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1 Assessing the knowledge of the potential harm to others caused by
2 secondhand smoke and its impact on protective behaviours in the
3 home.

4

5

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16

17 **INTRODUCTION**

18 Knowledge acquisition is an important step in the process of health behaviour
19 change(1-7). Nevertheless, the relationship between knowledge and behaviour
20 change is complex. There is often a discrepancy between one's beliefs and
21 behaviours known as cognitive dissonance. Dissonance theory proposes that in
22 order to achieve consonance either the belief or the behaviour must be changed(8,
23 9). Whilst some smokers change their smoking behaviour by quitting or reducing their
24 smoking (10), other evidence suggests that many smokers chose to understate the
25 scientific evidence or adduce anecdotal evidence to counter risks publicised in the
26 media instead(11, 12).

27

28 There is no safe level of exposure to SHS(13, 14). Knowledge of the impacts of
29 second hand smoke (SHS) and the role this might play in smoking practices has not
30 been thoroughly explored. It may be the case that smokers' concern about harming
31 others is a motivating factor in quit attempts(15). Furthermore, for those smokers who
32 are unable or unwilling to quit, concerns about the dangers and decreased social
33 acceptability of smoking, may influence smokers to take measures to protect others
34 from their smoke(16). In Queensland, Australia, researchers found that smokers
35 immediately indicated that they would avoid exposing both adults and children to
36 their SHS after they were informed of the risks of SHS to non-smokers(17).
37 Qualitative work in Scotland indicated that concern about the possible health risks
38 was cited as the main reason for both total and partial smoking restrictions in the
39 home(18). Similarly in the US, strong belief in the danger SHS posed to children's
40 health was associated with home smoking bans amongst smokers(19). It may be the
41 case that smokers' unrealistic optimism about their own risk of illness is juxtaposed
42 by their concern about the impact of their smoking on others(20). Indeed, a
43 phenomenon known as the 'third person effect' suggests that people often discount
44 the personal effects of harmful environments while at the same time recognising the
45 risks to others(21). However, results from a small-scale US study on children with
46 asthma showed that although many parents were aware that their smoking
47 exacerbated the symptoms of their children's asthma, only 33% of these smokers
48 reported having a smokefree home(22). Similarly, a UK study found that 85% of
49 parents from smoking households believed that smoking affects children's health, yet
50 only 30% prohibited smoking in the house. However, 65% of these parents did report
51 other measures that they believed protected against SHS exposure, e.g. opening a
52 window or not smoking in the same room as a child(23). Recent qualitative UK
53 research has suggested that smokers are confused about the specific impacts of

54 SHS and are displaying classic cognitive dissonance behaviours, as well as
55 employing the aforementioned protective smoking practices. The authors conclude
56 that mass media campaigns could be used to give information on the ineffectuality of
57 these behaviours in order to reduce 'half-way' measures(24).

58

59 The Health Bill enacting smokefree legislation (SFL) in England was passed in
60 February 2006 and SFL was implemented on 1st July 2007. Awareness of the
61 dangers and concern about the impact of SHS might have been expected to be
62 particularly salient during the build up to SFL. In 2003, debate surrounding the issue
63 of smokefree started in earnest and was highly publicised in the media as a result. In
64 the same year, a government funded TV, press and billboard campaign on the effect
65 of SHS on children, titled '*If you smoke, I smoke*' was launched. Anti-SHS mass
66 media campaigns frequently ran between December 2003 and April 2007(25).
67 Thereafter government funded campaigns focused on compliance with SFL. Action
68 for Smoking and Health (ASH) monitored their personal media coverage and noted it
69 was at its highest between March 2004 and February 2006 with stories mentioning
70 ASH England reaching an average audience of 4.5 million people a week(25).

71

72 Evidence suggests that media coverage of debates over smokefree policies and SHS
73 mass media health promotion campaigns help disseminate the implicit message that
74 SHS exposure is unacceptable(26). Furthermore, increased awareness of the issue,
75 including knowledge of the dangers of SHS, may influence subsequent knowledge
76 and smoking behaviours.

77

78 In England, recent evidence shows that 79% of children whose parents smoke are
79 still exposed to SHS in the home(27). In the absence of definitive evidence of what
80 works in terms of increasing the prevalence of smokefree homes(28), it is worth
81 exploring the factors that may be influential in achieving reduced SHS exposure in
82 children. This paper aims to quantitatively explore levels of and trends in knowledge
83 of the health impacts of SHS exposure in England, the predictors of knowledge and,
84 in turn, whether knowledge is associated with SHS-protective behaviours.

