Claims and evidence: How safe is vaping?

Earlier this year, there was a heated (sic) exchange in the Daily Maverick over the merits and demerits of e-cigarettes. Daily Maverick opinionista, Ivo Vegter, published an opinion piece calling on the World Health Organisation to support vaping and e-cigarette use as a positive harm reduction strategy. His position was criticized by a network of public health researchers, who argued that there was no evidence to support his position, but that, on the contrary, there were substantial grounds for public health concern if e-cigarettes were to be promoted without regulation. Vegter, in true Vegter style, took exception to these arguments. Here, we provide a point-by-point analysis of his claims which comprehensively rebutt (sic!) his arguments.

The landscape of e-cigarette politics and research is highly contested, given the enormous financial stakes at play. Public health researchers and activists need to familiarize themselves with the issues otherwise public policy decisions risk being made without adequate evidence. South Africa's National Department of Health is currently processing a bill that will introduce regulation of e-cigarettes and related vaping products. Watch that space for more smoke and mirrors – and be well informed!

The Vegter arguments

Ivo Vegter's 30 May entire piece is reproduced below in italics, with a point-by-point rebuttal, each argument supported with relevant URLs.

> *Let's start with McRobbie (2014), a review of the scientific literature which concludes that vaping helps smokers to quit, helps heavy smokers to reduce their cigarette consumption, and is not associated with significant adverse events.*

McRobbie and colleagues conducted a systematic review. Their conclusion was that e-cigarettes "help smokers to stop smoking long-term compared with placebo ECs. However, the small number of trials, low event rates and wide confidence intervals around the estimates mean that our confidence in the result is rated 'low' by GRADE standards." It was based on only two randomized controlled trials that met study standards. Moreover, it is not clear what McRobbie or Vegter consider 'long-term' since of the two RCTs, neither went beyond 12 months follow up.

The evidence that Vegter would like us to believe is confirmation that vaping helps smokers to quit is stated by McRobbie as follows: "The quality of the evidence overall is low because it is based on only a small number of studies. More studies of EC are needed."

Thirdly, Vegter does not add that the outcome assessed for this review was only whether smokers smoked cigarettes. The review did not look at whether the participants quit nicotine. Since nicotine is addictive, that is unlikely for the majority of study participants allocated to vaping.

An update by Hartmann-Boyce et al. in 2016 came to the same conclusion.

The update by Hartmann-Boyce came to the same conclusions because there were no new studies to add. It reviewed the very same 2 randomized controlled trials. They also published the same qualifier – that the "confidence in the result is rated 'low' by GRADE standards" and also noted that "… the long-term safety of ECs (e-cigarettes) is unknown." So, it is essentially the same study with the same methods and the same conclusions, not two new studies. Vegter is implying that two different studies came to the same conclusion. You can't present what is the same methodology using the same data as if they are different studies coming to the same conclusion. That is misleading.

Notably, neither meta-analysis drew conclusions about the efficacy of e-cigarettes versus other interventions for cessation because only one of the trials had a non-e-cigarette comparison (control) group. In that reviewed study, there was no significant difference.

In the British Medical Journal (BMJ), Beard (2016) concludes that e-cigarettes are positively correlated with the success of quit attempts.

This study was a time series study which is a design highly subject to confounding. It is not designed to answer the question of whether people who use e-cigarettes are more likely to quit. It only correlates the rate at which e-cigarette use in the population varies with success of quit attempts by anyone in the population. What it found was that if the prevalence of e-cigarette use increased in the smoking population from 2 to 4%, for example, then success of quitting amongst a thousand smokers was associated with 2 more people quitting smoking. We don't know if it is the e-cigarette users who quit. Moreover, other factors co-occurring with e-cigarettes (greater public awareness, greater medical attention) may have driven the quitting. This is known as confounding in epidemiology. Time series studies are useful to look at trends but are vulnerable to such confounding and cannot be directly used to attribute cause, as Vegter tries to do here.

