

4 Tobacco

4.1 Introduction

As with alcohol and illicit drugs, we revised the aetiological fractions for tobacco to incorporate recent data on prevalence wherever such data were available. In addition, we revised the risk-ratio estimates for tobacco and cervix cancer and tobacco and peptic ulcer. Finally, we incorporated estimates of aetiological fractions associated with passive smoking, based on the National Health and Medical Research Council's report on passive smoking (NHMRC 1997).

As part of the revision of prevalence data, we also dealt with the question of the time lag between tobacco exposure and disease onset. This is discussed in detail in section 4.1.1; briefly it involves the derivation of a synthetic prevalence estimate which represents past exposure to tobacco rather than current exposure.

4.1.1 Aetiological fractions associated with cancer and chronic obstructive pulmonary disease

English et al. (1995) used an estimate of current smoking prevalence in their calculation of aetiological fractions for tobacco. But for many conditions there is a long time lag between exposure to tobacco smoke and the associated ill-effects—in the case of cancer it may be many decades—so for these conditions estimates of the current prevalence of smoking are not helpful in understanding the current associated disease burden.

We have followed the Australian Burden of Disease Study (Mathers et al. 1999) in using the method proposed by Peto et al. (1992) to adjust for the time lag. Peto et al. proposed using an artificial compound prevalence measure of tobacco exposure, derived from a comparison between lung cancer rates in the country of interest and lung cancer rates among non-smokers observed in a large long-term follow-up study in the United States. This method was used here to determine tobacco exposure for the cancers on our risk factor list and for chronic obstructive pulmonary disease. The mean time between tobacco exposure and the onset of the other illnesses and injuries discussed in this chapter is considerably shorter than that for cancer and chronic obstructive pulmonary disease, so the estimates of current tobacco exposure described in Chapter 1 were used for these other conditions.

4.2 Revised aetiological fractions for tobacco

4.2.1 Tobacco and cervix cancer

English et al. (1995) concluded that, while there is limited evidence that smoking causes cervix cancer, a causal interpretation of the association is credible, although confounding cannot be ruled out with confidence. Confounding could be due to known risk factors for cervix cancer, particularly the number of sexual partners and infection with the human papilloma virus (HPV). If confounding due to HPV infection were to explain the

relationship between cigarette smoking and the risk of cervix cancer, there would be little association between cigarette smoking and cervix cancer among women known to be infected with HPV.

Epidemiological evidence for reviewing the aetiological fraction for tobacco and cervix cancer

English et al. (1995) found, from a meta-analysis of 14 studies, that female ex-smokers had a relative risk of 1.31 (95% CI: 1.21–1.43) and female current smokers had a relative risk of 1.75 (95% CI: 1.66–1.85). The results for current smokers were broadly consistent with a previously published meta-analysis that reported a relative risk of 1.42 (95% CI: 1.33–1.51) for female smokers after adjusting for age and the number of sexual partners (Sood 1991). However, another meta-analysis, while confirming that female current smokers were at increased risk, did not confirm the significantly elevated risk for ex-smokers (Licciardone et al. 1990).

The overall aetiological fraction derived by English et al. for cervix cancer caused by smoking was estimated as 0.19. Thus 19% of cervix cancer was attributed to cigarette smoking.

The major risk factor for cervix cancer has been shown to be the human papilloma virus (Bosch et al. 1994b; Eluf Neto et al. 1994; Munoz et al. 1994), the association between HPV infection and cervix cancer being reflected in odds ratios ranging from 15 to 100 (Bosch et al. 1994a). Cervix cancer risk for a woman depends largely on the probability of being infected with some specific types of HPV (Bosch et al. 1994b).

Risk factors usually strongly associated with cervical neoplasia—such as number of sexual partners or age at first sexual intercourse—were no longer associated with cervix cancer among women who were HPV DNA positive, while the association persisted among women who were HPV DNA negative. Similarly, the odds ratio for the association between smoking status and cervix cancer ranged from 1.4 to 2.0 after adjustment for confounders including HPV. However, when HPV-positive women only were analysed (removing confounding due to undetected HPV), the odds ratio attributable to smoking was not statistically different from one (Bosch et al. 1994a).

Phillips and Davey Smith (1994) discussed the likelihood that the association between cigarette smoking and sexual activity makes the evaluation of the role of smoking difficult. This is because of confounding due to the presence of the aetiological pathogen (HPV), which is transmitted through sexual activity.

They noted that studies of the association between smoking and cervix cancer have adjusted for the lifetime number of sexual partners as a proxy measure of the presence of the aetiological pathogen and, in most cases, the association with smoking has diminished but remained significant. Use of a proxy tends, however, to result in an underestimation of the effect of the aetiological pathogen (HPV) on the risk of cervix cancer. Hence the adjustment is also likely to be insufficient, resulting in an overestimation of the adjusted or 'independent' effect of smoking. Using realistic estimates of the association between the presence of the aetiological pathogen (HPV) and both smoking and the risk of cervix cancer, Phillips and Davey Smith generated 'independent' relative risks for cigarette smoking of two and above. Thus they concluded that the observed 'independent' effect of cigarette smoking on cervical cancer arises because of residual confounding.

Revised aetiological fractions for tobacco and cervix cancer

Sexually transmitted viruses of the HPV type have been shown to be present in high grade squamous pre-cancer and cancer of the cervix. That the 'independent' effect of smoking with regard to cervix cancer as an outcome arises because of residual confounding does not support a causal relationship between smoking and cervix cancer; as a result the fraction should be zero.

4.2.2 Tobacco and peptic ulcer

English et al. (1995) and Ashley (1997) claimed that smoking increases the risk of the occurrence of peptic ulcer, delays healing (with or without treatment) and increases the risk of recurrence after healing. Thus they said the relationship between smoking and peptic ulcer is causal. English et al. found that 41% of peptic ulcer disease in males and 33% in females is caused by cigarette smoking. Studies published before that of English et al. have also published attributable fractions for cigarette smoking in the aetiology of peptic ulcer disease. Kurata et al. (1986) found that between 43% and 63% of duodenal ulcer mortality for males and between 25% and 50% for females could be attributed to smoking. Schoon et al. (1991) estimated that, among people aged 35–84 years, 24.4% of ulcers diagnosed for the first time and 42.0% of relapsing ulcers were caused by smoking. Johnsen et al. (1994) found that 53.0% of duodenal ulcer disease and 60.0% of gastric ulcer disease was attributable to daily cigarette smoking.

Epidemiological evidence for reviewing the aetiological fraction for tobacco and peptic ulcer

In the last 20 years there has been increasing recognition of the role that *Campylobacter pylori* or *Helicobacter pylori* infection may have as a major contributing factor to peptic ulcer disease (Everhart et al. 1998). In 1989 it was reported that the use of non-steroidal anti-inflammatory drugs and the presence of antibodies to *C. pylori* identified people at risk for peptic ulcer disease and that smoking increased this risk in subjects with *C. pylori* (Martin et al. 1989). An absence of a history of NSAID use and antibody to *C. pylori* therefore identifies individuals with a low probability of ulcer disease. This is confirmed in the more recent review by Blum (1996) that also reported that ulcer development in the absence of *H. pylori* is extremely rare in those not taking NSAIDs. While peptic ulcer disease is still described as a multifactorial condition that is influenced by a number of environmental factors (including smoking), in the absence of *H. pylori* infection these factors would not normally lead to ulcer formation (Blum 1996).

Gastritis induced by *H. pylori* is a powerful risk factor for peptic ulcer disease. The risk of developing peptic ulcer is at least 15 times higher in those infected with *H. pylori* when compared with those not infected with *H. pylori*. Furthermore, eradication of *C. pylori* or *H. pylori* leads to the cure of peptic ulcer disease and long-term remission (Blum 1996). Numerous studies have shown that eradication therapy significantly reduces the rate of relapse and complication associated with genuine non-NSAID induced duodenal ulcer (Chan et al. 1997; Hunt & Mohamed 1995; Labenz & Borsch 1994b; Labenz & Borsch 1994c; Marshall et al. 1988; Rauws & Tytgat 1990; Tytgat & Rauws 1990) or gastric ulcer (Chan et al. 1997; Labenz & Borsch 1994a; Labenz & Borsch 1994b; Labenz & Borsch 1994c). This marked decrease in the rate of recurrence of peptic ulcer disease following the eradication of infection provides the strongest evidence for the pathogenic role of *H. pylori* in peptic ulcer disease (NIH 1994).

Since there is no protection from reinfection after the cure of a first infection (Blum 1996), reinfection in adults can occur at a rate similar to the infection rate in adults. This is, however, rare (Cullen et al. 1993) and in industrialised countries amounts to about 1% a year. The four-year follow-up by Labenz (1994b) reported the reinfection rate one year after successful eradication was 2.6% (ulcer relapse 1.1%) and after two years reinfection had risen to 3.2% (ulcer relapse 1.6%). No further increase in reinfection was found during the subsequent two years. More recently, the 1% a year *H. pylori* infection rate among adults was confirmed by an Australian study of Sydney and Melbourne residents (Lin et al. 1998).

