

***Smoking non-disclosure***  
**in the UK:**  
**An update**

A paper by

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March 2007

## INTRODUCTION

In the UK this continues to be a subject of interest, although not of huge concern. Life and health insurers *know* that non-disclosure of smoking takes place, but they don't know for sure to what extent, and they can't find out without testing for cotinine those applicants who declare themselves to be non-smokers. And that sort of routine testing is inconsistent with the UK's 'process quick and cheap' new business model that implies minimal underwriting evidence.

So insurers and reinsurers are aware of the cross-subsidy between the non-smoking and smoking groups, and the consequent equity failings; they believe it shouldn't be like that, but are unsure of what, if anything, to do about it. While a scientific study of UK life and health insurance applicants on a large enough scale remains outstanding, the best we can do is to estimate smoking non-disclosure rates using population data and with some help from experience in the US and elsewhere.

So we have taken the opportunity of recent data from ExamOne, a subsidiary of Quest Diagnostics in the United States, coupled with population statistics, to have a look at the issue.

## POPULATION DATA

### United Kingdom

Smoking prevalence overall:

	1974	1978	1982	1986	1990	1994	1998	2002	2004
Men	51%	45%	38%	35%	31%	28%	28%	27%	26%
Women	41	37	33	31	29	26	26	25	23
All	45	40	35	33	30	27	27	26	25

Source: General Household Survey 2004-5

Smoking prevalence by age:

Ages/years	16-19	20-24	25-34	35-49	50-59	60-up
1978	34%	44%	45%	45%	45%	30%
1988	28	37	36	36	33	23
1998	31	40	35	30	27	16
2000	29	35	35	29	27	16
2004	24	32	31	29	24	14

Source: General Household Survey 2004-5

Smoking prevalence by socio-economic classification:

	Men	Women
Large employers and higher managerial	16%	14%
Higher professional	14	10
Lower managerial and professional	21	19
Intermediate	22	19
Small employers, own account	26	24
Lower supervisory and technical	28	28
Semi-routine	35	29
Routine	34	32

### United States

Smoking prevalence overall<sup>1</sup>:

	1974	1978	1983	1987	1990	1994	1998	2002	2004
Men	43%	38%	35%	31%	28%	28%	26%	25%	23%
Women	32	31	30	27	23	23	22	20	19
All	37	34	32	29	26	26	24	23	21

Source: Centers for Disease Control

<sup>1</sup> 'Smoker' defined as reported lifetime smoking of at least 100 cigarettes and every day or some days at the time of the interview

Smoking prevalence by age<sup>1</sup>:

<b>Age group</b>	<i>Men</i>	<i>Women</i>	<i>All persons</i>
18-24	26%	22%	24%
25-44	26	21	24
45-64	25	20	22
65 up	10	8	9
Total	23	19	21

**Source: National Health Interview Survey 2004, Centers for Disease Control**

According to the Centers for Disease Control, the prevalence of cigarette smoking among adults in 2005 was 21%, the same as in 2004.

Smoking prevalence by other characteristics:

	<i>Men</i>	<i>Women</i>
Education		
General Education Development diploma	42%	40%
High school graduate	27	21
Associate degree	25	18
Some college	25	20
Undergraduate degree	14	10
Graduate degree	8	8
Poverty threshold status		
At or above	24	18
Below	32	27
Unknown	21	17

It is interesting to examine some figures published by the American Lung Association (ALA). The paper *Trends in Tobacco Use*<sup>2</sup> contains the statistics shown in the table above but also covers usage of other tobacco products for the year 2000:

Cigars	19.6%
Pipes	7.4
Chewing tobacco	18.7
Snuff	30.7
Bidis*	8.7

*Source: Morbidity and Mortality Weekly Reports, and National Health Interview Survey 2000, American Lung Association*

\*A thin, often flavoured cigarette made from tobacco rolled in a tendu leaf; more potent than ordinary cigarettes and generating much more carbon monoxide and tar

<sup>2</sup> *Trends in Tobacco Use*. American Lung Association; New York; 2006

We find these ALA figures hard to believe – at least that these forms of tobacco are used on a regular basis. They suggest that:

- Nearly a third of the population used snuff in 2000
- Nearly a fifth chewed tobacco
- A fifth smoked cigars
- Getting on for one in ten people smoked bidis.