Shahab (2017), funded by Cancer Research UK and published in the Annals of Internal Medicine, finds "substantially reduced levels of measured carcinogens and toxins" in vapers, compared to smokers.

The study by Shahab only examined carcinogens associated with tobacco smoking. Given the entire purpose of e-cigarettes is to avoid tobacco combustion, such a finding is hardly surprising. However, the fact that there are still significant (but lower) levels of known carcinogens (such as 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol [NNAL]) and Volatile Organic Compounds (including metabolites of acrolein; acrylamide; acrylonitrile; 1,3-butadiene; and ethylene oxide) is a clear conclusion of such a study. Moreover, the presence of known carcinogens in what people breathe is a rather worrying concern. Moreover, the study did not measure other potential carcinogens added to vaping fluid (such as flavourants), nor do any risk assessment nor take account of the penetration of e-cigarette vapour deeper into the respiratory tract compared to cigarette smoke. All this would be crucial to understand actual

toxicological risk, since there is evidence that the dose-response curve for the carcinogen 4-(N-methyl-N-nitrosoamino)-1-(3-pyridyl)-1-butanone is highly nonlinear, with substantial increases in risk at low doses.

Reduced levels of measured carcinogens and toxins means just that. What you chose to measure was reduced (and what you did not measure, you can't comment on) but that does not mean that e-cigarettes do not cause cancer. The best thing you can do to avoid cancer is not to vape at all under such circumstances.

> *In the BMJ's Journal of Tobacco Control, Stephens (2017) concludes that under ordinary circumstances, e-cigarette vapour has less than 1% of the carcinogenic potency of cigarette smoke.*

Firstly, Stephens' study is deeply flawed as it simply omits nicotine as a potential carcinogenic toxicant on the assumption there is currently no data on nicotine's carcinogenic potential, an assumption already under question in 2015. Since e-cigarettes are entirely and primarily designed to deliver nicotine deep into one's airway, this is a major flaw in Stephens' assessment. As we indicated in our original response, the International Agency for Research on Cancer, IARC, has made it an urgent priority to investigate nicotine and establish a monograph assessment of its cancer potential. There is no shortage of evidence which underlies IARC's concern that nicotine may be a carcinogen. A recent report in Nature concluded that e-cigarette vapours exhibited co-mutagenic and cancer-initiating effects in laboratory experiments with rats, prompting the authors to caution that "the erroneous belief that e-cigs are safe should be retracted and suitable measures implemented to protect public health." Even if the carcinogenic co-efficient of nicotine is determined as not particularly high, the very high concentrations of nicotine inhaled will inevitably send Stephen's estimates of carcinogenic potential out the window if nicotine was to be included.

Notably, Vegter also does not mention that Stephens' study also concluded that carcinogenic potency of e-cigarettes was 10-times that of nicotine inhalers, medical prescribed devices for quitting, making it 10 times more hazardous than current standard of care. Moreover, Stephen's study draws on no empirical measurements and does not factor into the study the variable additives, flavourants and agents added to vaping fluids.

Lastly, having lower carcinogenic potential does not address any of the non-carcinogenic risks associated with nicotine. To imply that e-cigarettes are 99% safer based on a modelled study that ignores nicotine in e-cigarette vapours is not scientifically valid.

> *It is notable that this claim is stronger than the position of Public Health England (PHE), which is that vaping is 95% less risky than smoking. The authors dispute the PHE position, but since it is not necessary to my arguments, I won't argue the point.*

Arguing the point would be helpful, since the PHE statement has been widely discredited in the literature. The critique of the PHE report is well summarized by Combes and Ball - it relied on

commissioned reports which were not peer-reviewed. It ignored undetected contaminants, by-products and other chemicals derived during solvent extraction that can have effects at very low dose levels; it used faulty toxicological assumptions and inappropriate data on likely adoption and use of e-cigarettes. In fact, the now infamous Public Health England meme of "95% safer" was based on the opinions of 12 individuals attending a single consultative meeting who reached this conclusion without citing any specific evidence.