From the data available, a further difficulty in establishing a causal relationship between *H. pylori* and peptic ulcer disease is that only a small proportion of individuals harboring the organism develop ulceration (National Institute of Health 1994). It is hypothesised that diversity among *H. pylori* strains is in part responsible for the observed variability in the outcome of the infection (Blaser 1994). That only certain strains of *H. pylori* cause ulceration and that their ulcerogenic potential appears to be associated with the presence of strain-specific factors, such as the *cagA* gene (Blaser 1994), are further evidence for the pathogenic role of *H. pylori* in peptic ulcer disease (Blum 1996).

Studies used to revise the aetiological fraction for tobacco and peptic ulcer

The biological evidence cited in support of an aetiological role for cigarette smoking is that in general nicotine appears to act by potentiating the adverse effects of gastric aggressive factors such as acid and pepsin secretion, motility, duodenogastric reflux, the risk of *H. pylori* infection, levels of free radicals, vasopressin secretion, platelet activating factor generation, and endothelin generation. At the same time, nicotine attenuates defensive mechanisms by decreasing mucosal blood flow, prostaglandin synthesis, mucus secretion and epidermal growth factor secretion (Ashley 1997).

However, none of the studies used by English et al., and four of the six studies they excluded in deriving the aetiological fraction, considered the direct influence of *C. pylori* or *H. pylori* infection. Of the remaining two studies that did consider the influence of *H. pylori*, the most recent (Bateson 1993) found that, while the association of peptic ulcer disease with both *H. pylori* infection and cigarette smoking was confirmed, the excess of peptic ulcer disease in cigarette smokers may have been explained by their increased susceptibility to *H. pylori* infection. The other study—by Martin et al. 1989—found that, while smokers (>10 cigarettes/day) were more likely (41%; 11/27) to have an ulcer than non-smokers (20%; 16/80; $p < 0.05$), this was only because of the increased prevalence of ulcers in smokers who also had *C. pylori* (smokers: 73%; 11/15 in contrast with non-smokers: 29%; 13/45). Therefore, while smoking increased the risk in subjects with *C. pylori*, absence of a history of NSAID use and antibodies to *C. pylori* identified individuals with a low probability of ulcer disease (Martin et al. 1989).

The literature search found nine further studies that accounted for *H. pylori* infection and implicated smoking in the aetiology of peptic ulcer disease. Three studies were reviews (Eastwood 1997; Lam 1994b; Parsonnet 1998). Four papers (Archimandritis et al. 1995; Leoci et al. 1995; Menzel et al. 1995; Wang et al. 1996) gave estimates of relative risk for smoking status and *H. pylori* status. The remaining two papers presented summary (Lam 1994a) and pooled (Kurata & Nogawa 1997) estimates of relative risk; in one case the data were used to derive aetiological fractions (Kurata & Nogawa 1997).

Parsonnet (1998) concluded that *H. pylori* is the single most important cause of both duodenal ulcer disease and gastric ulcer disease and that in the United States it appears to be a causative factor in at least 50% to 65% of all duodenal ulcer. While the proportion of gastric ulcer disease attributable to *H. pylori* is thought to be lower than that for duodenal ulcer, this

could be because NSAIDs contribute disproportionately to gastric ulcer disease (Lam 1994a; Lam 1994b; McIntosh et al. 1985; Parsonnet 1998; Schubert et al. 1993).

Eastwood (1997) summarised the relationship between smoking and *H. pylori* infection in the pathogenesis of peptic ulcer disease as one where smoking appears to increase the risk for *H. pylori* infection and may also augment the harmful effects of *H. pylori* in the development of peptic ulceration. But smoking does not appear to delay ulcer healing or increase the risk of recurrence once *H. pylori* has been eradicated. Furthermore, while the adverse effects of smoking on aggressive and protective factors qualify it as an important contributor to the maintenance of peptic ulcer disease, these effects are transient and the affected physiological functions return to normal within minutes to hours after cessation of smoking.

Lam (1994b) concluded that circumstantial evidence is supportive of *H. pylori* playing a role in the aetiology of duodenal ulcer. Mucosal inflammation appears associated with peptic ulcer disease in many situations. Conditions associated with severe mucosal inflammation include the habitual use of NSAIDs, *H. pylori* infection and, to a lesser degree, cirrhosis of the liver and chronic renal failure, as well as conditions associated with minimal inflammation, such as cigarette smoking. Unlike Eastwood, who suggested that smoking appears to increase the risk of *H. pylori* infection, Lam cites Maxton et al. (1990) as finding that the ulcerogenic potential of NSAIDs and smoking is not mediated through a predisposition to *H. pylori* infection. A later study by Lee et al. (1994) also reported that there was no difference between people positive or negative to *H. pylori* in terms of their tobacco exposure. With regard to ulcer relapse or the recurrence of *H. pylori* infection after eradication, Chan et al. (1997) also found no significant difference between smokers (≥ 10 cigarettes/day) and non-smokers. They concluded that cigarette smoking does not appear to increase the recurrence of peptic ulcers after eradication of *H. pylori*.

The four studies published after 1993—Archimandritis et al. (1995), Leoci et al. (1995), Menzel et al. (1995) and Wang et al. (1996)—reported that, even after adjustment for *H. pylori* infection, smoking status also remained a significant predictor in the aetiology of peptic ulcer.

The prospective study by Archimandritis (1995) examined the impact of smoking and *H. pylori* on 166 duodenal ulcer disease patients and 75 gastric ulcer disease patients. Individuals having recently used NSAIDs were excluded. Univariate analysis found that 48% of duodenal ulcer and 37% of gastric ulcer patients had a positive family history. Furthermore, a majority of duodenal ulcer (63%) and gastric ulcer (67%) patients were smokers of more than 10 cigarettes a day and an even greater majority of duodenal ulcer (85%) and peptic ulcer (75%) patients were *H. pylori* positive.

In their prospective study evaluating the incidence and risk factors for duodenal ulcer, Leoci et al. (1995) found 41 cases of the disease among 526 individuals undergoing oesophagogastroduodenoscopy. Multiple logistic regression identified maximal acid output, a history of peptic ulcer in brothers, and smoking more than 10 cigarettes a day as significant predictors of peptic ulcer disease. Only a subgroup of 178 individuals had had gastric biopsies in this study, so adjustment for *H. pylori* infection was not possible in the analysis of all 526 individuals. Furthermore, this study was not able to use information on consumption of NSAIDs as an adjustment in the analysis because the data were considered unreliable. While maximal acid output and cigarette smoking were independent predictors of duodenal ulcer, Leoci et al. did not demonstrate any interaction between these variables; thus their findings are consistent with those of another report that found intragastric activity was not dependent on cigarette smoking (Kaufmann et al. 1990). In another report, however, Harris

et al. (1996) hypothesised that acid hypersecretion in duodenal ulcer disease is caused by *H. pylori* infection.

Menzel et al. (1995) reported on a study of 1299 individuals, of whom 310 had duodenal ulcer and 157 had gastric ulcer. They did not exclude individuals taking aspirin, steroids and/or NSAIDs and they used low and high urease activity as a marker for low and high *H. pylori* colonisation of the mucosa. (Low and high urease activity reflect low and high *H. pylori* colonisation of the mucosa.)

The analysis undertaken by Menzel et al. was by logistic regression and included all two-way-interactions between urease activity and the other factors considered. For the duodenal ulcer model there were interactions between urease activity and both presenting gastric symptoms and nationality. The interaction odds ratios of 87.4 (95% CI: 6.4–1187) for epigastric pain and high urease activity and 26.4 (95% CI: 9.0–78.0) for epigastric pain and low urease activity compare with that of 11.1 (95% CI: 4.8–25.9) for epigastric pain and no urease activity. This compares with an odds ratio of 2.2 (95% CI: 1.3–4.0) for smoking as an independent predictor of duodenal ulcer disease. Further, there was no apparent interaction between urease activity and smoking and there was no apparent dose–response relationship for those smoking more than 20 cigarettes a day and those smoking fewer than 20 cigarettes a day.

The regression results also showed that smoking was an independent predictor of disease (OR: 3.4; 95% CI: 2.0–5.7). However, this compared with the odds ratio of 3.4 (95% CI: 2.0–5.7) for low urease activity and 24.8 (95% CI: 8.5–72.3) for high urease activity when compared with no urease activity. Again, there was no evidence of a significant interaction between urease activity and smoking.

A case-control study of 500 factory workers in China with peptic ulcer (85% duodenal) and 500 employees selected from the same factories as controls was undertaken by Wang et al. (1996). Cases of peptic ulcer were confirmed, by endoscopy or gastrointestinal barium examination, as either new or recurrent (within the last two years). Cases due to NSAID use or Zollinger Ellison syndrome were excluded.

Among the cases there were more males (84%) than females (16%). There was a very high prevalence of smoking among the cases (67%), although there was only one female smoker. There was a very high prevalence of *H. pylori* infection among the cases (81.5%) when compared with the controls (69.9%) and a very high prevalence of a family history of peptic ulcer disease among the cases (50.4%) when compared with the controls (17.4%).

