mmol/l)	5	5.3	0.3+	(0.007,0.593)*	(176, 98)	4.7	5.1	0.4+	(0.125,0.675)*
HDL (198, 87)	mean (mmol/l)	1.1	1.1	0	(-0.071,0.071)	(176, 98)	1.3	1.2	0.1+	(0.029,0.171)*
Triglycerides	mean (mmol/l)	NA	NA	NA			NA	NA	NA	NA
<b>Physical Measure</b>										
Waist/hip ratio (273, 138)	Mean	0.90	0.91	0.01	(-0.014,0.034)	(288, 171)	0.84	0.85	0.01	(-0.012, 0.032)
BMI (409, 330)	Mean	23.8	24.7	0.9	(0.399,1.401)*	(408, 353)	24.1	25.7	1.6+	(0.841,2.359)*
Blood pressure (214, 99)	av. Systolic	124.0	121.0	-3	(-6.401,0.401)	(259, 144)	118.2	116.4	-1.8	(-5.616,2.016)
	av. Diastolic (mmHg)	73.0	72.2	-0.8	(-2.865,1.265)		70.6	72.3	1.7	(-1.026,4.426)
<b>Self-reported Health Status</b>										
Diabetes (533, 411)	Doctor-diagnosed (%)	10.6	8.2	-2.4+	(-6.563,1.763)	(563, 478)	5.9	5.2	-0.7+	(-3.782,2.382)

Table A9 Black Caribbean population: Variables (with unweighted sample size in 1999, 2004) with prevalence and 95% C.I. around difference between the two surveys, by sex. An asterisk indicates the 95% CI excludes zero.

		Men				Women				
Variable (N)	Measure	1999	2004	Difference	(95% C.I.)	(N)	1999	2004	Difference	(95% C.I.)
<b>Life Style Factor</b>										
Smoking (540, 403)	Current smoker (%)	35	25	-10+	(-16.334,-3.666)*	(741, 637)	25	24	-1	(-5.821,3.821)
Physical activity in last month (547, 409)	Greater than or equal to five days per week on which there was moderate physical activity	39	37	2+	(-4.552,8.552)	(748, 648)	28	31	-3+	(-8.039,2.039)
<b>Biochemical Measure</b>										
Cholesterol (285, 137)	mean (mmol/l)	5.0	5.1	0.1	(-0.148,0.348)	(368, 195)	4.9	5.2	0.3+	(0.103,0.497)*
HDL (285, 137)	mean (mmol/l)	1.5	1.4	0.1+	(0.029,0.171)*	(368, 195)	1.6	1.6	0	(-0.071,0.071)
Triglycerides (124, 57)	mean (mmol/l)	1.5	1.2	-0.3+	(-0.499,-0.101)*	(174, 82)	1.1	1.1	0	(-0.143,0.143)
<b>Physical Measure</b>										
Waist/hip ratio (363, 209)	Mean	0.88	0.9	0.02	(0.005,0.035)*	(513, 314)	0.82	0.83	0.01	(-0.005,0.025)
BMI (466, 317)	Mean	26.2	27.1	0.9	(0.234,1.566)*	(618, 459)	28	28	0	(-0.856,0.856)
Blood pressure (287, 155)	av. Systolic	133	133.3	0.3	(-3.077,3.677)	(432, 243)	126.6	123	-3.6	(-6.762,-0.438)*
	av. Diastolic (mmHg)	74.3	74.7	0.4	(-1.984,2.784)	(432,243)	72.5	73.7	1.2	(-0.728,3.128)
<b>Self-reported Health Status</b>										
Diabetes (547, 414)	Doctor-diagnosed (%)	7.8	10	2.2+	(-1.984,6.384)	(748, 653)	7.9	8.4	0.5+	(-2.62,3.62)

### APPENDIX 3: details of statistical methods

#### i) Absolute measures – prevalences and means

We estimated 95% confidence in prevalences by using an estimate of the number of individuals with the risk factor (published prevalence as a fraction x published unweighted sample size, then rounded to the nearest whole number) and, by subtraction, estimating the number without the risk factor. The calculation of the confidence interval followed method 2 of Newcombe.(47) Confidence intervals for the differences in mean values were estimated using the published standard error of the mean using a Student's t-test with the Welch-Satterthwaite equation(48;49). Where the 95% confidence interval of the difference between prevalences or means did not include zero we marked this with an asterisk.