Superficially they suggest that 85% of Americans used alternative tobacco products, although there must be some very large overlaps between the groups – and with cigarette smokers too. In 2000, around a quarter of the US population were cigarette smokers.

### Canada

Smoking prevalence by age:

<b>Age group</b>	<i>Men</i>	<i>Women</i>	<i>All persons</i>
20-24	29%	23%	26%
25-34	30	17	24
35-44	27	19	23
45-54	21	18	20
55 up	11	9	10
All ages	22	16	19

Source: Canadian Tobacco Use Monitoring Survey 2005

### Comment

We have overtly queried the American Lung Association figures for the US, but the other statistics quoted should not be regarded as ‘absolute truths’. Although good researchers do their best to stratify their interviewee samples to reflect the distribution of the national population in terms of geography, age, sex and other characteristics, the participants in any survey are just a sample of the whole population.

Thus the results may not be an exact reflection of the smoking habits of the population as a whole. Indeed, sometimes year-on-year figures show an *increase* in the smoking prevalence for particular age groups, when one would expect it to go down. That may represent a sampling error, or it could be a reflection of part of a heavier-smoking cohort of lives moving into a new age bracket for survey purposes with the passage of a year.

Moreover, some smoker interviewees declare themselves as non-smokers. They may have nothing to gain in doing so (as they would when applying for life or health insurance) but who knows what their motivation might be? Likewise those who admit they smoke may under-declare their tobacco consumption.

Patients who smoke don’t always tell doctors the truth. Hobbs et al reported<sup>3</sup> on a series of 100 patients presenting to a hospital outpatient clinic with a diagnosis of

<sup>3</sup> Hobbs SD, Wilimink ABM, Adam DJ et al. Assessment of smoking status in patients with peripheral arterial disease. J Vasc Surg 2005;41:451-6

intermittent claudication. Of the 40 patients who said they were ex-smokers, six (15%) had urinary cotinine levels consistent with regular smoking and a further two (5%) tested positive for cotinine with a level suggestive of light, irregular or passive smoking. The assay used had a sensitivity and specificity of 100% and 98% respectively for detecting active smoking.

Thus we can conclude that the population figures probably understate the true picture.

## LIFE INSURANCE DATA from ExamOne

### US data

Positive cotinine percentages, by age and gender:

	<i>Age groups</i>				
	<i>20-29</i>	<i>30-39</i>	<i>40-49</i>	<i>50-59</i>	<i>All ages</i>
Male	20.04%	15.75%	15.16%	13.50%	15.52%
Female	11.22	9.45	12.12	10.44	10.68
Total	15.43	12.89	13.91	12.34	13.39

Source: ExamOne 2004 data

Positive cotinine percentages, by sum assured and test method:

<b>Test method</b>	<i>Sum assured (US\$)</i>			
	<i>Less than 100,000</i>	<i>100,000 exactly</i>	<i>Over 100,000</i>	<i>All amounts</i>
Oral fluid	26.7%	23.9%	16.1%	22.8%
Urine	18.2	16.0	8.8	10.9

Source: ExamOne 2004 data

### Canadian data

Positive cotinine percentages, by age and gender:

	<i>Age groups</i>				
	<i>20-29</i>	<i>30-39</i>	<i>40-49</i>	<i>50-59</i>	<i>All ages</i>
Male	22.31%	17.43%	17.59%	14.90%	17.47%
Female	14.70	11.47	12.66	11.10	12.34
Total	18.36	14.74	15.57	13.45	15.22

Source: ExamOne 2004 data

Positive cotinine percentages, by test method:

#### *Test method*

Oral fluid 20.9%

Urine 13.8%

Combined 15.2%

Source: ExamOne 2004 data

### **Comment**

The ExamOne data show an overall cotinine positive rate of 13.4% in the US and 15.2% in Canada. These are broadly similar figures that reflect small differences in the prevalence of smoking in the insured populations in each country.