85

86

87 **METHODS**

88 Data

89 The Omnibus Survey (OS) is a monthly survey conducted using a multistage design
90 by the Office of National Statistics, to produce a nationally representative sample of
91 adults living in private households in Great Britain, with one interviewee per
92 household(29). A smoking module was conducted in October and November every
93 year, apart from 1998. Data from 2007 onwards were therefore collected post-SFL. A
94 sampling error compromised the 2008 survey results, therefore the 2008 survey was
95 repeated in February and March 2009. For simplicity, we refer to these data as the
96 2008 data. The smoking module was discontinued in 2009. Between 1996 and 2004,
97 approximately 1800 adults were interviewed each month; 1200 since 2005.
98 Response rates from 1996 to 2008 ranged from 61% to 70% of the eligible sample.

99

100 Outcome measures

101 *Knowledge*

102 Respondents were asked ten questions about their knowledge of SHS-related
103 illnesses, five about illnesses in children and five in adults. “*Do you think that living*
104 *with someone who smokes does, or does not, increase a child’s risk of: asthma/ear*
105 *infection/cot death/chest infections/other infections?” AND “Do you think that*
106 *breathing in someone else’s smoke increases the risk of a non-smoker getting:*
107 *asthma/lung cancer/heart disease/bronchitis/coughs & colds?” Response options are*
108 “Increases risk” or “Does not increase risk” of each illness.

109

110 *SHS protective behaviour*

111 Since 2006, the OS asked *all* respondents to describe their home smoking policy:
112 Smoking is not allowed at all, smoking is allowed in some rooms or at some times,
113 smoking is allowed everywhere, or don’t know. In our analyses a smokefree home
114 describes a household where smoking is not allowed at all.

115

116 Since 1997, *smokers only* have been asked about their smoking behaviour when in a
117 room with a non-smoking adult and a child; whether they smoke the same number of
118 cigarettes as usual, smoke fewer, do not smoke at all, or other. Smokers are asked
119 regardless of whether they report a smokefree home as it does not only refer to
120 smoking within their own home.

121

122 Analyses

123 We examined levels of and trends (1996-2008) in knowledge of SHS-related
124 illnesses before creating a composite knowledge score by giving 1 point for every
125 correctly identified illness. As knowledge of respiratory illnesses is relatively

126 common(1) and many of the questions asked about respiratory illnesses, a total
127 score of 8-10 was taken to indicate good knowledge.

128

129 To determine the predictors of good knowledge and SHS-protective behaviours the
130 data were analysed using univariate and multivariate logistic regression, with
131 adjustments made for the OS complex sampling design. A weighting factor was
132 applied to correct for unequal probability of selection.

133

134 The predictor variables included were: age-group, gender, smoking status, social
135 class, number of cars owned, number of adults in the household and age of youngest
136 child. To evaluate changes over time, and to crudely assess whether mass media
137 campaigns have impacted on knowledge or SHS-protective behaviour, three time
138 periods were created, 1996-2002 (pre-SHS-media campaigns), 2003-2006 (during
139 SHS-media campaigns) and 2007-2008 (post-SFL). Although one campaign on the
140 impacts of SHS ran between March and April 2007, from then until July 2007 the
141 campaigns focused on explaining compliance with legislation. No SHS-mass media
142 campaigns were run in 2008.

143

144 The predictive ability of each model was assessed using predicted probabilities to
145 compute the Receiver Operating Characteristic (ROC). A value of 1 represents
146 perfect predictive fit whereas 0.5 means the model is synonymous with a random
147 guess(30). An Area Under the Curve (AUC) value of 0.7 is representative of a good
148 fit(31).

149

150 The SHS-protective behaviour analyses included knowledge of SHS-related illnesses
151 and attitudes towards restrictions in three public places. A composite score of 0 to 3
152 was created for agreement with smoking restrictions in pubs, restaurants and
153 workplaces.

154

155 **RESULTS**

156 The sample distribution for gender and age for each annual sample are consistent
157 with national population estimates(32). A total sample of 32,630 respondents was
158 obtained across the 12-year period (Table 1). Approximately 50% of respondents had
159 never smoked, 27% were ex-smokers, and 24% were current smokers (17% light,
160 7% heavy-smokers). Examining annual smoking prevalence rates showed that, in

161 line with other national surveys(33), smoking prevalence decreased from 28% in
162 1996 to 21% in 2007.

163

164 *Levels of and trends in knowledge of SHS-related illnesses*

165 Over 80% of respondents knew that SHS causes respiratory illnesses (Figure 1a) but
166 fewer were aware of the role of SHS in cot death (55%) and other infections (64%) in
167 children, and the links to coronary heart disease (71%) and coughs and colds in
168 adults (68%). Knowledge of childhood ear infections was particularly poor (33%).
169 There was a small increase in knowledge between 1996 and 2008 for cot death
170 (6%), ear infection (7%) and coronary heart disease (6%). Using the composite score
171 it was clear that knowledge increased from 1996 (Figure 1b). The most marked
172 increase was between 2003 and 2004 from 56% (54.4-57.0%) to 62% (60.3-63.7%).
173 The highest level of knowledge was reached in 2006 (64%) but this fell significantly
174 to 59% in 2007, remaining constant in 2008.