#### ii) Ratios of means or risk ratios

In both age standardised ratios of means (SRMs) and age standardised prevalence ratios (PRs) the published standard error of the ratios in HSE reports was given to relatively low precision in comparison to the size of the differences being analysed. Additionally the statistical distribution around the published figures is unknown. Therefore in both cases the confidence interval was calculated using published data that were not age-standardised but for which higher precision estimates of the standard error were presented. These confidence intervals were then shifted by a constant such that the mean of the confidence interval matched the mean of the ratio of the standardised ratio of means as described below:

In the case of standardised ratio of means the confidence interval was calculated by simulating the ratio from the four constituent normal distributions according to Equation 1.

$$R1 = \frac{N_{et04}}{N_{gp04}} \bigg/ \frac{N_{et99}}{N_{gp99}} \quad \text{equation 1}$$

Where  $R1$  represents the distribution of the ratio;  $N_{et04}$  represents a normal distribution for the ethnic group in 2004;  $N_{gp04}$  represents a normal distribution for the general population in 2004;  $N_{et99}$  represents a normal distribution for the ethnic group in 1999;  $N_{gp99}$  represents a normal distribution for the general population in 1999. Each of these distributions is defined by the non-age-standardised

mean and corresponding standard error as published in the reports. The resultant distribution was then shifted so that its mean matched the actual ratio of age-standardised ratio of means and if the 95% confidence interval then did not include 1 a significance of  $p < 0.05$  was then assumed.

Additionally, the ratio of standardised ratio of means was simulated based on two normal distributions using the standardised ratio of means and its standard error of the mean (sem) (equation 2).

$$R2 = \frac{NSRM_{et04}}{NSRM_{gp04}} \text{ equation 2}$$

Where  $NSRM_{et04}$  represents a normal distribution of the standardised ratio of means for the ethnic group in 2004;  $NSRM_{et99}$  represents a normal distribution of the standardised ratio of means for the ethnic group in 1999;  $R2$  represents the resultant distribution in the ratio of standardised ratio of means. To be conservative, only when both the above tests gave significance (95%) was an asterisk placed against the difference.

In the case of binary variables and standardised relative risk a similar approach was taken. The confidence range was estimated from simulations of a ratio of ratio of four beta distributions (representing 2004 and 1999, general population and ethnic population) based upon the published prevalence and the number of individuals sampled in 1999 and 2004 (equation 3). The limits of this range were then shifted by a constant so that the mean was equal to the ratio of the 2004 prevalence ratio to the 1999 prevalence ratio.

$$R1 = \frac{\beta_{et04}}{\beta_{gp04}} \bigg/ \frac{\beta_{et99}}{\beta_{gp99}} \text{ equation 3}$$

Where  $\beta_{et04}$  represents a beta distribution for the ethnic group in 2004;  $\beta_{gp04}$  represents a beta distribution for the general population in 2004;  $\beta_{et99}$  represents a beta distribution for the ethnic group in 1999;  $\beta_{gp99}$  represents a beta distribution for the general population in 1999.

iii) *Estimating the likely size of errors in the proportional change in the SRM (standardised ratio of means) of blood pressure between 1999 and 2004 due to the change in equipment.*

The comparison of mean blood pressure levels was carried out on published Omron adjusted levels for 1999 and Omron readings for 2004 as presented in the HSE 2004 report. We used the SRMs (standard ratio of the means) in 1999 using the equipment of the time (i.e. Dinamap and not Omron). The following equation gives an estimate of the equipment-caused error in the proportional change in SRM between 1999 and 2004:

$$\text{error}(\Delta SRM) \sim SRM04 \cdot \left( \frac{c + m \cdot x_{g99}}{c + m \cdot x_{e99}} - \frac{x_{g99}}{x_{e99}} \right) \quad \text{Equation 4}$$

Where:

$\Delta SRM$  is the proportional change in the standardised ratio of means;  $SRM04$  is the standardised ratio of means in 2004;  $c$  is the constant of calibration for converting dinamap to omron;  $m$  is the rate of calibration for converting dinamap to omron (From HSE 2004 pp 207);  $x_{e99}$  is the published mean blood pressure for the ethnic group in 1999 and  $x_{g99}$  is the published mean blood pressure for the general population in 1999.

This equation was applied for each ethnic group for both males and females and for systolic and diastolic blood pressure. The results are thought to be indicative of the range of possible errors in the change in the standardised ratio of means.

Our analysis suggested a range from -0.015 to 0.005 indicating that the standardised ratio of means are not greatly sensitive to the change in equipment