Multivariate analysis of male workers identified age, family history, *H. pylori* infection and cigarette smoking as significant predictors for duodenal ulcer and peptic ulcer. However, among the females, where there was only one smoker, significant predictors were increasing age, family history and *H. pylori* infection.

Wang et al. purported to show that, despite *H. pylori* infection being almost ubiquitous within the population studied, male gender, increasing age, low socio-economic status, a family history of ulcer and cigarette smoking remain risk factors for peptic ulcer. But the high prevalence of *H. pylori* infection (81.5%) and cigarette smoking (up to 89% among male workers with ulcers) in the study may have rendered these factors less specific predictors of peptic ulcer (Rose 1985). Furthermore, Wang et al. did not examine the interaction between *H. pylori* and smoking, so as to assess any effect modification due to smoking between exposure to *H. pylori* infection and the outcome of peptic ulcer disease. A further limiting factor, not restricted to the Wang et al. study, is that, while adjustment was made for the presence of *H. pylori* infection, the adjustment did not extend to the specific *H. pylori* strain characteristics, which may have an important influence on clinical outcomes (Blaser 1994).

As did a number of others—such as Archimandritis et al. (1995) and Leoci et al. (1995)—Wang et al. identified a family history of ulcer as a strong predictive factor for peptic ulcer disease among both males and females. This is consistent with both the circumstantial evidence suggestive of person-to-person transmission of *H. pylori* (Lin et al. 1994; Mitchell et al. 1993b; Peach et al. 1997) and of genetic factors (Boren et al. 1994), which are evidenced by *H. pylori* concordance being higher in monozygotic than dizygotic twins (Parsonnet 1998).

Lam et al. (1994a) reported on summary estimates and Kurata and Nogawa (1997) reported on pooled estimates of relative risk for the three environmental risk factors—NSAID use, cigarette smoking and *H. pylori* infection—for peptic ulcer disease. Lam et al. reported that NSAID use (RR: 5.0) and cigarette smoking (RR: 5.0) carried a far higher risk for gastric ulceration than did infection with *H. pylori* (RR: 1.0). On the other hand, for duodenal ulcer disease it was cigarette smoking (RR: 2.0) and *H. pylori* infection (RR: 2.0) that carried a higher risk than NSAID use (RR: 1.0).

Kurata and Nogawa used meta-analysis techniques to determine overall risk ratios and 95% confidence intervals for each of the three main environmental risk factors for peptic ulcer disease. The outcomes of interest for the *H. pylori* studies incorporated in the meta-analysis were the presence or development of peptic ulcer and not past history or recurrence of ulcer.

Population-attributable risks were calculated for each of the major risk factors based on two hypothetical models—no interaction between risk factors and interaction between risk factors. The no-interaction model assumes that individuals are exposed to only one of the three risk factors at a time and that the estimates for the population-attributable risk percentages are additively combined.

The hypothetical interaction model assumes synergistic interaction and overlapping exposure, producing results consistent with the idea that there are two common forms of peptic ulcer: that associated with *H. pylori* infection and that associated with the use of NSAIDs. This is based on the assumption that NSAIDs do not interact with either cigarette smoking or *H. pylori* infection (Schubert et al. 1993) but that there is interaction between *H. pylori* infection and cigarette smoking. Therefore, non-smokers who are *H. pylori* positive are at increased risk and smokers who are *H. pylori* positive are at even greater risk. However, those who smoke and are *H. pylori* negative are not at increased risk.

Overall, the Kurata and Nogawa interaction model appears the most consistent with the literature review just discussed. This is supported by Borody et al. (1991), who examined 302 patients with an endoscopic diagnosis of duodenal ulcer and found 94% (284) to have associated *H. pylori* gastritis. Of the 18 who were *H. pylori* negative, eight had been taking NSAIDs and a further four had recently taken antibiotics. Similarly, in a later study of 115 patients with endoscopic diagnosis of gastric ulcer, 62% (71) had *H. pylori* infection (Borody et al. 1992). Of these patients, 30% (21) were taking NSAIDs. Of the 44 *H. pylori*-negative gastric ulcer cases, 66% (29) were taking NSAIDs. *H. pylori* infection and NSAID use accounted for 87% (100) of the 115 gastric ulcer cases.

Revised aetiological fractions for tobacco and the onset of peptic ulcer disease

The Kurata and Nogawa (1997) interaction model was the basis for calculation of the aetiological fraction. Data from Martin et al. (1989) were used to estimate relative risk for those exposed to both *H. pylori* and smoking. Those who were *H. pylori* positive and who smoked more than 10 cigarettes a day were 6.8 times more likely to develop peptic ulcer than *H. pylori*-positive individuals who did not smoke. This is derived from the fact that 11 out of 15 smokers with *H. pylori*, as opposed to 13 out of 45 non-smokers with *H. pylori*, had

duodenal and/or gastric ulcers. On the other hand, individuals who smoked and were *H. pylori* negative were not at increased risk.

The product of the prevalence of *H. pylori* infection in the general population and the smoking prevalence (10 or more cigarettes a day) for the general population provides an estimate of the proportion of the general population who smoke and who are *H. pylori* positive (Kurata & Nogawa 1997).

Table 4.1: Relative risk estimates for smoking and *H. pylori* exposure for peptic ulcer disease

Sex	Age	<i>H. pylori</i> +		Current smoker, ≥10 cigarettes per day		<i>H. pylori</i> + and smoker	
		RR	95% CI	RR	95% CI	RR	95% CI
Male	All	3.3	2.6–4.4	1.9	1.7–2.1	6.8	1.8–25.2
Female	All	3.3	2.6–4.4	2.3	1.9–2.7	6.8	1.8–25.2

Sources: *H. pylori*—Kurata and Nogawa 1997; current smoker—Kurata and Nogawa 1997; *H. pylori* and smoker—Martin et al. 1989.

Lin et al. (1998) estimated that the overall prevalence of *H. pylori* in the population of Melbourne was 38% and increased with age from 18% at ages 20–30 years to 53% at ages over 70 years. The prevalence of *H. pylori* was 48% in men and 30% in women. The rate of acquisition of *H. pylori* infection was 1% per year.

Overall prevalence data from Lin et al. were disaggregated by sex so as to reflect the overall 48% prevalence in men and 30% prevalence in women across all the age groups examined in the study (Table 4.2).

Table 4.2: Prevalence of *H. pylori* infection among Australians, by age and sex, 1998

Sex	Age						20 and over
	20–30	31–40	41–50	51–60	61–70	>70	
	(per cent)						
Male	23	30	34	44	58	67	48
Female	14	19	21	28	36	42	30
Total	18	24	27	35	46	53	38

Source: Derived from Lin et al. 1998.

The estimates for the prevalence of current smokers (10 or more cigarettes a day) for the general population are derived from the 1995 National Smoking and Health Survey conducted by the Anti-cancer Council of Victoria and analysed by the Council's Centre for Behavioural Research in Cancer (Table 4.3).

Table 4.3: Proportion of the population smoking 10 or more cigarettes a day, by age and sex, 1995

Sex	Age							18 and over
	18–19	20–29	30–39	40–49	50–59	60–69	70+	
	(per cent)							
Male	13.8	22.2	23.7	18.6	18.9	10.6	7.2	17.8
Female	21.4	23.8	21.7	16.7	16.8	11.2	4.7	17.1

Source: Unpublished data from the Anti-Cancer Council of Victoria's Centre for Behavioural Research in Cancer.

We used the product of the *H. pylori* infection prevalence from Table 4.2 and the smoking prevalence from Table 4.3 to estimate the proportion of the population who smoke more than 10 cigarettes per day and are *H. pylori* positive. This is the population prevalence figure used in the aetiological fraction formula (Table 4.4).

The US National Institute of Health has reported 80% to 90% eradication of *H. pylori* as achievable with a multi-drug regimen lasting two weeks (NIH 1994). We took 80% as a conservative estimate of the proportion of people with *H. pylori* infection who are successfully treated. Accordingly, before determining the aetiological fraction, the *H. pylori* prevalence cited above was scaled back by a factor of 0.20.

Overall, 9% of peptic ulcer disease among males and 6% among females is caused by the interaction between *H. pylori* and smoking 10 or more cigarettes a day (Table 4.5).

Table 4.4: Proportion of the population who smoke 10 or more cigarettes per day and who would remain *H. pylori* positive after therapy to eradicate *H. pylori* infection

Sex	Age						20 and over
	20–30	31–40	41–50	51–60	61–70	>70	
Male	0.010	0.014	0.013	0.017	0.012	0.010	0.017
Female	0.007	0.008	0.007	0.009	0.008	0.004	0.010

Source: AIHW analysis of data in Tables 4.2 and 4.3.

Table 4.5: Revised aetiological fractions for tobacco exposure and peptic ulcer disease

Age	Males	Females
Exposed		
All ages	0.853	0.853
General population		
20–24	0.056	0.037
25–29	0.056	0.037
30–34	0.076	0.046
35–39	0.076	0.046
40–44	0.068	0.039
45–49	0.068	0.039
50–54	0.088	0.052
55–59	0.088	0.052
60–64	0.067	0.045
65–69	0.067	0.045
70–74	0.053	0.022
75–79	0.053	0.022
80+	0.053	0.022
Total (20+)	0.090	0.056

Source: AIHW analysis of data in Tables 4.1 and 4.4.