175

176 A higher proportion of never smokers had good knowledge (65%, 64.0-65.5%)
177 compared with ex (59%, 58.1-60.1%), light (46%, 44.6-47.2%) and heavy (34%,
178 31.9-35.8%) smokers. Unfortunately, trend data for each subgroup is not reliable due
179 to sample size limitations.

180

181 *Predictors of good knowledge*

182 Adjusted multivariate logistic regression found age, gender, social class, smoking
183 status, number of adults in the household, having a child under 16 in the household
184 and time period, all independently predicted knowledge (Table 2). Odds of good
185 knowledge were highest for 25-44 year olds (OR 1.20, 95% CI 1.12-1.29) compared
186 to 45-64 year olds and for those of managerial and professional occupations (OR
187 1.09, 1.03-1.16) compared to those of skilled occupation. Heavy (OR 0.28, 0.25-
188 0.31), light (OR 0.45, 0.42-0.48), and ex-smokers (OR 0.86, 0.81-0.92) were all less
189 likely than never smokers to have good knowledge. The presence of children in the
190 household increased the odds of good knowledge (OR 1.24, 1.16-1.33) compared to
191 households with no children, whereas those living in households with three or more
192 adults had lower odds (OR 0.90, 0.85-0.95) compared to households with two adults.
193 Odds of good knowledge were lower in 1996-2002 compared with 2003-2006 (OR
194 0.85, 0.80-0.90). There was no significant difference in the odds of good knowledge
195 between 2007-2008 and 2003-2006. The AUC value testing the predictive ability of
196 the model was 0.63, $p < .05$, suggesting that the model was unable to fully explain all
197 the variation in knowledge.

198

199 *SHS-protective behaviours*

200 In 2008, the percentage of respondents with smokefree homes was 72% (69.4-
201 73.6%); an 11% absolute increase since 2006. Amongst smokers there was a
202 smaller increase from 27% (22.6-30.4%) to 30% (25.0-34.7%) during the same
203 period. In 2008, smoking abstinence was higher when in a room with a child (67%)
204 than with an adult (49%).

205

206 *Knowledge and SHS-protective behaviours*

207 Prevalence of smokefree homes and smoking abstinence varied markedly with
208 respondents' level of knowledge of SHS-related illnesses (Table 3).

209

210 Of those respondents who knew of 0-5 SHS-related illnesses, only 39% (35.7-41.5%)
211 had smokefree homes, whereas 75% (73.9-76.7%) of those with knowledge of 8-10
212 illnesses did. Similarly, amongst smokers, only 16% (12.8-19.9%) with knowledge of
213 0-5 illnesses had smokefree homes compared to 35% (30.9-38.7%) of smokers with
214 good knowledge.

215

216 Smoking abstinence in a room with a child for those with knowledge of 0-5 SHS-
217 related illnesses was 56% (54.2-58.1%) whilst for those who were aware of 8-10
218 illnesses it was 74% (72.8-76.0%). Although abstinence was less prevalent when in a
219 room with a non-smoking adult, better knowledge was associated with an increased
220 proportion of abstinent smokers, 54% (52.5-56.0%) of those with knowledge of 8-10
221 illnesses compared to 42% (40.5-44.4%) of those who knew about only 0-5 illnesses.

222

223 *Predictors of smokefree homes: the population as a whole*

224 Adjusted multivariate analysis found that knowledge of SHS-related illnesses
225 predicted smokefree homes with odds increasing by 18% (16-23%) for every unit
226 increase in knowledge (Table 4). There was a significant increase in smokefree
227 home prevalence between 2006 and 2007 (OR 1.30, 1.09-1.56) and between 2006
228 and 2008 (OR 1.58, 1.31-1.90). Respondents with part or unskilled occupations and
229 those with no car had poorer odds of having a smokefree home (OR 0.70, 0.57-0.86
230 and OR 0.64, 0.53-0.78 respectively) compared to those of skilled occupation and
231 those with one car. Heavy (OR 0.09, 0.06-0.13), light (OR 0.18, 0.14-0.22) and ex
232 smokers (OR 0.81, 0.68-0.97) all had lower odds of a smoke-free home than never
233 smokers. Those with a child under the age of 5 had much greater odds of a
234 smokefree home (OR 2.33, 1.71-3.19) than those with no children under 16 years

235 residing. Respondents' odds of a smokefree home increased with each additional
236 public place in which they agreed smoking restrictions were necessary (OR 1.78,
237 1.61-1.97). The AUC was 0.82, $p < .05$ indicating that the model was a good fit of the
238 data.

