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# How much do mental disorders contribute to New Zealand's tobacco epidemic?

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## ABSTRACT

**Objective:** To quantify the share of tobacco consumed by people with 12-month mental disorders in New Zealand.

**Methods:** Estimates of current smoking prevalence and the 12-month prevalence of three groups of mental disorders—*anxiety, mood and substance use disorders*—were derived from the New Zealand Mental Health Survey, a nationally representative survey of almost 13 000 adults (16+ years) fielded in 2003–4. Estimates of the smoking intensity ratio (comparing smokers with mental disorders to those without mental disorders) were derived from the 2006–7 New Zealand Health Survey.

**Results:** Approximately 33% of all cigarettes are consumed by people with 12-month mental disorders (males 27%, females 39%), using an estimated smoking intensity ratio of 1.21. Among this group, anxiety disorders account for almost one-half of consumption, mood disorders for over one-quarter and substance use disorders for about one-fifth.

**Conclusion:** This study quantifies for the first time the contribution of mental disorders to tobacco consumption in New Zealand. In particular, it identifies anxiety disorders as an important risk factor for tobacco use. People with mental disorders are an important target group for tobacco control. Enhanced collaboration and sharing of expertise between smoking cessation service providers and community mental health services are urgently needed.

In New Zealand tobacco smoking is second only to poor nutrition and physical inactivity combined as a cause of preventable mortality,<sup>1</sup> with almost 5000 deaths per year (approximately 18% of all deaths) attributable to active and passive smoking.<sup>2</sup> In 2006 approximately 23.5% of the adult (15–64 years) population were current smokers, most of them daily,<sup>3</sup> consuming on average 12 cigarettes per smoker per day.<sup>2</sup>

Population-based mental health surveys in Australia<sup>4</sup> and the United States<sup>5</sup> have demonstrated that people with current (12-month) mental disorders are more likely to smoke, and to be nicotine dependent, than others. As a result such smokers typically exhibit greater smoking intensity, are less likely to quit and may experience higher risks of tobacco-attributable morbidity and mortality than other smokers.<sup>6</sup> Indeed, smokers who seek treatment for mental disorders have been found to experience greater functional disability, more serious psychiatric symptoms and poorer general health than non-smokers seeking treatment.<sup>7</sup> Furthermore, nicotine addiction may increase the risk of suicide among men even after controlling for the presence of mental disorders.<sup>8</sup>

What explains the association between mental disorders and tobacco use? Tobacco use may increase the risk of some mental disorders.<sup>9</sup> Both tobacco use and mental disorders may reflect a common exposure, such as socioeconomic disadvantage or a shared genetic vulnerability.<sup>6–10</sup> Finally, people with mental disorders may use tobacco (nicotine) as self-medication for cognitive deficits or other symptoms including the parkinsonian effects of medications.<sup>11</sup> In reality several mechanisms are likely to play a part, to different extents in different mental disorders.<sup>12</sup>

A deeper understanding of the association between mental disorders and tobacco consumption is important for tobacco control. The fielding of a population-based mental health survey in New Zealand in 2003–4 has allowed this association to be investigated in our population for the first time.

## METHOD

### Prevalences

The 2003–4 New Zealand Mental Health Survey (NZMHS) interviewed a nationally representative area-based probability sample of 12 992 adults (16+ years) resident in permanent private dwellings, and included a Maori and Pacific oversample. The overall response rate was 73%. The questionnaire was a modification of the Composite International Diagnostic Interview (CIDI) as used in the World Mental Health Survey Initiative (WHO CIDI 3.0), providing DSM IV diagnoses with high reliability and validity.<sup>13</sup> Details of the survey design and fielding are reported elsewhere.<sup>14</sup>

### Definitions

The CIDI 3.0 generates DSM IV diagnoses by determining whether the respondent has ever in their lifetime met the criteria for the disorder, then determines the last time the person had an episode or key symptoms of the disorder. If this was within 12 months of the interview, this is described as a “12-month disorder” (which therefore includes present or currently active disorders). For this study, diagnoses were grouped into three 12-month disorder groups: anxiety disorders, mood disorders and substance use disorders. Anxiety disorders included panic disorder, agoraphobia without panic, specific phobia, social phobia, generalised anxiety disorder, post-traumatic stress disorder and obsessive-compulsive disorder; mood disorders included major depressive disorder, dysthymia and bipolar disorder; and substance use disorders included alcohol abuse, alcohol dependence, drug abuse, drug dependence, marijuana abuse and marijuana dependence. Prevalence of psychotic disorders such as schizophrenia could not be reliably estimated from this household survey.