Revised aetiological fractions for tobacco and death due to peptic ulcer disease

An Australian case-control study that examined the association between, on the one hand, individual co-existing illnesses, septicaemia, intra-abdominal abscess, marital status, smoking and alcohol use and, on the other, mortality following perforated peptic ulcer without pre-operative evidence of haemorrhage did not identify smoking as a risk factor for mortality (McIntosh et al. 1996). The study found co-existing illnesses, septicaemia and intra-abdominal abscess as the risk factors predictive of mortality following ulcer perforation.

More recently, in a study examining mortality within one month of peptic ulcer bleed, elderly patients, those undergoing surgery, or those who were current users of acid-suppressing drugs or NSAIDs were identified as at increased risk of mortality (Garcia Rodriguez et al. 1998). After *H. pylori*, NSAIDs are thought to be the most important cause of peptic ulcer disease and a major risk factor for ulcer complications and mortality (Kang 1995).

Overall, the mortality rate associated with peptic ulcer disease is in the main attributed to re-bleeding among the elderly population, who also have more co-existing systemic diseases. The majority of deaths, therefore, result from non-peptic ulcer diseases (Mueller et al. 1994). This is reflected in one report—by Ng et al. (1994)—on peptic ulcer disease among the people aged 60 years or more, which found that bleeding is a frequent and major complication occurring among 50% of cases and perforation occurs among 2% of cases. However, while mortality arising from bleeding peptic ulcers in this group is 11%, around 90% of this is due to concurrent medical conditions and only 10% arises directly from bleeding ulcer. The concurrent medical conditions most frequently encountered were hypertension and ischaemic heart disease (Ng et al. 1994).

We took 10% as our estimate of deaths coded to peptic ulcer disease that actually arose due to bleeding peptic ulcer. Hence the attributable fractions in Table 4.5 should be reduced by a factor of 10% when applied to deaths. This means that less than 1% of peptic ulcer deaths are attributable to tobacco smoking.

4.2.3 Passive exposure to tobacco smoke and its health effects in pregnancy and childhood

Environmental tobacco smoke (ETS) consists of exhaled mainstream and sidestream smoke. In 1993 the National Health and Medical Research Council established a working party to update the Council's 1986 report *Effects of Passive Smoking on Health*. The final review document (NHMRC 1997) made available a synthesis of relevant scientific knowledge on the health effects of passive smoking. It contains the estimates that formed the basis for quantifying and, where possible, revising the aetiological burden of ETS.

Exposure to passive smoking during pregnancy

Studies of women's exposure to passive smoking during pregnancy show a small detriment in birthweight among babies born to such women. The size of the effect is, however, small (30–40g) and so may have little clinical significance for most infants overall but a more marked significance among socially disadvantaged groups (NHMRC 1997).

Passive smoking and sudden infant death syndrome

Current evidence supports the conclusion that there is a causal association between sudden infant death syndrome (SIDS) and exposure to ETS. Nevertheless, the relative importance of maternal smoking during pregnancy and exposure to ETS after birth remains unclear (NHMRC 1997).

In examining whether or not postnatal exposure to ETS is associated with SIDS, the NHMRC report identified eight studies (Bergman & Wieser 1976; Blair et al. 1996; Brooke et al. 1997; Klonoff Cohen et al. 1995; McGlashan 1989; Mitchell et al. 1993a; Ponsonby et al. 1995; Schoendorf & Kiely 1992), of which seven were case-control studies. Pooled estimates of relative risk were, however, not reported. Consistent with later reports that parental smoking (Henderson Smart et al. 1998), and in particular maternal smoking (Mitchell et al. 1997), were significantly associated with SIDS, a pooled estimate of relative risk was determined from the study by Mitchell et al. (1997) and the three studies from the NHMRC report (Klonoff Cohen et al. 1995; Ponsonby et al. 1995; Schoendorf & Kiely 1992) that examined postnatal maternal smoking.

Table 4.6: Sudden infant death syndrome and maternal smoking

Study	Country	SIDS	Controls	Confounders controlled	OR (95% CI)
Schoendorf and Kiely 1992	US	234	6,000 random	Yes	1.75 (1.04–2.95)
Klonoff Cohen et al. 1995	US	200	200 matched	Yes	2.28 (1.04–4.96)
Ponsonby et al. 1995	Australia	58	101 matched	Yes	3.82 (1.43–10.2)
Mitchell et al. 1997	NZ	232	1,200 random	Yes	5.01 (2.01–12.46)

The pooled relative risk estimate was 2.44 (95% CI: 1.69–3.51). This compares with a pooled estimate of relative risk of 2.76 (95% CI: 2.66–2.86) for any smoking during pregnancy, as determined by English et al. (1995). Based on an exposure prevalence of 0.29 for smoking during pregnancy, English et al. concluded that 0.338 or 34% of SIDS was attributable to this exposure.

Revised aetiological fraction for postnatal ETS and SIDS

The estimate of relative risk used was the pooled estimate of 2.44. The proportion of infants exposed to ETS was 0.126, based on the unpublished Victorian Anti-Cancer Council prevalence estimate of 12.6% of households where exposure to maternal smoke among children under 2 years old was likely to occur. This gave an aetiological fraction of 0.153, or around half that estimated by English et al. This halving of the aetiological fraction for SIDS is in the main due to the reduced prevalence of exposure to maternal smoking in the postnatal context. This is because around 50% of female smokers with a child under 2 years of age will not smoke in their home.

Passive smoking and asthma among children aged less than 15 years

The weight of evidence suggests that exposure to ETS is associated with asthma (ICD-9 code 493) in childhood (<15 years). In the main, it has been reported that exposure to ETS is associated with an increase in morbidity in young people with pre-existing asthma, although several studies have also reported an increase in the number of new cases of asthma among children. Furthermore, exposure to ETS is associated with increased

bronchial reactivity and the occurrence of atopy. The association of ETS with childhood asthma is most consistent at high exposures, and the evidence is supportive of a causal relationship (NHMRC 1997).

Aetiological fraction for passive smoking and asthma among children aged less than 15 years

Studies of childhood asthma and passive smoking have commonly reported on the association with heavy exposure (where mothers smoke more than 10 cigarettes a day). It is less clear whether exposure to lower levels of ETS increases the risk of asthma. Accordingly, children are defined as exposed if they had a mother who smoked more than 10 cigarettes a day. This is comparable with the definition of exposure applied in some of the studies reviewed in the NHMRC report. The 1989–90 ABS National Health Survey found that 22.2% of children aged less than 15 years had mothers who smoked more than 10 cigarettes a day. The NHMRC report based its aetiological fraction on this prevalence estimate. The corresponding estimate from the 1995 National Health Survey was 21.3%.

The median of the 50 estimates of relative risk summarised from the peer-reviewed literature in the NHMRC report was 1.40, with an inter-quartile range of 1.20–1.93. This estimate of 1.40 was used in the NHMRC report, along with the 1989–90 prevalence estimate of 0.222, to derive an aetiological fraction of 0.082 for childhood asthma and ETS (NHMRC 1997).

We used the relative risk estimate of 1.40, but our prevalence estimate was taken from unpublished results of the Victorian Anti-Cancer Council study described in Chapter 2. This shows that the proportion of children aged less than 16 years who live in a household with a female (assumed to be their mother) who smokes 10 or more cigarettes a day and who is not restricted to smoking outdoors is 0.054. The aetiological fraction derived from these estimates is 0.021. Again, the reduction in the fraction is a result of only some 25% of such households allowing smoking indoors.

Passive smoking and lower respiratory illness among children under 18 months

‘Lower respiratory illness’ refers to the illnesses principally affecting the respiratory tract below the epiglottis that correspond to ICD-9 codes 464, 466, 490, 480–486 and 487—but excluding asthma, which is considered separately. The NHMRC report indicates that, based on the peer-reviewed scientific literature, passive smoking is most strongly associated with lower respiratory illness in early life—in particular, the first 18 months after birth. The aetiological fraction calculation assumes that there is no increase in risk of lower respiratory illness for children exposed to ETS if they are over the age of 18 months (NHMRC 1997).

Aetiological fraction for passive smoking and lower respiratory illness among children aged less than 18 months

The median of the 26 estimates of relative risk from 25 published papers summarised in the NHMRC report was 1.60, with an inter-quartile range of 1.40–2.10. The report’s estimate of the proportion of children aged less than 18 months and exposed to maternal smoking was 0.25. This was the mid-point of a range of estimates from the research literature. These estimates led to an aetiological fraction of 0.130 (NHMRC 1997).

We used the relative risk estimate of 1.60, but our exposure prevalence was based on the Victorian Anti-Cancer Council study results. This study showed that the proportion of children under 2 years who live in a household with a female (assumed to be their mother) who smokes one or more cigarettes a day and who is not restricted to smoking outdoors was

0.126. This led to an aetiological fraction of 0.070. Again, the reduction in the fraction is a result of only some 50% of such households allowing smoking indoors.