239

240 *Predictors of smokefree homes: smokers only*

241 Odds of a smokefree home increased by 10% (4%-16%) with every unit increase in
242 knowledge. Smokers' odds also increased with agreement with restrictions in each
243 additional public place. Heavy smokers had lower odds of having a smokefree home
244 (OR 0.47, 0.31-0.71) compared to light smokers, as did those with no car (OR 0.43,
245 0.30-0.75) compared to those with a car. Smokers with a child under 5 years had
246 *greater* odds of a smokefree home (OR 2.96, 1.77-4.96). The AUC (0.74, $p < .05$)
247 indicated that the model was a good fit.

248

249 *Smokers' abstinence in a room with children and non-smoking adults: smokers only*

250 Odds of abstinence when in a room with children increased by 11% (9-14%) for each
251 unit increase in composite knowledge score and the odds of abstinence when in a
252 room with a non-smoking adult by 6% (4-8%; Table 5). Additionally, the odds of
253 abstinence were greater for each additional public place that smokers added to their
254 list. Heavy smokers, compared to light smokers, respondents with a part or unskilled
255 occupation, compared to those of skilled occupation, and those with no car,
256 compared to those with a car, were less likely to abstain, whilst those with two or
257 more cars and those of managerial or professional occupation were more likely to.
258 However, for the latter group this relationship was only significant when in a room
259 with a child (OR 1.52, 1.29-1.78). Older smokers had greater odds of abstinence in
260 both contexts than younger smokers. Having children 0-10 years old in the
261 household predicted abstinence when in a room with non-smoking adults and having
262 children aged 5-15 years predicted abstinence when in a room with children.
263 Interestingly, having infants (0-4 years) in the household was significantly associated
264 with being less likely to abstain in a room with children. Number of adults residing
265 and gender were not significant predictors of abstinence when in a room with a child.
266 However, compared to women, men were less likely to abstain when in a room with
267 other non-smoking adults (OR 0.88, 0.79-0.99). Compared with the period 2003-
268 2006, the odds of abstinence in a room with a child were lower in 1996-2002 (OR
269 0.78, 0.69-0.88) but higher in 2007-2008 (OR 1.55, 1.26-1.91). However, abstinence
270 in a room with adults was not significantly higher in this final period. The model for

271 abstinence with children was a good fit of the data (AUC = 0.71, $p < .05$), whilst the
272 model for abstinence with adults was not (AUC = 0.67, $p < .05$).

273

274 **DISCUSSION**

275

276 **Main findings of this study**

277 To our knowledge, this quantitative study is the first in England to assess the trends
278 in, and determinants of, knowledge of the specific illnesses related to SHS, and
279 explore the relationship between knowledge and the implementation of SHS-
280 protective behaviours such as smokefree homes and smoking abstinence around
281 others. Our findings show that respondents know SHS increases the risk of
282 respiratory illnesses but are less aware of non-respiratory diseases. A quarter of the
283 population were unaware that SHS exposure can cause heart disease in adults,
284 whilst only a third knew SHS could cause child ear infection and 55% cot death.
285 Awareness has improved over the last decade, yet levels of knowledge remain low
286 for these conditions.

287

288 'Good knowledge' (correct identification of an association between SHS and at least
289 8 out of the 10 SHS-related illnesses) was most prevalent amongst never smokers
290 (65%), falling to 34% among those smoking over 20 per day. In addition to being a
291 non-smoker, having a child in the household, being aged 25-44 years, female and of
292 higher social class were all predictive of good knowledge.

293

294 Our multivariate analysis suggests knowledge was highest during a period of
295 frequent SHS-related mass media campaigns (2003-2006) and that post-SFL there
296 was no further increase in knowledge. This coincided with the end of SHS mass
297 media campaigns which in 2007 ran from March to April only(34). To our knowledge,
298 there have been no further national, government funded mass media campaigns that
299 have focused specifically on SHS between May 2007 and March 2009 – the last data
300 collection point of this study. Campaigns in late 2007 and 2008/9 focused on smoking
301 cessation(34) and since April 2010 there have been no mass media campaigns at
302 all(35).

303

304 Knowledge was associated with smokefree homes and abstinence from smoking
305 when in a room with others even once potential confounders had been adjusted for.
306 The odds of smokers having a smokefree home increased by 9% with each unit
307 increase in knowledge. Similarly, with each additional unit increase in knowledge, the

308 odds of smoking abstinence increased by 11% when with children and 6% when with
309 adults. Although our findings are cross-sectional in nature they do support earlier
310 findings of a relationship between knowledge and smoking related behaviour (18, 19,
311 24, 36).