**Table 1** Prevalence (%) (95% confidence interval) of 12-month mental disorders among adults, by disorder group, 2004

Disorder	Males	Females	Total
Any mental disorder	17.0 (15.3 to 18.6)	24.1 (22.5 to 25.7)	20.7 (19.5 to 21.9)
Any anxiety disorder	10.6 (9.4 to 11.8)	18.7 (17.3 to 20.0)	14.8 (13.9 to 15.7)
Any mood disorder	6.2 (5.3 to 7.0)	9.6 (8.6 to 10.6)	7.9 (7.3 to 8.7)
Any substance use disorder	4.9 (4.0 to 5.8)	2.1 (1.7 to 2.5)	3.5 (3.0 to 4.0)

Prevalences by group sum to >100% as some people have more than one disorder.  
Prevalence rates are rates per 100.

Smoking status—current smoker, ex-smoker or never smoker—was captured through a single item that included roll-your-own and factory-made cigarettes, cigar and pipe smoking. Data on intensity of smoking was not sought. Only current (daily plus non-daily) smoker data are used for the present analysis.

### Tobacco consumption

There are few quantitative estimates of differences in smoking intensity between smokers with and without a current or 12-month mental disorder. There is, however, general agreement that smokers with mental disorders tend to be more heavily addicted, to have more difficulty quitting and to be, on average, heavier smokers than their counterparts without mental disorders.

It was possible to estimate the smoking intensity ratio (SIR) using the Kessler 10-item Scale of Psychological Distress (the K10),<sup>15</sup> which was included in both the 2004 NZMHS and the 2006–7 New Zealand Health Survey.<sup>16</sup> The former survey demonstrated that K10 scores in the highest quintile were highly predictive of a CIDI 12-month mental disorder. The latter survey included questions on smoking intensity, so allowing K10 score quintiles to be related to mean cigarette equivalents consumed per day. Combining both datasets provided an estimate for the SIR (mean cigarette equivalents per day for smokers in the highest K10 quintile versus those in the other quintiles pooled, corresponding to smokers with and without any 12-month mental disorder, respectively). Logistic regression modelling was used to adjust the SIR for age, sex, ethnicity and deprivation (NZDep 2001 index).

### Contribution estimates

The contribution of any mental disorder, or of each mental disorder group, to total tobacco consumption was estimated using the formula:

$$\text{Contribution (proportion)} = \frac{p_i}{p_i + 1}$$

where  $p_i$  is the proportion of smokers with the illness and  $i$  is the smoking intensity ratio.

The contribution estimates for the individual mental disorder groups were then re-scaled proportionately, such that the sum of these contributions equalled the contribution of “any mental

disorder”. This provided an approximate adjustment for comorbidity (prevalence overlap between disorder groups).

Where necessary, prevalence rates were age standardised by the direct method with the New Zealand 2001 census population as the reference.

## RESULTS

### Mental disorders

Overall, almost 21% of the adult population experienced a 12-month mental disorder in 2003–4 (table 1), with female prevalence (24%) exceeding that of males (17%) ( $p < 0.05$ ).

### Smoking

The estimated prevalence of current (daily plus non-daily) tobacco smoking in the total adult population (16+ years) in the 2004 NZMHS survey was 23.1% (table 2)—almost identical to that estimated from the 2002–3 New Zealand Health Survey.<sup>3</sup>

Adults with 12-month mental disorders were estimated to be approximately 50% more likely to smoke than others (32% versus 21%,  $p < 0.05$ ) (table 2). By far the highest smoking rates were found in those with a substance use disorder (56%). There was no significant difference between those with anxiety and those with mood disorders (point estimates of 30% and 34%, respectively).