In both countries oral fluid produced higher positive rates than did urine. This is not due to any difference in sensitivity between the two modes of testing, merely a reflection of the use of oral fluid testing for lower sums assured; lower-value policies tend to be bought by individuals in lower socio-economic classes among whom smoking prevalence is higher.

It is mildly interesting that a higher proportion of Canadians tested positive for cotinine overall, yet Canada has a slightly lower smoking prevalence among the general population. This could be due to a difference in the socio-economic mix of insurance buyers between the two countries, or age-related differences in smoking patterns – see below.

In the US and Canada laboratory tests are carried out at much lower sum assured levels compared to the UK, and routine cotinine testing is common; if a urine specimen is taken for testing, cotinine is a standard analysis – even on declared smokers. In theory the majority of North American applicants know (or their advisers know) that they will be tested for cotinine, so there is little point in lying about smoking. This is known as the ‘sentinel effect’ of screening, which should minimise non-disclosure.

Note that ExamOne’s testing procedures have cut-offs designed to exclude positives due to environmental tobacco smoke, or passive smoking. Re-testing of urine or oral fluid samples given by applicants who deny smoking, using gas chromatography/mass spectrometry has yielded results that were 100% positive.

## GAUGING SMOKING NON-DISCLOSURE IN THE UK

### Points to note

- Smoking prevalence in the UK population overall is about 20% higher than in the US, and about 30% higher than in Canada.
- In the US smoking prevalence rates are in the narrow range of 22% to 24% between ages 18 and 64, but then drop sharply to a mere 9% at ages 65-plus.
- In the UK and Canada there is more of a gradient across the age range.

If one takes the typical insurance-buying age range as being 25 to 55/60, then national rates of smoking prevalence are approximately as follows (for convenience we have focused on men):

- UK: 31%
- US: 25.5%
- Canada: 26%.

This again gives a UK v US/Canada differential of about +20%.

Comparing the national smoking prevalence in that age range and the ExamOne cotinine positives gives a guide to the effect of selection (see below):

- US: ExamOne rate 15.5% – effect of selection = 39% reduction
- Canada: ExamOne rate 17.5% – effect of selection = 33% reduction.

Let us assume, then, that the effect of selection is around 35% in a market in which cotinine testing is routine, and applicants know they will be tested.

### ***The effect of selection***

Comparing the prevalence of smoking in the general population and among insurance applicants gives an indication of the effect of the selection. In this case self-selection by consumers (in deciding to buy insurance) and selection by intermediaries (in deciding to acquire a given client) is more powerful than any active selection carried out by insurers via the underwriting process.

These two forms of selection give an upward socio-economic bias to the group of insurance buyers: these people have the need for protection cover, they have been targeted by intermediaries or have been self-motivated to buy (maybe in association with another financial product) and, importantly, they can afford the monthly premiums. And socio-economic status (or proxies for it such as educational attainment) is inversely correlated with smoking prevalence.

### ***Further data from ExamOne***

According to ExamOne research in 2004, 17% of the positive cotinine tests in the US were in respect of applicants who say they are non-smokers.<sup>4</sup> Assuming 16% of applicants are smokers and that 17% of those fail to disclose the fact, a sample of 100 applicants would be made up roughly as follows:

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<sup>4</sup> Personal communication

13 disclosing smokers
3 non-disclosing smokers
84 true non-smokers
100 total

A total of three lying about smoking on the application gives a non-disclosure rate of 3.4% among the 87 declared non-smokers.

However, ExamOne has a non-US client that operates in a market where there is no routine testing for cotinine. Despite the practices of its competitors, this insurer decided to test almost all applicants. So this is a situation akin to that in the UK. To the application form question ‘Do you use tobacco in any form?’ proposed insureds answered as follows:

- Yes: 22%
- No: 70%
- No answer: 8%.

Of the declared non-smokers, 18% tested positive for cotinine, and 27% of the ‘no answer’ group tested positive.