312

313 Knowledge did not increase in 2007-2008 but smoking abstinence with children did,
314 as did smokefree homes amongst non-smokers. There was no increase in
315 abstinence around adults or smokefree homes amongst smokers in 2007-2008
316 compared with 2003-2006. Whilst it is unknown why abstinence increased with
317 children when knowledge concurrently decreased, it may be the case that smoking
318 parents are subject to social desirability bias which may lead them to either falsely
319 report abstinence or truly abstain when in a room with a child but not go as far to
320 implement a smokefree home. What is clear from this study is that more smokers
321 with good knowledge have a smokefree home compared to those with poor
322 knowledge, 35% versus 16% respectively (Table 3).

323

324 **What is already known on this topic**

325 Our findings are consistent with qualitative studies which suggest a relationship
326 between knowledge of the dangers of SHS and SHS-protective behaviour(16, 24,
327 36). In California, smokers who believed that SHS was harmful were five times more
328 likely to report living in a smokefree home(16) and in Tasmania, a mass media
329 campaign highlighting the link between SHS and cot death successfully reduced
330 child SHS exposure(36).

331

332 As outlined above, to reduce experiences of cognitive dissonance, it is not
333 uncommon for people to revise their beliefs to complement their behaviour (9). A
334 qualitative study in England showed smoking mothers who smoked in the home used
335 risk minimising beliefs to justify their behaviour(37). Increasing knowledge of the
336 impacts of SHS is required to challenge cognitive dissonance based rationalisations
337 that smokers make to justify their smoking behaviour and to encourage them to
338 change their behaviour rather than their beliefs(24, 38, 39). Given that our results
339 show that good knowledge was not more likely in 2007-2008 compared to 2003-
340 2006, there is a case for further education campaigns in order to increase
341 knowledge. This knowledge should be framed so that it combats functional and risk-
342 minimising beliefs and provides practical advice on how to protect children from SHS.
343 Research investigating the impact of mass media campaigns on SHS-related
344 knowledge and subsequent behaviour is also warranted.

345

346 Although we recognise that knowledge alone is unlikely to be sufficient to bring about
347 behaviour change, given that knowledge acquisition is an important step in the
348 process of behaviour change and that without knowledge, behaviour change is
349 unlikely(1, 6, 7, 39), the low levels of knowledge revealed in our study are cause for
350 concern. This concern is further heightened by our findings of the significant link
351 between knowledge and protective behaviours and that 52% of children with smoking
352 parents in England still live in homes where smoking occurs(40).

353

354 **What this study adds**

355 This study quantifies levels of knowledge by population subgroups and provides
356 quantitative evidence that knowledge of SHS-related illnesses is predictive of
357 keeping a smokefree home and abstaining from smoking in the presence of children
358 and non-smoking adults. This link between knowledge and behaviour and its
359 concurrence with topical mass media campaigns has potential implications for policy
360 and practice. Given the lack of evidence for what really works in terms of producing
361 smokefree homes(41, 42), and that little has hitherto been known about the levels of
362 national SHS knowledge in England, our findings suggest a role for including
363 knowledge in the development of future interventions and supports the recent call for
364 further mass media campaigns to highlight the dangers of SHS(24, 41) in
365 combination with information on the ineffectuality of some 'protective' measures and
366 how smokefree homes can be achieved.

367

368 **Limitations of this study**

369 Our data are cross-sectional; it would be useful to examine the relationship between
370 knowledge and SHS-protective behaviours using longitudinal data but such data
371 were not available. Our logistic regression model for 'good' knowledge could have
372 been a better fit, suggesting that there may be other important predictors of
373 knowledge that we have not included in our analyses.

374

375 Due to the nature of self-reported data, we can not rule out the possibility of social
376 desirability bias amongst parents which leads them to report smokefree homes and
377 smoking abstinence in a room with a child as they wish to be seen as a considerate
378 smoker, neither can we deny that this bias may have increased over time. However,
379 cotinine measures have been used to verify self-reported prevalence of smokefree
380 homes in previous studies(27, 40). Furthermore, some smokers may have a different
381 view of 'smokefree' than others. A study with smoking mothers found a discrepancy

382 whereby some women describe their homes as non-smoking whilst also reporting
383 that they smoke in an open doorway, believing that this still constitutes a non-
384 smoking home(43).

385

386 Finally, it was not possible to discern whether respondents had a suitable outdoor
387 space to smoke. One of the reported barriers to smoking outdoors is lack of
388 appropriate space(44); future work needs to encompass the impact of such barriers.

