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Is youth vaping a problem in New Zealand?

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Recent media reports have presented conflicting evidence on youth vaping in NZ. While some NZ school principals report concerns about increasing vaping on school grounds and confiscating vapes, ASH Year 10 survey data have been interpreted as suggesting few young people who are non-smokers are vaping. How can these apparently contradictory perceptions co-exist? In this blog, we begin by outlining recent findings on electronic nicotine delivery systems (ENDS) and their potential contribution to public health. We then explore possible explanations for why reports and perceptions about youth vaping sometimes differ and offer suggestions about how this behaviour needs to be more effectively monitored.

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ENDS’ impact on population health

Electronic nicotine delivery systems (ENDS) deliver nicotine to smokers using a hand-to-mouth process that parallels smoking. Because ENDS mimic smoking behaviour and can deliver nicotine more rapidly than traditional nicotine replacement therapy (NRT), they have generated considerable enthusiasm among some health workers who view them as a potential means to achieve rapid reductions in smoking.[1] Despite uncertainty about ENDS’ immediate and long-term health effects, there is general agreement that vaping is likely to be less harmful than smoking, so long as smokers transition fully from smoking to vaping or use them to quit their nicotine addiction completely.

However, opinions on ENDS' likely contribution to ending the smoking epidemic vary in at least two ways. First, debate over vaping's effectiveness as a smoking substitute or cessation aid continues and, second, evidence regarding vaping uptake among adolescents and young adults is interpreted in different ways. With respect to the former, a recent randomised trial found vaping accompanied by behavioural support was about twice as effective at supporting smokers to quit as NRT (e.g. nicotine patches) combined with behavioural support.[2] Another trial from New Zealand reported modest increases in cessation when nicotine patches were supplemented with vapes containing nicotine relative to when they were used with vapes containing no nicotine or nicotine patches alone.[3] However, evidence from observational population-based studies is more mixed.[4] While some studies suggest ENDS could help reduce smoking prevalence at the population level, their introduction about a decade ago has not resulted in big declines in the proportion of people who smoke, or had more than a modest impact on quit rates.[5] Therefore vaping's potential contribution to achieving the Smokefree Aotearoa 2025 goal through acting as a substitute for smoking and supporting cessation remains unclear.

To examine ENDS' overall impact on population health, we must also consider the second area of debate: vaping's likely impact on non-smokers. Non-smokers who start vaping face potential risks from long-term use (although the natural history of vaping among youth and long-term health effects are highly uncertain), and substantial risks if they then transition from vaping to smoking (although the degree to which vaping promotes smoking is highly contested). Policy makers thus need to take a regulatory position that encourages smokers who have not been able to quit using other approaches to quit using ENDs or switch completely to vaping, while fully protecting non-smokers from starting to vape. Vaping uptake among non-smokers appears likely to be concentrated among young people, whose engagement in risk behaviours is well-documented.[6-8] As smoking uptake also occurs among young people, it is logical to monitor vaping and smoking in this group to examine ENDS' impacts.

Gaps in the NZ data?

Data on youth vaping and smoking is primarily reported from the ASH Year 10 Snapshot survey (commonly known as the ASH Y10 survey). Other sources of data include the Youth Insights survey and the Youth19 survey. The Snapshot survey is a short cross-sectional survey administered to between 20,000 and 30,000 14 and 15 year olds annually since 1999. The survey data have documented changing tobacco use patterns and informed policies, including youth access to tobacco,[9] smoking in cars,[10 11] removal of tobacco point of sale displays,[12] and tobacco endgame goals.[13] The ASH Y10 survey continues to offer important data on youth smoking in Aotearoa and rangatahi contributing to the survey have provided key insights over two decades.

In contrast to the extensive annual data available on 14-15 year olds, monitoring of young people aged 16-24 years is limited in scope, partly as it is very difficult to cost-effectively survey this age group. Hence available data are largely restricted to those collected as part of broader adult surveys such as the NZ Health Survey, and Health and Lifestyle Survey. As a result, estimates of smoking and vaping behaviour among young adults have limited precision due to the small numbers of participants from these age groups in these surveys. Limited numbers also means that exploring how use varies by ethnicity and socio-economic factors is not very informative.

Differences in perceptions about youth vaping prevalence

The ASH Y10 survey reported overall daily e-cigarette use of 1.8% and daily or weekly of 4%. Reports of ENDS use based on the ASH Y10 surveys have also described prevalence of use in relation to smoking status (daily e-cigarette use was 0.4% among never smokers and 14.4% among regular smokers). For example, the 2018 survey briefing released by ASH NZ (in April 2019) noted "*Fewer than 1% of Year 10 students who reported never smoking reported using e-cigarettes daily*" and concluded that "….*daily use of e-cigarettes is rare and is largely confined to those who have smoked*."[14] This finding has been cited by Associate Minister Salesa to support the conclusion that youth vaping was at minimal levels, particularly among never smokers, and that the risk of vaping functioning as a gateway to smoking was thus low.