Passive smoking and lung cancer among adults

The NHMRC report concluded that, despite inherent limitations, the available data on ETS and lung cancer in humans were sufficiently strong to infer that ETS was a cause of the disease. Summarising the quantitative data on the relationship was made difficult by the differences in study methods adopted. However, restricting studies to those that examined lung cancer among people who never smoked but had a spouse who smoked yielded 34 studies with a median relative risk of 1.32 and an inter-quartile range of 1.10–1.69 (NHMRC (1997)).

The 1998 European multicentre case-control study of lung cancer in non-smokers examined exposure to spousal smoke among 344 cases and 700 controls and yielded an odds ratio of 1.16 (95% CI: 0.93–1.44). When study subjects were stratified by gender, the odds ratio for exposure to spousal smoke was 1.47 (95% CI: 0.81–2.66) among men and 1.11 (95% CI: 0.88–1.39) among women (International Agency for Research on Cancer 1998). The study concluded there was some indication of an increasing risk of lung cancer with increasing cumulative exposure to ETS from the spouse. No clear trend emerged for average exposure or for years of exposure but, with duration of exposure expressed as the product of hours a day and years of exposure, a positive dose response was shown.

Aetiological fraction for passive smoking and lung cancer among adults

The formula for the aetiological fraction used in the NHMRC report is more complex than that described here in Chapter 2 and used throughout this report. The NHMRC (1997) formula is:

$$F = p_n p_s (RR_s - 1) / \{ [p_s (RR_s - 1) + 1] [p_x (RR_x - 1) + p_c (RR_c - 1) + 1] \} \quad (1)$$

where

p_n = prevalence of people never having smoked

p_x = prevalence of ex-smokers

p_c = prevalence of current smokers

p_s = people never having smoked but who have spouses that are current smokers.

The relative risk estimates for ex-smokers (RR_x) and for current smokers (RR_c) were those derived by English et al. (1995). For males, these were $RR_x = 6.75$ and $RR_c = 13.0$; for females, they were $RR_x = 5.07$ and $RR_c = 11.4$. The relative risk for people who have never smoked but who have spouses that are current smokers (RR_s) was the median value found in the NHMRC report $RR_s = 1.32$.

Smoking prevalence data elsewhere in this report are based on the 1995 Victorian Anti-Cancer Council study. However, these data do not support an analysis of people who have never smoked but who have spouses who currently smoke. So the prevalence estimates for this aetiological fraction (p_n , p_x , p_c and p_s) are taken from the ABS 1995 National Health Survey. As with other cancer fractions calculated in this report, estimates are calculated only for ages 35 and over.

Table 4.7: Proportion of people who have never smoked but who have spouses that are current smokers

Age	Year			
	Males		Females	
	1989–90	1995	1989–90	1995
	(per cent)			
35–39	11.09	4.0	17.83	15.3
40–44	7.03	2.0	19.89	9.8
45–49	9.18	2.3	20.81	6.9
50–54	11.14	1.6	15.02	10.5
55–59	10.16	0.4	14.39	8.0
60–64	8.03	1.4	15.27	8.1
65–69	4.10	3.7	7.78	7.3
70–74	6.86	3.9	2.99	5.2
75 and over	4.50	3.1	2.04	2.9

Source: 1989–90 data from ABS National Health Survey, as reported in NHMRC (1997); 1995 data derived from 1995 ABS National Health Survey.

Table 4.8: Proportion of the population who are current smokers, ex-smokers or have never smoked, 1995

Age	Males			Females		
	Current smoker	Ex-smoker	Never smoked	Current smoker	Ex-smoker	Never smoked
	(per cent)					
35–39	36.8	25.6	37.6	26.1	18.1	55.8
40–44	31.3	29.4	39.3	23.8	17.5	58.6
45–49	33.3	31.9	34.8	24.4	20.6	55.0
50–54	30.5	33.7	35.8	22.1	16.6	61.3
55–59	29.5	41.2	29.3	20.7	17.9	61.4
60–64	26.9	45.8	27.4	17.9	18.4	63.6
65–69	22.2	53.4	24.3	14.0	21.7	64.3
70–74	16.3	54.1	29.7	13.5	21.0	65.4
75–79	11.7	55.9	32.3	9.8	18.6	71.6
80+	10.2	54.6	35.2	2.8	14.6	82.6

Source: Derived from 1995 ABS National Health Survey.

Passive smoking and cardiovascular disease among adults

The NHMRC report concluded that the evidence suggests that passive smoking increases the risk of ischaemic heart disease and that this excess risk is apparent in both men and women. While this relationship is unlikely to be explained by the confounding of passive smoking with other risk factors, some evidence of publication bias was evident and the excess risk of ischaemic heart disease in passive smokers appears large when compared with the excess risk in active smokers (NHMRC 1997). Because of these anomalies, although passive smoking appears to increase the risk of IHD, other non-causal explanations are possible. Furthermore, there was insufficient evidence to determine whether ETS affects the

risk of cerebrovascular disease or peripheral vascular disease. Therefore estimates of the effects of passive smoking are restricted to heart attacks (ICD-9 410) and other deaths from IHD (ICD-9 codes 411–414).

Table 4.9: People who have never smoked: revised aetiological fraction for lung cancer attributable to smoking by a spouse

Age	Males	Females
35–39	0.00083	0.00530
40–44	0.00041	0.00397
45–49	0.00048	0.00321
50–54	0.00028	0.00484
55–59	0.00007	0.00422
60–64	0.00021	0.00450
65–69	0.00051	0.00455
70–74	0.00050	0.00338
75–79	0.00016	0.00199
80 years and over	0.00103	0.00395

Source: AIHW analysis of prevalence data in Tables 4.7 and 4.8 and relative risk estimates reported by English et al. (1995).

Aetiological fraction for heart attacks and ischaemic heart disease among adults

The formula on page 83 was used for the aetiological fraction for heart attacks and IHD among adults. The prevalence estimates were those presented in Tables 4.7 and 4.8. The relative risk estimates for ex-smokers (RR_x) and for current smokers (RR_c) were those derived by English et al. (1995). For males aged more than 65 years these were $RR_x = 1.45$ and $RR_c = 3.06$; for females aged more than 65, they were $RR_x = 0.93$ and $RR_c = 1.67$.

Table 4.10: People who have never smoked: revised aetiological fractions for ischaemic heart disease attributable to smoking by a spouse

Age	Males	Females
30–34	0.0017	0.0143
35–39	0.0022	0.0113
40–44	0.0011	0.0081
45–49	0.0013	0.0063
50–54	0.0008	0.0095
55–59	0.0002	0.0080
60–64	0.0006	0.0084
65–69	0.0022	0.0096
70–74	0.0022	0.0071
75–79	0.0007	0.0037
80 years and over	0.0040	0.0059

Source: AIHW analysis of prevalence data in Tables 4.7 and 4.8 and relative risk estimates reported by English et al. (1995).

4.2.4 Aetiological fractions for tobacco updated with recent prevalence data

Where possible, all the aetiological fractions were revised to incorporate updated estimates of the prevalence of tobacco consumption. The conditions just discussed were also based on revised risk-ratio estimates. Table 4.11 lists the conditions that were revised to incorporate updated estimates of the prevalence of tobacco consumption but that were based on the risk-ratio estimates derived by English et al. (1995). Table 4.12 lists the values of the revised aetiological fractions.

Most of the fractions listed in Table 4.11 involve a straightforward application of the risk-ratio to the prevalence estimate derived from the Victorian Anti-Cancer Council study. However, some of the calculations are more complex and require some explanation.

Table 4.11: Conditions for which aetiological fractions were based on the English et al. risk-ratio estimates but were revised to incorporate updated estimates of prevalence

Condition	Source of prevalence data
Oropharyngeal cancer	Synthetic prevalence estimate
Oesophageal cancer	Synthetic prevalence estimate
Stomach cancer	Synthetic prevalence estimate
Anal cancer	Synthetic prevalence estimate
Pancreatic cancer	Synthetic prevalence estimate
Laryngeal cancer	Synthetic prevalence estimate
Lung cancer	Direct calculation
Endometrial cancer	Synthetic prevalence estimate
Vulvar cancer	Synthetic prevalence estimate
Penile cancer	Synthetic prevalence estimate
Bladder cancer	Synthetic prevalence estimate
Renal parenchymal cancer	Synthetic prevalence estimate
Renal pelvic cancer	Synthetic prevalence estimate
Respiratory carcinoma in situ	Synthetic prevalence estimate
Ischaemic heart disease	1995 Anti-Cancer Council Survey
Chronic obstructive pulmonary disease	Synthetic prevalence estimate
Parkinson's disease	1995 Anti-Cancer Council Survey
Pulmonary circulation disease	Same fraction as chronic obstructive pulmonary disease
Cardiac dysrhythmias	Same fraction as ischaemic heart disease
Heart failure	Derived from fraction for ischaemic heart disease
Stroke	1995 Anti-Cancer Council Survey
Atherosclerosis	1995 Anti-Cancer Council Survey
Pneumonia	1995 Anti-Cancer Council Survey
Crohn's disease	1995 Anti-Cancer Council Survey
Ulcerative colitis	1995 Anti-Cancer Council Survey
Ectopic pregnancy	1995 Anti-Cancer Council Survey
Spontaneous abortion	1998 National Drug Strategy Household Survey
Antepartum haemorrhage	1998 National Drug Strategy Household Survey
Hypertension in pregnancy	1998 National Drug Strategy Household Survey
Low birthweight	1998 National Drug Strategy Household Survey
Premature rupture of membranes	1998 National Drug Strategy Household Survey
SIDS (and smoking during pregnancy)	1998 National Drug Strategy Household Survey