389

390

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396

397 **CONFLICT OF INTEREST**

398 None

399

400

401

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Table 1. Characteristics of the OS England sample by year (1996-2008)

Socio-demographics	96	97	99	00	01	02	03	04	05	06	07	08*	Total
<i>Gender</i>													
Male	49	46	46	49	43	46	46	46	45	46	47	45	15 101 (46)
Female	51	54	54	51	57	54	54	54	55	54	53	55	17 529 (54)
<i>Age group</i>													
16-24	12	13	13	12	13	12	14	12	11	12	11	9	4 008 (12)
25-44	38	36	37	35	35	34	34	35	36	34	33	31	11 450 (35)
45-64	32	33	31	32	31	33	32	33	32	34	35	36	10 585 (32)
65+	18	18	19	22	21	20	20	20	21	20	20	24	6 587 (20)
<i>Smoking status</i>													
All smokers	28	25	26	25	23	25	23	22	22	24	21	19	7 924 (24)
Light (0-20/day)	19	17	18	17	16	17	16	16	16	18	15	5	2 244 (7)
Heavy(20+/day)	9	8	8	8	7	8	7	6	6	6	6	14	5 680 (17)
Ex	26	28	28	28	26	26	26	28	26	27	27	36	8 917 (27)
Never	46	47	46	47	51	49	51	50	51	49	52	55	15 721 (48)
<i>Social Class</i>													
Professional & managerial	32	30	34	34	33	32	34	33	32	31	34	36	10 547 (32)
Skilled non-manual & manual	41	42	39	38	42	42	39	41	42	41	39	40	13 260 (41)
Part skilled & Unskilled	23	23	23	21	20	19	19	19	19	19	19	16	6 357 (20)
Never worked/unclassified †	4	5	4	6	5	7	8	7	7	8	8	8	2 465 (8)
Total Sample	3 202	3 174	3 003	2 881	3 032	3 316	3 050	3 095	2 097	2 013	1 956	1 812	32 630

*Note: Not all variable classifications will add up to the sample totals due to missing data for those variables. † Not included in the final sample * The 2008 data were collected in February & March 2009 due to a sampling error in October & November 2008.*

Table 2. Logistic regression predicting 'good' knowledge (1996-2008)

Predictor variables	N	Good knowledge (%)	Univariate		Multivariate	
			Odds ratio	95% CI	Odds ratio	95% CI
Gender						
Female	16 721	59	1.00		1.00	
Male	13 641	56	0.87	0.83-0.92	0.90	0.86-0.95
Age (years)						
45-64	9 721	57	1.00		1.00	
16-24	1 936	57	1.03	0.94-1.13	1.05	0.94-1.18
25-44	11 035	62	1.27	1.20-1.35	1.20	1.12-1.29
65+	7 670	52	0.82	0.77-0.88	0.77	0.72-0.83
Social Class						
Skilled manual & non-manual	13 237	57	1.00		1.00	
Managerial & professional	10 583	61	1.21	1.15-1.28	1.09	1.03-1.16
Part & unskilled	6 542	53	0.86	0.80-0.92	0.93	0.87-1.00
Number of cars						
1	13 754	57	1.00			
0	7 117	52	0.80	0.75-0.85	0.96	0.89-1.03
2+	9 491	61	1.17	1.12-1.24	1.03	0.96-1.09
Smoking status						
Never	13 937	65	1.00		1.00	
Ex	8 811	59	0.79	0.75-0.84	0.86	0.81-0.92
Light	5 375	46	0.46	0.43-0.49	0.45	0.42-0.48
Heavy	2 239	34	0.28	0.25-0.31	0.28	0.25-0.31
Adults in household						
2	16 323	59	1.00		1.00	
1	9 804	54	0.80	0.76-0.84	0.96	0.91-1.03
3+	4 235	57	0.90	0.84-0.96	0.89	0.83-0.96
Child in the household						
No child <16	21 930	55	1.00		1.00	
<16 years	8 432	63	1.39	1.32-1.47	1.24	1.16-1.33
Year						
2003-2006	9 392	56	1.00		1.00	
1996-2002	17 510	60	0.83	0.79-0.88	0.85	0.80-0.90
2007-2008*	3 460	59	0.95	0.88-1.03	0.92	0.84-1.01

For every consecutive increase in the predictor variable 'year' the odds ratio represents the increase in odds of the outcome occurring. For all categorical variables the odds ratio describes a multiplicative change in the outcome compared with the reference category. *The 2008 data were collected in February & March 2009 due to a sampling error in October & November 2008.