However, in the last few months some school principals have made media statements indicating their concern at the rapid growth in vaping they had observed among their students.[15] For example, the President of the Auckland Secondary School Principals' Association commented: "*At some schools we are starting to see over 30 per cent of students have tried it. The percentages of people who are using it regularly are pushing up towards five, six-plus per cent and the interesting thing about that statistic, that might seem low, but that's in schools where smoking has hit basically zero per cent*."[15]

How can we explain these differences in estimates and perceptions of youth vaping?

We suggest there are at least five reasons why these differences in estimates and perceptions of regular vaping may have arisen.

First, it is not clear how school principals' gathered data on vaping within their schools. Without robust quantification of youth vaping, it is possible observations could over-estimate (or under-estimate) vaping prevalence in their schools.

Second, the high vaping prevalence reported by principals may be concentrated in particular schools or regions, and thus may not reflect the national situation. Many of the reports of concerns about vaping have come from principals of private schools and those in high socio-economic status areas and these need to be contrasted with work Hāpai te Hauora has underway that will provide information on vaping among schools in low socio-economic status areas. Yet, even if vaping uptake is currently concentrated in particular schools, there is a risk that – like other innovations – it will spread to schools in all regions and serving all socio-economic groups.

Third, the lower estimates of regular vaping in the ASH survey data compared to perceptions of some school principals may reflect the age range of the survey participants. The age at which adolescents begin to experiment with substance use has increased in recent years.[16] Therefore the 14-15 year olds who participate in the ASH survey may be below the age where vaping (and smoking) uptake typically occurs. For example, smoking prevalence in NZ rises quickly among older age groups and is currently 20% among 18-24 year olds; if vaping uptake occurs in a similar way, the estimates some school principals have reported may be correct and could be higher than the ASH Survey findings because they are including older adolescents.

Fourth, the ASH Survey is based on data collected in 2018, when nicotine pod mods (NPM, shown in image above) were first entering the NZ market. This timing means the 2018

survey may not have captured a possible subsequent increase in adolescent uptake following the introduction of NPMs, as has occurred in the USA, where NPMs (e.g. JUUL) are the most widely used vaping device by US young people.[17] [18] US surveys of young people in Grades 8, 10 and 12 support the possibility that uptake is increasing rapidly among several different age groups. Miech et al found substantial recent increases in reported vaping among all age groups; for example, vaping in the past 30 days more than doubled in all age groups between 2017-19.[19] Hammond et al reported similar findings; they examined changes in vaping prevalence between 2017 and 2018 among 16 to 19 year olds in Canada, the US and England, and found the prevalence of vaping increased greatly (e.g. past week use had almost doubled between 2017 and 2018) in Canada and the US, but not in England, where advertising is restricted and nicotine content of e-liquids is limited.[20] They also found that smoking prevalence among 16 to 19 year olds in Canada had increased over this period. These findings highlight two key points: first, rapidly evolving marketplaces make it crucial to consider product availability when data were collected and second, as we discuss above, it is equally important to sample from age groups most likely to experiment with risk behaviours.

Finally, measurement error is a possibility in all surveys. For example, if terminology used by youth for a behaviour is changing, survey questions that include words that are not those respondents use to describe a behaviour may be misunderstood, and the survey may not accurately measure the prevalence of the behaviour or describe trends over time. This problem may have occurred in the ASH Survey, where the 2018 survey question referred to e-cigarettes, ‘e-cigs’ and ‘vapes’, if participants used different terms. For example, “Juuling” has become a verb in the US where young people reportedly discuss “ripping a Juul” and NZ youth may have developed their own slang. Data currently being collected by Hāpai, could help clarify how young people interpret and refer to ENDS.

We suggest that, in addition to the ASH Y10 survey, an in-depth, ideally nationaly representative study is needed that examines adolescents’ and young adults’ smoking and vaping behaviours and can explore geographic and socio-demographic differences, and monitor patterns of uptake over time. Such a study could quantify principals’ concerns, test how widespread the behaviours they have observed are, and enable a better understanding of vaping among adolescents and young adults in New Zealand.

How should we interpret the ASH Survey data?

Even if the ASH Y10 data is assumed to be broadly accurate, regarding low prevalence of vaping among never smokers but quite high prevalence among current smokers as unproblematic is questionable on two grounds. First, while it is encouraging to see low prevalence of ENDS use among never smokers, the proportion of daily or regular vapers who are never smokers is much higher than a simple comparison of the prevalence figures suggests. That is because the vast majority of 14-15 year olds are never smokers, thus even a low prevalence may represent a significant proportion of regular e-cigarette users. We estimate around 20% of weekly or daily vapers are never smokers and less than half are current smokers. The table below outlines these calculations. Second, while most regular vapers may be occasional or regular smokers at the time of the survey, we do not know if they were never smokers when they first vaped, and to what degree these adolescents graduated to smoking as a result of vaping (the proposed gateway effect). Conversely, it is also not clear what proportion of regular vapers among the never smokers who subsequently remain non-smokers would otherwise have been, or become, smokers.