Cancer and chronic obstructive pulmonary disease

Peto et al. (1992) derived an underlying rate of lung cancer among people who never smoked in the United States. We assumed that this rate applied in Australia and used it to derive the expected rate of lung cancer in the absence of smoking. Comparison of this with the observed lung cancer rate gave us the proportion of lung cancer attributable to smoking. We then used the Peto et al. estimates of lung cancer rates for smokers and non-smokers to derive a synthetic smoking prevalence rate that represented the historical prevalence which was consistent with the observed lung cancer rate. Finally, we combined this synthetic rate with the risk ratios from English et al. to derive aetiological fractions for the remaining cancers and chronic obstructive pulmonary disease.

Pulmonary circulation disease

We followed English et al. in applying the aetiological fraction for chronic obstructive pulmonary disease to ICD-9 codes 415.0, 416 and 417 but excluding 415.1 (pulmonary embolism). This approach is based on the assumption that chronic obstructive pulmonary disease is the underlying pathology in the vast majority of cases of pulmonary circulatory conditions other than embolism.

Cardiac dysrhythmias

We followed English et al. in assuming that most cardiac dysrhythmias in Australia—and especially those causing sudden death or significant morbidity—are the result of ischaemic heart disease.

Heart failure

We followed English et al. in apportioning heart failure conditions between ischaemic heart disease and other specific heart disease codes, in accordance with the proportional distribution of mortality or morbidity associated with the specific condition. The other specific heart conditions are not caused by cigarette smoking and so have aetiological fractions of zero. Hence the aetiological fraction for ischaemic heart disease was then applied to the relevant proportion of heart failure cases while the remainder were discarded.

Ectopic pregnancy

We followed English et al. in applying the prevalence of smoking in the general population rather than among pregnant women on the grounds that many women give up smoking after the time of conception.

Spontaneous abortion

English et al. derived a risk ratio and a fraction for the effect of tobacco on spontaneous abortion. We updated their fraction. However, during the period 1996 to 1998 there were no deaths coded to spontaneous abortion and no hospital stays longer than the average normal confinement. Hence if we do not count the separations, as recommended by English et al., this condition makes no contribution to the attributable mortality or hospital morbidity. The fractions are given in Table 4.12, but this condition has been excluded from the tables of results.

4.3 Unrevised aetiological fractions for tobacco

Only two conditions were left with unrevised fractions. The first was tobacco abuse, which has a fraction value of one by definition. The second was fire injuries. English et al. derived a fraction of 0.23 based on six case series of fire injuries. In the absence of better or more recent data, we used the same estimate.

Table 4.12: Revised values for tobacco fractions based on the English et al. risk-ratio estimates and updated prevalence data

1. Fractions updated with synthetic prevalence data derived using the Peto et al. method

Oropharyngeal cancer (ICD-9 codes 141, 143–146, 148, 149)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.43	0.78	0.71	0.92	0.83	0.43	0.78	0.71	0.92	0.83
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.302					0.280			
45–49		0.533					0.261			
50–54		0.479					0.412			
55–59		0.513					0.435			
60–64		0.570					0.443			
65–69		0.584					0.453			
70–74		0.583					0.523			
75–79		0.548					0.470			
80+		0.569					0.445			
Total (35+)		0.464					0.361			

Oesophageal cancer (ICD-9 code 150)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.44	0.75	0.69	0.75	0.80	0.44	0.75	0.69	0.75	0.80
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.269					0.248			
45–49		0.492					0.230			
50–54		0.438					0.373			
55–59		0.472					0.395			
60–64		0.529					0.403			
65–69		0.544					0.413			
70–74		0.543					0.482			
75–79		0.507					0.429			
80+		0.528					0.405			
Total (35+)		0.423					0.324			

Stomach cancer (ICD-9 code 151)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.10	0.29	0.61	0.55	0.68	0.10	0.29	0.61	0.55	0.68
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.048					0.043			
45–49		0.117					0.039			
50–54		0.096					0.075			
55–59		0.109					0.082			
60–64		0.133					0.084			
65–69		0.140					0.087			
70–74		0.139					0.112			
75–79		0.123					0.093			
80+		0.132					0.085			
Total (35+)		0.091					0.061			

Anal cancer (ICD-9 codes 154.2, 154.3)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.45	0.69	0.53		0.78	0.45	0.69	0.53		0.78
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.210					0.193			
45–49		0.412					0.178			
50–54		0.361					0.301			
55–59		0.393					0.321			
60–64		0.449					0.328			
65–69		0.463					0.337			
70–74		0.462					0.403			
75–79		0.427					0.352			
80+		0.448					0.330			
Total (35+)		0.347					0.258			

Note: There were no studies on which to base a risk-ratio estimate for people smoking 15–24 cigarettes a day.

Pancreatic cancer (ICD-9 code 157)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.13	0.46	0.39	0.41	0.49	0.13	0.46	0.39	0.41	0.49
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.095					0.086			
45-49		0.217					0.079			
50-54		0.182					0.145			
55-59		0.203					0.157			
60-64		0.243					0.162			
65-69		0.254					0.167			
70-74		0.253					0.210			
75-79		0.227					0.177			
80+		0.242					0.163			
Total (35+)		0.173					0.120			

Laryngeal cancer (ICD-9 code 161)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.65	0.87	0.77	0.83	0.92	0.65	0.87	0.77	0.83	0.92
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.442					0.415			
45-49		0.676					0.391			
50-54		0.626					0.561			
55-59		0.658					0.584			
60-64		0.708					0.592			
65-69		0.719					0.602			
70-74		0.719					0.667			
75-79		0.689					0.618			
80+		0.707					0.594			
Total (35+)		0.613					0.508			

Lung cancer (ICD-9 code 162)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.85	0.92	0.85	0.88	0.93	0.80	0.91	0.87	0.92	0.95
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.449					0.247			
45–49		0.659					0.528			
50–54		0.798					0.644			
55–59		0.866					0.732			
60–64		0.906					0.743			
65–69		0.920					0.781			
70–74		0.927					0.788			
75–79		0.917					0.743			
80+		0.903					0.646			
Total (35+)		0.903					0.646			

Endometrial cancer (ICD-9 codes 179, 182)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	—	—	—	—	—	–0.10	–0.89	—	—	—
General population		All levels of exposure					All levels of exposure			
35–39		—					0.000			
40–44		—					0.000			
45–49		—					0.000			
50–54		—					–0.102			
55–59		—					–0.114			
60–64		—					–0.118			
65–69		—					–0.123			
70–74		—					–0.170			
75–79		—					–0.133			
80+		—					–0.119			
Total (35+)		—					–0.081			

Note: The evidence for the effect of smoking on endometrial cancer supports only estimation of the effect for post-menopausal women. We followed English et al. in assuming that this corresponds to women aged 50 and over. There were no studies that allowed the separate estimation of risk ratios by numbers of cigarettes smoked per day for post-menopausal women.

Vulvar cancer (ICD-9 code 184.4)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	—	—	—	—	—	0.27	0.71	0.70	—	0.83
General population		All levels of exposure					All levels of exposure			
35-39			—					0.000		
40-44			—					0.209		
45-49			—					0.194		
50-54			—					0.323		
55-59			—					0.344		
60-64			—					0.352		
65-69			—					0.361		
70-74			—					0.428		
75-79			—					0.376		
80+			—					0.353		
Total (35+)			—					0.278		

Note: There were no studies on which to base a risk-ratio estimate for people smoking 15-24 cigarettes a day

Penile cancer (ICD-9 codes 187.1-187.4)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.38	0.44	0.15	0.55	0.68	—	—	—	—	—
General population		All levels of exposure					All levels of exposure			
35-39			0.000					—		
40-44			0.089					—		
45-49			0.205					—		
50-54			0.171					—		
55-59			0.192					—		
60-64			0.230					—		
65-69			0.241					—		
70-74			0.240					—		
75-79			0.215					—		
80+			0.229					—		
Total (35+)			0.163					—		

Bladder cancer (ICD-9 code 188)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.40	0.63	0.49	0.69	0.66	0.40	0.63	0.49	0.69	0.66
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.174					0.158			
45-49		0.356					0.146			
50-54		0.308					0.254			
55-59		0.338					0.272			
60-64		0.391					0.278			
65-69		0.405					0.286			
70-74		0.404					0.347			
75-79		0.370					0.300			
80+		0.390					0.280			
Total (35+)		0.296					0.215			