So a sample of 100 applicants would be made up as follows:

22 disclosing smokers
13 non-disclosing smokers
2 ‘fence-sitting’ smokers
57 true non-smokers
6 ‘fence-sitting’ non-smokers
100 total

These figures make 37% of life insurance applicants smokers – much higher than in the US and Canada. But then the country concerned is not wealthy and one would expect high smoking prevalence among the many in low socio-economic grouping occupations. Placing these results in context is made difficult by there being poor population smoking data for the country concerned: what is available is not recent, not detailed, and somewhat conflicting.

But by this reckoning 40% (15 of the 37 in the sample of 100) of the smokers non-disclosed.

## Discussion

What conclusions can one draw? Well, none that is firm: one can merely speculate. Drawing on the US and Canadian data, both population and insured from ExamOne, maybe one could expect true smoking rates among UK applicants to be about 20% higher than in the US and Canada – say between 19% and 21%.

As regards the level of smoking non-disclosure, ExamOne’s non-US/Canadian experience looks very powerful: 40% of smokers non-disclosed. (However, modelling UK experience on this data, as we are about to do, assumes similar levels of motivation to lie, which is quite a big assumption). Can one apply this to the UK, and make an arbitrary judgment on those cases for which the smoking question was unanswered? Let us try:

- Population smoking prevalence in insurance-buying age range: 31%

- Effect of selection: 35% reduction
- Estimated smoking prevalence in insurance applicants: 20%

BUT, because of higher smoking prevalence rates compared with the UK, the model fails, or at least it works in two ways:

**ONE:** Given a non-disclosure rate of 40% among all smokers, a sample of 100 applicants could be made up as follows:

12 disclosing smokers
8 non-disclosing smokers
80 true non-smokers
100 total

A total of eight lying about smoking on the application gives a non-disclosure rate of 9% among the 88 declared non-smokers.

**TWO:** Given a non-disclosure rate of 20% among declared non-smokers, a sample of 100 applicants could be made up as follows:

0 disclosing smokers
20 non-disclosing smokers
80 true non-smokers
100 total

Well, at such a low smoking prevalence rate, the model does not work given the premise that 20% of declared non-smokers lie. It would mean that no applicant admits to being a smoker.

Suppose one assumes no effect of selection and that 30% of UK applicants are smokers. On the basis of 40% of smokers non-disclosing the sample of 100 applicants looks like:

18 disclosing smokers
12 non-disclosing smokers
70 true non-smokers
100 total

A total of 12 lying about smoking on the application gives a non-disclosure rate of 15% among the 82 declared non-smokers.

On the basis of 20% of declared non-smokers non-disclosing the sample of 100 applicants looks like:

12 disclosing smokers
18 non-disclosing smokers
70 true non-smokers
100 total

This way, more smokers non-disclose than disclose. Unlikely? It may just be the case...

## CONCLUSION

So where does all this leave us? Well, modelling is most powerful when the data is reliable and highly relevant. The data we have quoted here are reliable (certainly the ExamOne data are, though the population figures have a few caveats attaching), but they score low on relevance. However, in the context of nothing better being available, they will have to do provided they are interpreted with caution.

The most powerful statistics come from the market where cotinine testing is uncommon, but where ExamOne's client tests routinely:

- Roughly 20% of non-smokers test positive for cotinine.
- Roughly 40% of smokers non-disclose.

But note that these two figures only work in their original context, and not in all others.

The rates of 'smoking amnesia' in the UK remain unknown, but seem to lie in the bounds that our crude models have produced. Some brief observations:

- The 3% to 4% non-disclosure rate cited by ExamOne in the US looks far too low for the UK, where there is no sentinel effect of routine testing.
- 40% of smokers non-disclosing looks a safer bet for the UK.
- On that basis a non-disclosure rate among non-smokers of 9% to 12% looks reasonable, depending on the true prevalence of smoking in the UK population and the effects of selection.

But that's just hypothesis. We would really like to see that objective study carried out. And what about the cost-effectiveness of routine screening? That's a subject for another SelectX paper.

### *Acknowledgement*

We are grateful for the help given by ExamOne in producing this paper. For more information visit [www.Examone.com](http://www.Examone.com).

SelectX Ltd  
March 2007