### Smoking intensity ratio

After adjusting for age, sex, ethnicity and deprivation, NZHS 2006 respondents in the top quintile of K10 scores consumed a mean of 1.21 (1.12 to 1.31) times as many cigarettes per day as their counterparts in the (pooled) remaining quintiles. This SIR estimate corresponds to an average daily consumption of 14.5 and 11.5 cigarette equivalents for New Zealand smokers with and without 12-month mental disorders in 2004, respectively.

### Impact of mental illness on tobacco consumption

Tobacco consumption share estimates, based on the above prevalence estimates and an estimated smoking intensity ratio of 1.21, are summarised below (table 3).

Overall, we estimate that approximately 33% (29% to 37%) of all cigarette equivalents consumed in New Zealand are

**Table 2** Prevalence (%) (95% confidence interval) of current smoking among adults by 12-month mental disorder group and sex, 2004

Disorder	Males	Females	Total
Total population	24.3 (21.9 to 26.7)	22.2 (20.4 to 24.1)	23.1 (21.2 to 24.3)
No mental disorder	22.4 (19.8 to 25.0)	19.1 (16.9 to 21.3)	20.7 (19.0 to 22.4)
Any mental disorder	32.8 (28.3 to 37.3)	31.4 (28.7 to 34.2)	32.3 (29.7 to 34.8)
Any anxiety disorder	28.7 (24.4 to 33.1)	30.6 (27.6 to 33.6)	30.4 (27.7 to 33.0)
Any mood disorder	34.9 (28.3 to 41.5)	32.9 (28.6 to 37.3)	34.0 (30.2 to 37.8)
Any substance use disorder	50.9 (41.8 to 59.9)	69.9 (60.4 to 79.3)	56.2 (49.1 to 63.2)

Prevalence rates are rates per 100.

**Table 3** Proportion (%) (95% confidence interval) of all cigarettes consumed by 12-month mental disorder group and sex, 2004

	Males	Females	Total
<b>Proportion of adult population who are:</b>			
Smokers with no mental disorder	18.7 (16.5 to 20.9)	14.6 (12.9 to 16.3)	16.4 (15.0 to 17.8)
Smokers with any mental disorder	5.6 (4.5 to 6.7)	7.6 (6.7 to 8.5)	6.7 (6.0 to 7.4)
<b>Proportion of all cigarettes that are consumed by:</b>			
Smokers with no mental disorder	73.2 (68.0 to 78.4)	61.2 (56.7 to 65.7)	66.9 (63.3 to 70.5)
Smokers with any mental disorder	26.8 (21.6 to 32.0)	38.8 (34.3 to 43.3)	33.1 (29.5 to 36.7)
<b>Proportion of all cigarettes that are consumed by:*</b>			
Smokers with any anxiety disorder	10.5 (8.4 to 12.6)	21.1 (18.4 to 23.8)	16.0 (14.1 to 17.9)
Smokers with any mood disorder	7.7 (5.7 to 9.7)	12.1 (9.6 to 14.6)	9.9 (8.3 to 11.5)
Smokers with any substance use disorder	8.6 (5.9 to 11.3)	5.6 (4.1 to 7.1)	7.2 (5.4 to 9.0)

\*Adjusted for prevalence overlap (comorbidity).

consumed by adults with mental disorders; correspondingly, approximately 67% are consumed by smokers without a current mental disorder. Almost half of the tobacco consumption of people with a mental disorder is attributable to those with anxiety disorders. People with mood disorders (mainly depression) account for over one-quarter of tobacco consumption, while those with substance use disorders make up the remaining one-fifth.

## DISCUSSION

This analysis confirms the association of tobacco use with mental disorders seen in the similar Australian<sup>4</sup> and American<sup>5</sup> population-based mental health surveys. Our estimate for the overall contribution of mental illness to tobacco consumption (33%) is lower than the 44% estimated in the US study. Impact was not estimated in the Australian study and could not be calculated from the published data.

