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To members of the Select Committee on Tobacco Harm Reduction, Parliament of Australia:

I am making this public submission for the committee's consideration. By way of background, I am a professor emeritus and Dean emeritus from the University of Michigan School of Public Health, where I served on the faculty for 45 years. Trained as an economist, for over 40 years my research has focused on tobacco and health policy. I have participated in two dozen grants and contracts pertaining to tobacco control research and have published approximately 200 books, articles, book chapters, and commentaries on tobacco control. I served as the Senior Scientific Editor on the 25th anniversary Surgeon General's report on smoking and health and was the World Bank's representative to negotiations on the Framework Convention on Tobacco Control, the World Health Organization's first global health treaty. I am a past president of the international Society for Research on Nicotine and Tobacco and I am an elected member of the US National Academy of Medicine.

For the past several years most of my research has focused on issues pertaining to tobacco harm reduction, including specifically the implications of electronic- or e-cigarettes. Below I address three of the committee's terms of reference based on my research, as well as that of colleagues.

Item b: the impact nicotine vaping products have had on smoking rates in these countries, and the aggregate population health impacts of these changes in nicotine consumption

As a colleague and I describe in an article published just this month in *Nicotine & Tobacco Research*, several population studies in the US and UK indicate that use of e-cigarettes (vaping) has increased smoking cessation in these two nations by 10-15%. This is mathematically consistent with government-reported data indicating that e-cigarettes are now the most common aide to smoking cessation in both countries, combined with clinical trial evidence that e-cigarettes nearly double the rate of smoking cessation compared to governmentally-approved smoking cessation pharmaceuticals (with behavioral counseling in both cases). (References to all of these studies can be found in the linked article.)

The population health impacts can be estimated by simulation modeling. The link in the preceding paragraph describes my colleague David Mendez's and my most recent simulation findings, as well as identifying other similar studies. Considering 360 different possible scenarios, we conclude that through the remainder of this century vaping is likely to save millions of life-years that will otherwise be lost to smoking in the US. With regulations favorable to vaping (which do not exist in the US at present), tens of millions of life-years would be saved. Half of the 360 scenarios include the assumption (addressed below under item d) that vaping by non-smoking young people increases the smoking initiation rate by 10%, a figure higher than one would infer from the most pessimistic analyses. (We explain our derivation of the figure in supplementary material to the article.) In the 180 simulations that include this assumption, benefits exceed costs (in terms of life-years gained or lost) in all but 3 of the scenarios.

Item c: the established evidence on the effectiveness of e-cigarettes as a smoking cessation treatment

More trials are needed to confirm the existing evidence, but that evidence, including a major study by Hajek and colleagues published in the *New England Journal of Medicine*, indicates that vaping nearly doubles the odds of quitting smoking compared to governmentally-approved nicotine replacement therapy products. Importantly, the highly respected Cochrane Reviews has just published a paper in which the conclusion was that "There is moderate-certainty evidence that ECs [electronic cigarettes] with nicotine increase quit rates compared to ECs without nicotine and compared to NRT [nicotine replacement therapy products]."

Item d: the established evidence on the uptake of e-cigarettes amongst non- smokers and the potential gateway effect onto traditional tobacco products

In the US, youth have taken up vaping in large numbers, with 30-day prevalence of any use having jumped considerably from 2017-19 among high school students to 27.5%. In 2020, 30-day prevalence fell significantly to 19.6%. Frequency of use by those who vape has increased over time. However, frequency of use – and prevalence – are closely related to cigarette smoking status, with current and recent smokers more likely than never-smokers to use e-cigarettes and to be frequent users.

An important question is whether vaping serves as a causal "gateway" into smoking, i.e., whether otherwise never-smoking youth who vape are more likely to try cigarettes. A number of prospective studies have found that this is the case, although they cannot prove that the relationship is causal. That is, there may be a "common liability" that differentiates the kids who vape from those who don't; the former are more likely to try smoking anyway. With Dr. Lynn Kozlowski, I have identified problems with interpreting these studies as implying a gateway. Regardless of whether or not e-cigarette use might induce some young people to try cigarettes, that effect has to be very small: smoking prevalence among US high school students has declined at an unprecedented rate precisely during the period of vaping's ascendancy and is now at an historic low.

There are legitimate reasons to be concerned about the uptake of e-cigarettes by youthful non-smokers, both school-age children and young adults (primarily ages 18-24). (In the US, older adult non-smokers are very unlikely to take up vaping.) A challenge for policy makers is to weigh the potential risks of vaping for youthful non-smokers with the potential benefits for smokers who may find vaping a satisfactory way to quit smoking, which is clearly far more hazardous. (A recent report from the US National Academies of Sciences, Engineering and Medicine found that "Laboratory tests of e-cigarette ingredients, in vitro toxicological tests, and short-term human studies suggest that e-cigarettes are likely to be far less harmful than combustible tobacco cigarettes.") In the US, political and advocacy attention has focused nearly exclusively on the risks to kids, largely ignoring the potential benefits to adult smokers. I have discussed the issues and recommended how to think about them in a paper published in *Nicotine & Tobacco Research* last year.

I hope that this input will be useful for your deliberations.

Sincerely,

Kenneth E. Warner