Renal parenchymal cancer (ICD-9 code 189.0)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.38	0.39	0.15	0.24	0.39	0.38	0.39	0.15	0.24	0.39
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.072					0.065			
45-49		0.171					0.060			
50-54		0.142					0.112			
55-59		0.160					0.122			
60-64		0.193					0.125			
65-69		0.202					0.130			
70-74		0.201					0.165			
75-79		0.180					0.138			
80+		0.192					0.126			
Total (35+)		0.135					0.092			

Renal pelvic cancer (ICD-9 code 189.1)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.49	0.75	—	—	—	0.49	0.75	—	—	—
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.265					0.245			
45-49		0.488					0.227			
50-54		0.434					0.369			
55-59		0.468					0.391			
60-64		0.525					0.399			
65-69		0.540					0.408			
70-74		0.538					0.478			
75-79		0.503					0.425			
80+		0.524					0.401			
Total (35+)		0.419					0.320			

Respiratory carcinoma in situ (ICD-9 code 231)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.85	0.92	0.85	0.88	0.93	0.80	0.91	0.87	0.92	0.95
General population		All levels of exposure					All levels of exposure			
35-39		0.000					0.000			
40-44		0.449					0.247			
45-49		0.659					0.528			
50-54		0.798					0.644			
55-59		0.866					0.732			
60-64		0.906					0.743			
65-69		0.920					0.781			
70-74		0.927					0.788			
75-79		0.917					0.743			
80+		0.903					0.646			
Total (35+)		0.903					0.646			

Chronic obstructive pulmonary disease (ICD-9 codes 490–492, 496)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.85	0.90	0.85	0.79	0.79	0.85	0.90	0.85	0.79	0.79
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.518					0.491			
45–49		0.739					0.466			
50–54		0.695					0.635			
55–59		0.723					0.656			
60–64		0.767					0.664			
65–69		0.777					0.672			
70–74		0.776					0.731			
75–79		0.751					0.687			
80+		0.766					0.665			
Total (35+)		0.682					0.583			

Pulmonary circulation disease (ICD-9 codes 415.0, 416, 417)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.85	0.90	0.85	0.79	0.79	0.85	0.90	0.85	0.79	0.79
General population		All levels of exposure					All levels of exposure			
35–39		0.000					0.000			
40–44		0.518					0.491			
45–49		0.739					0.466			
50–54		0.695					0.635			
55–59		0.723					0.656			
60–64		0.767					0.664			
65–69		0.777					0.672			
70–74		0.776					0.731			
75–79		0.751					0.687			
80+		0.766					0.665			
Total (35+)		0.682					0.583			

2. Fractions updated with prevalence data derived from the 1995 Anti-Cancer Council Survey

Ischaemic heart disease (ICD-9 codes 410–414)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
Under 65	0.31	0.67	0.60	0.69	0.73	0.31	0.67	0.60	0.69	0.73
65 +	0.11	0.40	—	—	—	0.11	0.40	—	—	—
General population										
18–19	0.016	0.415	0.244	0.127	0.000	0.035	0.424	0.221	0.124	0.059
20–24	0.032	0.390	0.154	0.126	0.095	0.039	0.395	0.128	0.123	0.134
25–29	0.046	0.398	0.154	0.101	0.106	0.042	0.401	0.156	0.117	0.103
30–34	0.057	0.388	0.092	0.086	0.222	0.060	0.380	0.127	0.111	0.145
35–39	0.072	0.351	0.058	0.100	0.205	0.069	0.317	0.101	0.112	0.105
40–44	0.075	0.356	0.060	0.080	0.186	0.063	0.332	0.078	0.116	0.153
45–49	0.088	0.323	0.045	0.084	0.206	0.077	0.218	0.041	0.060	0.135
50–54	0.088	0.350	0.099	0.089	0.157	0.069	0.281	0.072	0.113	0.124
55–59	0.101	0.329	0.072	0.082	0.187	0.073	0.254	0.069	0.093	0.094
60–64	0.144	0.234	0.047	0.049	0.112	0.067	0.217	0.062	0.107	0.052
Total (<65)	0.070	0.358	0.098	0.094	0.159	0.059	0.331	0.105	0.109	0.118
65–69	0.052	0.102	—	—	—	0.022	0.086	—	—	—
70–74	0.056	0.081	—	—	—	0.029	0.049	—	—	—
75–79	0.056	0.081	—	—	—	0.029	0.049	—	—	—
80+	0.056	0.081	—	—	—	0.029	0.049	—	—	—
Total (65+)	0.055	0.088	—	—	—	0.027	0.059	—	—	—

Note: There were no data on which to base estimates of risk ratios for different levels of consumption at ages 65 and over.

Parkinson's disease (ICD-9 code 332)

Age	Male					Female				
	Ever smoked cigarettes									
Exposed										
All ages	—	—	–0.75	—	—	—	—	–0.75	—	—
General population										
18–19	—	—	–0.218	—	—	—	—	–0.291	—	—
20–24	—	—	–0.241	—	—	—	—	–0.268	—	—
25–29	—	—	–0.295	—	—	—	—	–0.287	—	—
30–34	—	—	–0.325	—	—	—	—	–0.322	—	—
35–39	—	—	–0.328	—	—	—	—	–0.273	—	—
40–44	—	—	–0.345	—	—	—	—	–0.272	—	—
45–49	—	—	–0.346	—	—	—	—	–0.202	—	—
50–54	—	—	–0.390	—	—	—	—	–0.237	—	—
55–59	—	—	–0.408	—	—	—	—	–0.222	—	—
60–64	—	—	–0.425	—	—	—	—	–0.181	—	—
65–69	—	—	–0.425	—	—	—	—	–0.181	—	—
70–74	—	—	–0.418	—	—	—	—	–0.171	—	—
75–79	—	—	–0.418	—	—	—	—	–0.171	—	—
80+	—	—	–0.418	—	—	—	—	–0.171	—	—
Total (18+)	—	—	–0.327	—	—	—	—	–0.232	—	—

Cardiac dysrhythmias (ICD-9 code 427)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
Under 65	0.31	0.67	0.60	0.69	0.73	0.31	0.67	0.60	0.69	0.73
65 +	0.11	0.40	—	—	—	0.11	0.40	—	—	—
General population										
18-19	0.016	0.415	0.244	0.127	0.000	0.035	0.424	0.221	0.124	0.059
20-24	0.032	0.390	0.154	0.126	0.095	0.039	0.395	0.128	0.123	0.134
25-29	0.046	0.398	0.154	0.101	0.106	0.042	0.401	0.156	0.117	0.103
30-34	0.057	0.388	0.092	0.086	0.222	0.060	0.380	0.127	0.111	0.145
35-39	0.072	0.351	0.058	0.100	0.205	0.069	0.317	0.101	0.112	0.105
40-44	0.075	0.356	0.060	0.080	0.186	0.063	0.332	0.078	0.116	0.153
45-49	0.088	0.323	0.045	0.084	0.206	0.077	0.218	0.041	0.060	0.135
50-54	0.088	0.350	0.099	0.089	0.157	0.069	0.281	0.072	0.113	0.124
55-59	0.101	0.329	0.072	0.082	0.187	0.073	0.254	0.069	0.093	0.094
60-64	0.144	0.234	0.047	0.049	0.112	0.067	0.217	0.062	0.107	0.052
Total (<65)	0.070	0.358	0.098	0.094	0.159	0.059	0.331	0.105	0.109	0.118
65-69	0.052	0.102	—	—	—	0.022	0.086	—	—	—
70-74	0.056	0.081	—	—	—	0.029	0.049	—	—	—
75-79	0.056	0.081	—	—	—	0.029	0.049	—	—	—
80+	0.056	0.081	—	—	—	0.029	0.049	—	—	—
Total (65+)	0.055	0.088	—	—	—	0.027	0.059	—	—	—

Atherosclerosis (ICD-9 codes 440-448)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.45	0.61	0.49	0.61	0.61	0.45	0.61	0.49	0.61	0.61
General population										
18-19	0.032	0.342	0.180	0.104	0.000	0.069	0.344	0.166	0.104	0.039
20-24	0.063	0.314	0.115	0.104	0.062	0.076	0.317	0.096	0.102	0.089
25-29	0.089	0.317	0.115	0.083	0.069	0.083	0.321	0.116	0.098	0.068
30-34	0.110	0.306	0.070	0.073	0.150	0.114	0.298	0.095	0.093	0.096
35-39	0.135	0.271	0.044	0.084	0.136	0.128	0.243	0.074	0.091	0.068
40-44	0.141	0.274	0.044	0.066	0.121	0.119	0.256	0.058	0.096	0.100
45-49	0.162	0.244	0.034	0.070	0.135	0.138	0.162	0.029	0.048	0.085
50-54	0.163	0.266	0.073	0.073	0.103	0.127	0.213	0.052	0.092	0.080
55-59	0.184	0.246	0.054	0.068	0.123	0.133	0.191	0.049	0.074	0.059
60-64	0.247	0.165	0.033	0.038	0.069	0.123	0.162	0.044	0.084	0.032
65-69	0.247	0.165	0.035	0.064	0.042	0.123	0.162	0.054	0.000	0.081
70-74	0.268	0.131	0.031	0.017	0.047	0.160	0.092	0.031	0.017	0.031
75-79	0.268	0.131	0.031	0.017	0.047	0.160	0.092	0.031	0.017	0.031
80+	0.268	0.131	0.031	0.017	0.047	0.160	0.092	0.031	0.017	0.031
Total (18+)	0.145	0.257	0.063	0.068	0.096	0.112	0.232	0.071	0.077	0.070