Unlike the US and Australian studies, our study also reveals an important difference between the sexes, with mental disorders being more important for tobacco consumption among females (39%) than males (27%). Differences between age groups (shown in the Australian but not the US study) and ethnic groups may also be important, but have not yet been examined in detail.

Other than schizophrenia—a condition not included in the NZMHS—the literature on smoking and mental illness has focused largely on depression (and, in particular, on the difficulty experienced by people with depression in quitting and avoiding relapse).<sup>17</sup> However, our results indicate that anxiety disorders may be even more important, although this may partly reflect the strong comorbidity between these two groups of mental disorders. An association between tobacco smoking and panic disorder has been documented in the literature,<sup>18</sup> but the role of other anxiety disorders has not been well described. Substance use disorders, in particular alcohol use disorders, have been strongly associated with tobacco use.<sup>19</sup> Indeed, these disorders were associated in the NZMHS with by far the highest prevalence of smoking—almost double that of the other groups of mental disorders and three times that of people without any mental disorder. Nevertheless, the (relatively) low prevalence of substance use disorders means that this group is the least important among females, though similar to mood disorders in its impact on male tobacco consumption.

In interpreting the results, the limitations of this study should be borne in mind. Although based on a relatively large, nationally representative sample, the NZMHS excluded adolescents under 16 years of age, the peak age group for smoking

initiation. It excluded people living in residential institutions, so excluding some of those with the most serious psychiatric disorders (including schizophrenia, a condition linked to exceptionally high prevalence of tobacco use).<sup>20</sup> The CIDI 3.0 survey instrument used has high reliability and validity, yet does not correlate perfectly with expert clinicians' diagnoses.<sup>4</sup> Similarly, the single smoking item included in the NZMHS will not always correctly assign smoking status. However, the misclassification of both mental health status and smoking status should have been non-differential, leading to underestimation of the mental health—tobacco consumption association (that is, a conservative bias).

Our estimate of the smoking intensity ratio may be biased, since it was not directly observed but modelled from the (imperfect) correlation between CIDI diagnoses and K10 scores. The estimate so obtained (1.21) is lower than those reported in the international (mainly US) literature,<sup>5 21 22</sup> which typically are around 1.5—again indicating a conservative bias on our part. Indeed, re-running our model with an SIR of 1.5 rather than 1.21 yields an overall estimate for the proportion of cigarettes consumed by people with mental illness of 38% rather than 33%. Thus the latter should be considered a minimum estimate.

Our estimates for the contribution of individual mental disorder groups to tobacco consumption are less robust than our estimate for the contribution of “any mental disorder”. This is not only because of sampling error, but because we were forced to use the same smoking intensity ratio (SIR) for all mental disorder groups, and also because our adjustment for comorbidity (prevalence overlap between mental disorder groups) was only approximate. Hence our estimates for individual mental disorder group contributions should be interpreted cautiously.

Despite these limitations, our results are of policy interest. From a tobacco control perspective, this study emphasises the need to ensure that primary care as well as specialist smoking cessation services address the needs of people with mental disorders. This must include people with common mental disorders such as anxiety and substance use disorders, who do not typically use (or need) secondary mental health services or inpatient services.<sup>23</sup> Indeed, our analysis has demonstrated that a substantial proportion of the total burden of tobacco is concentrated among people with common mental disorders who are treated (if at all) in primary care settings. This implies that effective sharing of information and expertise between smoking cessation services, community mental health services and general primary care providers is required in order to tailor services to meet the needs of this vulnerable group.

## Research paper

## What this paper adds

- ▶ The contribution of mental illness to tobacco consumption is a topic of current interest.
- ▶ This paper estimates that at least one-third of all cigarettes smoked in New Zealand today are smoked by people with a current (12-month) mental illness.
- ▶ Among this group, anxiety disorders account for almost half of tobacco consumption.
- ▶ This research identifies people with mental disorders as an important target for smoking cessation.

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