TABLE 3. Relationship between knowledge of SHS-related illnesses and SHS-protective behaviours

Number of illnesses correctly identified	Percentage respondents (95% confidence intervals)			
	Smoke-Free home (2006-2008)		Smoking abstinence (1997-2008) with...	
	All	Smokers only	...a child	...non-smoking adult
0-5	39 (35.7 – 41.5)	16 (12.8 – 19.9)	56 (54.2-58.1)	42 (40.5 – 44.4)
6-7	65 (62.5 – 68.0)	33 (27.4 – 38.7)	72 (69.3 – 73.8)	49 (46.3 – 51.3)
8-10	75 (73.9 – 76.7)	35 (30.9 – 38.7)	74 (72.8 – 76.0)	54 (52.5 – 56.0)
Total	66 (65.1 – 67.6)	28 (25.8 – 30.8)	67 (62.2 – 68.4)	49 (47.7 – 50.0)

Table 4. Logistic regression predicting smokefree home incidence for all respondents and smokers only (2006 – 2008)

Predictors	All respondents				Smokers only			
	N	Smokefree(%)	Univariate OR	Multivariate OR	N	Smokefree(%)	Univariate OR	Multivariate OR
Sex								
<i>Female</i>	2388	67	1.00	1.00	599	32	1.00	
<i>Male</i>	2842	65	0.92(0.82-1.04)	1.06 (0.91-1.24)	565	24	1.47(1.19-1.94)	1.39(1.00-1.93)
Age group (years)								
45-64	1872	66	1.00	1.00	396	25	1.00	1.00
16-24	264	59	0.74(0.59-0.93)	0.95 (0.65-1.38)	106	36	1.64(1.06-2.55)	0.97 (0.52-1.79)
25-44	1739	69	1.17(1.01-1.35)	1.08 (0.88-1.33)	477	31	1.33(0.96-1.83)	0.77 (0.51-1.16)
65+	1416	66	1.01(0.86-1.17)	1.09 (0.90-1.33)	185	16	0.59(0.35-0.98)	0.74 (0.41-1.35)
Social class								
<i>Skilled manual & non-manual</i>	2346	66	1.00	1.00	567	29	1.00	1.00
<i>Managerial & professional</i>	1911	73	1.44(1.25-1.66)	0.98(0.83-1.17)	290	33	1.23(0.88-1.73)	0.96 (0.66-1.41)
<i>Part & unskilled</i>	1034	55	0.63(0.53-0.74)	0.70(0.57-0.86)	307	21	0.67(0.46-0.99)	0.79 (0.51-1.21)
Number of cars								
1	2361	65	1.00		513	28	1.00	1.00
0	1129	50	0.53(0.46-0.62)	0.64(0.53-0.78)	359	14	0.43(0.29-0.62)	0.47(0.30-0.75)
2+	1801	74	1.49(1.29-1.71)	1.17(0.97-1.40)	292	40	1.74(1.27-2.39)	1.46(1.00-2.13)
Smoking status								
<i>Never</i>	2444	79	1.00	1.00	-	-		
<i>Ex</i>	1683	73	0.72(0.62-0.84)	0.81(0.68-0.97)	-	-		
<i>Light</i>	846	33	0.13(0.11-0.16)	0.18(0.14-0.22)	846	33	1.00	1.00
<i>Heavy</i>	318	15	0.04(0.03-0.06)	0.09(0.06-0.13)	318	15	0.34(0.23-0.49)	0.47(0.31-0.72)
Number of adults								
2	2842	69	1.00	1.00	509	31	1.00	1.00
1	1745	58	0.61(0.54-0.69)	1.04 (0.88-1.23)	475	16	0.42(0.31-0.56)	0.75 (0.51-1.10)
3+	704	66	0.85(0.72-1.00)	1.07 (0.85-1.35)	180	33	1.10(0.78-1.54)	1.07 (0.69-1.67)
Age of youngest child (years)								
<i>No child <16</i>	3982	64	1.00	1.00	813	24	1.00	1.00
0-4	597	77	1.85(1.50-2.29)	2.33(1.71-3.19)	154	42	2.36(1.62-3.43)	2.96(1.77-4.96)
5-10	392	66	1.09(0.87-1.35)	1.17(0.87-1.58)	115	29	1.29(0.81-2.06)	1.34(0.77-2.33)
11-15	320	71	1.34(1.04-1.71)	1.42(1.03-1.97)	82	41	2.18(1.35-3.52)	1.54(0.94-2.52)
Year								
2006	1833	61	1.00	1.00	444	27	1.00	1.00
2007	1785	67	1.26(1.09-1.45)	1.30(1.09-1.56)	393	29	1.14(0.82-1.57)	1.19 (0.82-1.71)
2008*	1673	72	1.58(1.36-1.83)	1.58(1.31-1.90)	327	30	1.18(0.83-1.66)	1.22 (0.81-1.83)
Knowledge SHS illnesses			1.29(1.26-1.32)	1.18(1.14-1.21)			1.16(1.11-1.22)	1.10 (1.04-1.16)
Agreement with restrictions			2.75(2.52-2.99)	1.78(1.61-1.97)			1.87(1.60-2.19)	1.64(1.35-1.97)

OR: Odds ratio. The continuous predictors, knowledge and agreement with restrictions in public places produce a multiplier that describes the odds of the outcome occurring for each unit increase in the predictor variable. For all categorical variables the odds ratio describes a multiplicative change compared with the reference category. *The 2008 data were collected in February & March 2009 due to a sampling error in October & November 2008.