Pneumonia (ICD-9 codes 480–487)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.22	0.32	0.31	0.24	0.36	0.22	0.32	0.31	0.24	0.36
General population										
18–19	0.015	0.140	0.103	0.026	0.000	0.034	0.147	0.097	0.026	0.017
20–24	0.030	0.129	0.066	0.026	0.027	0.037	0.132	0.055	0.026	0.039
25–29	0.044	0.134	0.065	0.020	0.030	0.040	0.136	0.067	0.024	0.030
30–34	0.054	0.130	0.041	0.018	0.066	0.056	0.126	0.055	0.023	0.042
35–39	0.066	0.114	0.025	0.021	0.059	0.060	0.099	0.041	0.022	0.028
40–44	0.069	0.116	0.025	0.016	0.051	0.056	0.105	0.033	0.023	0.043
45–49	0.079	0.102	0.019	0.017	0.057	0.061	0.062	0.015	0.011	0.034
50–54	0.081	0.115	0.041	0.018	0.044	0.058	0.085	0.029	0.022	0.033
55–59	0.092	0.106	0.030	0.016	0.052	0.060	0.074	0.026	0.017	0.024
60–64	0.120	0.069	0.017	0.008	0.027	0.054	0.061	0.023	0.019	0.013
65–69	0.120	0.069	0.018	0.014	0.017	0.054	0.061	0.028	0.000	0.031
70–74	0.129	0.055	0.016	0.004	0.018	0.068	0.034	0.015	0.004	0.011
75–79	0.129	0.055	0.016	0.004	0.018	0.068	0.034	0.015	0.004	0.011
80+	0.129	0.055	0.016	0.004	0.018	0.068	0.034	0.015	0.004	0.011
Total (18+)	0.070	0.108	0.035	0.016	0.040	0.052	0.092	0.039	0.018	0.029

Crohn's disease (ICD-9 code 555)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1–14	15–24	25+		All	1–14	15–24	25+
Exposed										
All ages	0.48	0.48	0.32	0.84	0.61	0.38	0.69	0.77	0.89	0.67
General population										
18–19	0.041	0.236	0.078	0.306	0.000	0.044	0.443	0.312	0.293	0.027
20–24	0.081	0.213	0.048	0.299	0.052	0.049	0.413	0.198	0.318	0.067
25–29	0.113	0.215	0.050	0.249	0.060	0.053	0.419	0.238	0.299	0.050
30–34	0.139	0.205	0.031	0.218	0.131	0.075	0.395	0.202	0.295	0.074
35–39	0.167	0.178	0.019	0.243	0.115	0.087	0.332	0.163	0.302	0.055
40–44	0.174	0.181	0.019	0.197	0.106	0.080	0.346	0.129	0.320	0.081
45–49	0.197	0.158	0.015	0.207	0.116	0.097	0.229	0.079	0.195	0.084
50–54	0.201	0.174	0.032	0.220	0.090	0.087	0.295	0.119	0.315	0.066
55–59	0.224	0.159	0.024	0.205	0.107	0.092	0.266	0.120	0.268	0.052
60–64	0.287	0.102	0.015	0.121	0.064	0.086	0.229	0.104	0.300	0.028
65–69	0.287	0.102	0.015	0.192	0.037	0.086	0.229	0.165	0.000	0.089
70–74	0.307	0.080	0.015	0.057	0.046	0.117	0.136	0.094	0.080	0.034
75–79	0.307	0.080	0.015	0.057	0.046	0.117	0.136	0.094	0.080	0.034
80+	0.307	0.080	0.015	0.057	0.046	0.117	0.136	0.094	0.080	0.034
Total (18+)	0.178	0.168	0.028	0.206	0.085	0.076	0.317	0.165	0.266	0.059

Ulcerative colitis (ICD-9 code 556)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	0.42	-0.59	-0.20	-1.17	-9.00	0.42	-0.59	-0.20	-1.17	-9.00
General population										
18-19	0.048	-0.143	-0.049	-0.055	0.000	0.106	-0.147	-0.049	-0.059	-0.037
20-24	0.091	-0.125	-0.032	-0.057	-0.057	0.110	-0.128	-0.028	-0.057	-0.083
25-29	0.130	-0.128	-0.032	-0.044	-0.061	0.121	-0.131	-0.033	-0.053	-0.062
30-34	0.157	-0.121	-0.021	-0.042	-0.146	0.161	-0.116	-0.028	-0.052	-0.089
35-39	0.181	-0.101	-0.012	-0.046	-0.125	0.163	-0.086	-0.019	-0.045	-0.056
40-44	0.190	-0.103	-0.012	-0.033	-0.103	0.154	-0.092	-0.016	-0.051	-0.088
45-49	0.207	-0.087	-0.009	-0.036	-0.117	0.153	-0.050	-0.007	-0.021	-0.063
50-54	0.218	-0.099	-0.020	-0.038	-0.090	0.153	-0.071	-0.013	-0.046	-0.066
55-59	0.238	-0.088	-0.015	-0.036	-0.107	0.155	-0.061	-0.012	-0.034	-0.045
60-64	0.280	-0.052	-0.007	-0.016	-0.049	0.136	-0.050	-0.010	-0.036	-0.023
65-69	0.280	-0.052	-0.008	-0.027	-0.030	0.136	-0.050	-0.012	0.000	-0.057
70-74	0.290	-0.039	-0.006	-0.007	-0.031	0.160	-0.026	-0.006	-0.007	-0.020
75-79	0.290	-0.039	-0.006	-0.007	-0.031	0.160	-0.026	-0.006	-0.007	-0.020
80+	0.290	-0.039	-0.006	-0.007	-0.031	0.160	-0.026	-0.006	-0.007	-0.020
Total (18+)	0.189	-0.093	-0.016	-0.034	-0.080	0.139	-0.080	-0.018	-0.037	-0.057

Ectopic pregnancy (ICD-9 codes 633, 761.4)

Age	Male					Female				
	Ex-smoker	Current smoker (cigarettes per day)				Ex-smoker	Current smoker (cigarettes per day)			
		All	1-14	15-24	25+		All	1-14	15-24	25+
Exposed										
All ages	—	—	—	—	—	0.21	0.32	0.29	0.09	0.17
General population										
18-19	—	—	—	—	—	0.032	0.144	0.090	0.009	0.006
20-24	—	—	—	—	—	0.035	0.130	0.052	0.008	0.015
25-29	—	—	—	—	—	0.038	0.133	0.062	0.008	0.011
30-34	—	—	—	—	—	0.053	0.125	0.051	0.008	0.016
35-39	—	—	—	—	—	0.057	0.098	0.038	0.007	0.011
40-44	—	—	—	—	—	0.053	0.103	0.031	0.008	0.016
45-49	—	—	—	—	—	0.057	0.061	0.014	0.003	0.012
50-54	—	—	—	—	—	0.055	0.083	0.027	0.007	0.012
55-59	—	—	—	—	—	—	—	—	—	—
60-64	—	—	—	—	—	—	—	—	—	—
65-69	—	—	—	—	—	—	—	—	—	—
70-74	—	—	—	—	—	—	—	—	—	—
75-79	—	—	—	—	—	—	—	—	—	—
80+	—	—	—	—	—	—	—	—	—	—
Total (18+)	—	—	—	—	—	0.048	0.108	0.038	0.008	0.014

3. Fractions updated with prevalence data derived from the 1998 National Drug Strategy Household Survey

Spontaneous abortion: female only (ICD-9 codes 634, 761.8)

Any level of exposure	
Exposed	
All ages	0.26

General population	
All ages	0.091

Antepartum haemorrhage: females and newborn males (ICD-9 codes 640, 641, 762.0, 762.1)

Any level of exposure	
Exposed	
All ages	0.38

General population	
All ages	0.148

Hypertension in pregnancy: females and newborn males (ICD-9 codes 642, 760.0)

Any level of exposure	
Exposed	
All ages	-0.28

General population	
All ages	-0.065

Low birthweight: females and newborn males (ICD-9 codes 656.5, 764, 765)

Any level of exposure	
Exposed	
All ages	0.51

General population	
All ages	0.225

Premature rupture of membranes: females and newborn males (ICD-9 codes 658.1, 658.2, 761.1)

Any level of exposure	
Exposed	
All ages	0.48

General population	
All ages	0.206

SIDS (and smoking during pregnancy), males and females aged less than 5 years (ICD-9 code 798.0)

Any level of exposure	
Exposed	
All ages	0.64

General population	
All ages	0.329