Table 1: Vaping among NZ Y10 smokers and non-smokers

Ever tried vaping	**ASH Y10 Survey 2018 (N)**	**% Ever tried vaping**	**Number tried vaping (% of total)**	**Estimated number in NZ Yr 10 population (n=59,976)**
Total	28,756	29.1%	8,368 (100%)	17,453
Never smokers	23,292	21.1%	4,891 (58.4%)	10,250
Regular smokers	1,437	94.5%	1,358 (16.2%)	2,834
Weekly or daily vaping	**ASH Y10 Survey 2018 (N)**	**% Weekly+ vaping**	**Number weekly+ vaping**	**NZ Year 10 population estimate**
Total	28,756	4.0%	1,150 (100%)	2,399
Never smokers	23,292	1.1%	256 (22.3%)	534
Regular smokers	1,437	34.8%	500 (43.5%)	1,044
Daily vaping	**ASH Y10 Survey 2018 (N)**	**% Daily vaping**	**Number daily vaping**	**NZ Year 10 population estimate**
Total	28,756	1.8%	518 (100%)	**1,080**
Never smokers	23,292	0.4%	93 (18.0%)	194
Regular smokers	1,437	14.4%	207 (40.0%)	432

A way forward

The ASH Y10 Survey is an important and valuable monitoring instrument which continues to provide vital information on prevalence of smoking and vaping and on related issues (e.g. on exposure to smoking in cars). The large sample size enables valid sub-group comparisons and further analysis could explore the degree to which ENDs use varies by ethnicity and school decile. However, like any survey, it has limitations and leaves important questions unanswered in relation to the initiation and uptake of smoking and vaping.

So how can NZ's research and monitoring be strengthened to complement data from the ASH Y10 survey? First, given the evidence that smoking uptake predominantly occurs not among 14-15 year olds but among an older age group, and this pattern is plausible for vaping also, we need, in addition to the ASH Y10, a survey that collects data from mid to late adolescence and into young adulthood, and that is designed to ensure equal explanatory power for Māori. The Youth 19 survey may provide important data on older secondary school students and includes a sample of young people who are NEET (Not in Education, Employment, or Training) or in Alternative Education. Vaping and smoking data on this group will be available in early 2020 and will improve our understanding of the uptake sequence of vaping and smoking. More extensive research sampling young adults who have left school may also be necessary to understanding vaping uptake. Such research is challenging, so other data, from interviews, online panels, intercept surveys at events,

and point of sale, will be needed to elucidate vaping levels amongst young people.

Second, given the rapidly evolving nicotine marketplace, and the potential for rapid change in usage patterns of vaping products (demonstrated by the rise of Juul in the US),[21] we need frequent as well as more comprehensive measures of young people's behaviour. For example, surveys could include measures of how young people perceive the benefits and risks of vaping (including around vaping of cannabis), and examine motivations and reasons for vaping, alongside measure of access and use. They could also include visual images, to reflect the rapidly changing technology now available.

Third, analyses of END's marketing via social media show these devices are endorsed as lifestyle consumer products, often with little reference to smoking cessation.[22] Monitoring the impact of high profile marketing campaigns and the proliferation of ENDS point-of-sales displays at retail outlets is crucial to inform policies that protect this age group from campaigns similar to those that enticed their parents to start smoking.[23 24]

Fourth, we need to initiate follow-up studies to explore whether vaping is associated with smoking initiation and uptake, after allowing for factors that may represent a common liability.

Finally, we must ensure our surveys use questions that feature young people's language.[25] Extensive pre-testing could check and, if necessary, refine existing questions and ensure these draw on constructs and words that are meaningful to respondents. There is always a tension between altering question wording and maintaining the ability to track trends over time, but if questions no longer match the behaviour they are attempting to estimate, they will not provide the evidence we need.

To return to our original question – is youth vaping a problem? On current evidence it is difficult to say for certain, though we do not believe the ASH Y10 Survey data is sufficient to allow us to conclude there is no problem. We lack a comprehensive picture of vaping prevalence among young people, lack in-depth data on vaping in this age group, and do not yet have the longitudinal data needed to explore the relationship between vaping and smoking initiation. Until we have clear data to show that youth vaping is **not** a problem, we suggest the Government's impending regulations should take a precautionary approach by including robust measures to protect young people by minimising marketing **and** availability of ENDS products to youth and young people.

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