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The hardening hypothesis for smoking – but does the evidence point to “softening” in NZ?

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The hardening hypothesis suggests that as smoking prevalence declines, the remaining smokers will be the more addicted ones who are less likely to quit. But does the NZ evidence support this? This blog considers these issues and explores the potential implications for achieving NZ's Smokefree 2025 goal.

The 'hardening hypothesis' emerged in the 1980s and proposed that as smoking prevalence declines the remaining smokers will increasingly be 'hard-core' or 'hardened', with higher nicotine dependence and less willingness to quit. The logic is appealing, as it seems common-sense that lighter and more motivated smokers will be over-represented and hard-core smokers under-represented among those quitting. If true it would support the views of the people who say to me with wearying regularity when I mention New Zealand's Smokefree 2025 goal – "lovely idea, but completely impossible, it'll never happen," or words to that effect.

There is one problem with this hypothesis. Almost all the empirical evidence suggests it is not true.

There are several ways in which hardening could manifest and hence the hypothesis can be tested. The population of smokers could become: (i) more highly addicted (eg, heavier smokers, more dependent); (ii) less motivated to quit (eg, less intention to quit, fewer quit attempts, lower self-efficacy about ability to quit); and (iii) increasingly disadvantaged and marginalised (eg, more poor smokers, more smokers with mental health conditions). The net effect should be a reduced rate of quitting among the smoking population over time. However, studies from a variety of countries that have looked at these different aspects either singly or in combination in repeated surveys have generally found no evidence of hardening (1-11).

The most recent international evidence comes from a Dutch study which found that in repeated population-based surveys the proportion of 'hard-core' smokers (older than 25 years, smoked every day, smoked 15+ cigarettes per day, had not attempted to quit in the past year, and had no intention to quit within 6 months) fell from 41% in 2001 to 32% in 2012 (12). Another recent study investigated whether, as predicted by the hardening hypothesis, lower smoking prevalence at the population level was associated with

increasing mean number of cigarettes smoked per day and a declining proportion making quit attempts among smokers in US States (1992-2011) and 31 European countries (2006-2012). The authors found mostly the opposite, and argued this was consistent with 'softening' of the smoking population occurring with reducing smoking prevalence (13).

What about New Zealand research?

A recent paper (Edwards et al in the journal *Tobacco Control* (14)) drawing on evidence from the Health Promotion Agency's Health and Lifestyle surveys from 2008-2014, mirrored the findings of the studies described above. During a period of reducing smoking prevalence, there were no statistically significant changes in indicators of possible hardening including the proportion of smokers who were: unmotivated to quit, unable to quit despite repeated attempts, or receiving state benefits or on a low income. Quit rates did not change significantly over the study period. For 2014 vs 2008 the odds ratio for recent (within last 1-12 months) quitting was 1.14 (95% CI: 0.53-2.46) and for sustained (within previous 13-24 months) quitting was 1.88 (95% CI: 0.78-4.54). The findings were similar for Māori smokers. The survey did not include information on levels of addiction, but in the NZ Health Survey, there were statistically significant reductions in the mean numbers of cigarettes smoked per day by daily smokers from 11.5 in 2006/7 (11.6 among Māori) to 10.6 (10.3 among Māori) in 2014/15 (15).

So what might all this mean for NZ's Smokefree 2025 goal?

There are two key implications. The first concerns how we should achieve Smokefree 2025. If hardening was happening, this would suggest that we need to rethink what interventions at individual-level (eg, configuration of smoking cessation support services) and population-level (eg, mix of smokefree policy and regulatory measures) are implemented. However, the lack of evidence for hardening does not support the need for such a rethink, though it may well be needed for other reasons – such as evidence that ongoing prevalence reductions are too slow, particularly among Māori and that some measures like mass media campaigns and reducing supply of tobacco products are inadequately implemented (16-18).

A second implication is that although there are reasons to be doubtful about the achievability of Smokefree 2025 by this particular year – for example, due to lack of a Government action plan and failure to progress key interventions (19), – the evidence favouring softening rather than hardening, suggests there is room for optimism about ongoing progress. Indeed, in some ways it is not surprising that the smoker population is 'softening' ie, becoming less addicted, more motivated to quit and more likely to quit. Measures used in NZ such as regular above inflation tobacco tax increases, expansion of smokefree areas, pictorial health warnings on packs coupled with denormalisation from the reducing prevalence of smokers, all seem likely to prompt such changes in the smoking population. Intensification of these measures and introduction of additional measures are likely to enhance this apparent softening.

So a plausible conclusion from all this is as follows. If the necessary interventions were put in place – and the key recommendations of the Smokefree Working Group would be a great start (20), – then there is every reason to believe that NZ's Smokefree 2025 goal can and will be achieved.

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