Table 5. Logistic regression predicting smoking abstinence when in a room with a child or a non-smoking adult (smokers only, 1997-2008)

Abstain when in a room with...	...a child				...a non-smoking adult			
	N	Abstain (%)	Univariate OR	Multivariate OR	N	Abstain (%)	Univariate OR	Multivariate OR
Sex								
<i>Female</i>	3 618	68	1.00	1.00	3 619	51	1.00	1.00
<i>Male</i>	3 071	67	0.97 (0.87-1.08)	0.93 (0.82-1.05)	3 082	47	0.84(0.77-0.93)	0.88 (0.79-0.99)
Age group								
45-64	2 099	65	1.00	1.00	2 105	53	1.00	1.00
16-24	671	70	1.23 (1.02-1.48)	0.95 (0.76-1.19)	672	39	0.59 (0.49-0.70)	0.42 (0.34-0.53)
25-44	3 049	67	1.08 (0.95-1.22)	0.97 (0.83-1.14)	3 050	48	0.83 (0.74-0.93)	0.59 (0.51-0.69)
65+	870	71	1.32 (1.10-1.59)	1.38 (1.12-1.69)	874	57	1.18 (1.00-1.40)	1.25 (1.04-1.50)
Social class								
<i>Skilled manual & non-manual</i>	3 108	67	1.00	1.00	3 116	49	1.00	1.00
<i>Managerial & Professional</i>	1 677	77	1.64 (1.42-1.90)	1.52 (1.29-1.78)	1 678	54	1.21 (1.06-1.38)	1.07 (0.93-1.22)
<i>Part & unskilled</i>	1 904	60	0.74 (0.65-0.84)	0.82 (0.72-0.95)	1 907	45	0.83 (0.73-0.94)	0.88 (0.77-1.01)
Number of cars								
1	2 962	68	1.00	1.00	2 965	50	1.00	1.00
0	2 084	61	0.73 (0.65-0.83)	0.79 (0.68-0.92)	2 093	42	0.71 (0.63-0.80)	0.80 (0.69-0.92)
2+	1 643	73	1.26 (1.10-1.45)	1.17 (1.00-1.37)	1 643	53	1.11 (0.98-1.26)	1.15 (1.00-1.33)
Smoking status								
<i>Light</i>	4 754	74	1.00	1.00	4760	54	1.00	1.00
<i>Heavy</i>	1 935	51	0.37 (0.33-0.42)	0.44 (0.38-0.50)	1941	36	0.47(0.42-0.53)	0.50 (0.44-0.57)
Number of adults								
2	3 137	67	1.00	1.00	3 140	50	1.00	1.00
1	2 554	65	0.90 (0.81-1.00)	0.99 (0.86-1.13)	2 562	48	0.90 (0.81-0.99)	1.05 (0.93-1.19)
3+	998	69	1.08 (0.93-1.25)	1.04 (0.88-1.24)	999	47	0.88 (0.77-1.01)	1.01 (0.86-1.18)
Age of youngest child (years)								
<i>No child <16</i>	4 437	70	1.00	1.00	4 448	48	1.00	1.00
0-4	991	68	0.90 (0.78-1.05)	0.89 (0.73-1.07)	991	49	1.04 (0.90-1.19)	1.27 (1.07-1.51)
5-10	764	57	0.57 (0.48-0.67)	0.52 (0.43-0.64)	765	52	1.17 (1.00-1.38)	1.36 (1.12-1.65)
11-15	497	60	0.66 (0.54-0.80)	0.61 (0.49-0.77)	497	48	0.99 (0.81-1.20)	1.11 (0.89-1.38)
Year								
2003-2006	2 231	69	1.00	1.00	2 232	47	1.00	1.00
1996-2002	3 741	64	0.78 (0.69-0.88)	0.85 (0.74-0.97)	3 751	50	1.13 (1.01-1.26)	1.27 (1.12-1.43)
2007-2008*	717	78	1.55 (1.26-1.91)	1.77 (1.40-2.24)	718	50	1.11 (0.93-1.33)	1.15 (0.95-1.40)
Knowledge SHS illnesses			1.14 (1.12-1.16)	1.11(1.09-1.14)			1.08 (1.06-1.09)	1.06 (1.04-1.08)
Agreement with restrictions			1.55 (1.46-1.63)	1.35 (1.27-1.44)			1.44 (1.36-1.51)	1.31 (1.23-1.39)

OR: Odds ratio. The continuous predictors, knowledge and agreement with restrictions in public places produce a multiplier that describes the odds of the outcome occurring for each unit increase in the predictor variable. For all categorical variables the odds ratio describes a multiplicative change compared with the reference category. *The 2008 data were collected in February & March 2009 due to a sampling error in October & November 2008.