As noted in a review by Drope and colleagues in the prestigious journal CA: A Cancer Journal for Clinicians, the PHE conclusion "… does not appear to have been calculated from any known toxicological, epidemiological, or other empirical data but, rather, represented the opinion of the committee." The claims for reduced risk from e-cigarettes have been criticized as not supportable because of inadequate data to make such a risk assessment.

This approach to policy making, eschewing science, is quite unprecedented especially considering that subsequent investigation revealed that the meeting had been sponsored by companies with close links to the vaping industry and that some of the co-authors on the report had conflicts of interest. The PHE statement has been described as "a classic example of the temptation of short-term gain irrespective of the possibility of long-term pain. It is dangerous, because the relatively greater safety of ECs has not been scientifically established — and regrettable …[because of] … the lack of safety data and the resulting inability to perform any sort of risk assessment of the type normally undertaken for consumer products, as well as doubts concerning the relevance of the data on the impact of ECs on smoking habits." Even then, the report is wildly overstated. The report's most ardent supporters, Vegter included, never bother to state the report's own qualifier that "A limitation of this study is the lack of hard evidence for the harms of most products on most of the criteria." A lack of evidence for harms is often mistakenly interpreted as evidence of the lack of harms. In any event, since the PHE report, there is now much more evidence accumulating regarding risks associated with e-cigarettes.

> *Bauld (2017) shows that most e-cigarette experimentation does not turn into regular use, and levels of regular use in young people who have never smoked remain very low.*

The study by Bauld was based on data from 5 cross-sectional surveys with very different designs (some school-based, some internet-based) and with participants from different combinations of locations. What the study showed was that the prevalence of ever use of e-cigarettes amongst smokers 11 to 16 years old rose from 67% to 74% between 2016 and 2017, an increase of about 10%. In contrast, never smokers rates of ever using e-cigarettes stayed at 4%. The odds of being an ever user of e-cigarettes is thus close to 20 times higher if you are a youth smoker. This is a staggeringly large association which Vegter appears to have missed. Such a finding is quite easy to reconcile with the idea that "most e-cigarette experimentation does not turn into regular use", but that does not mean that e-cigarette use is not associated with regular smoking – in fact, the data suggest quite the opposite. While most youth do not get into smoking cigarettes, the association between regular smoking and trying e-cigarettes is very high. Of course, these associations are only cross-sectional and liable to bias, as is the idea

that 'most e-cigarette experimentation does not turn into regular use' without proper cohort design. But is it completely incorrect to interpret the findings by Bauld as suggesting that e-cigarette use is harmless.

In contrast to cherry picking cross-sectional studies, there are many cohort studies, following up large populations of adolescents and adults, showing strong evidence that e-cigarette use is a risk factor for subsequent cigarette smoking. For example, Barrington-Trimis and colleagues showed that amongst 6258 adolescents in California and Connecticut followed up from 2013 to 2016 who were non-smokers of cigarettes at baseline, e-cigarette users were 4.5 times more likely to experiment with cigarettes, 4.3 times more likely to become infrequent users and 3.5 times more likely to become frequent smokers at follow up. Any basic understanding of epidemiology recognizes that no cohort study is unconfounded but also recognizes that a cohort design is much more valuable in interpreting causality than the series of cross-sectional data assembled by Bauld and colleagues.

> *In the New England Journal of Medicine, Hajek (2019) finds that e-cigarette users are almost twice as likely (18%) to quit successfully as people who used traditional nicotine-replacement therapy (9.9%).*

Firstly, the study by Hajek included participants who had previously failed nicotine-replacement therapy. In fact, 75% of the participants were previous treatment failures. Running a trial in this selected group is (a) almost certainly likely to find a positive effect for a new treatment and (b) not generalizable to the general population. It is like doing a trial of a new weight-lowering medication compared to diet amongst a sample of people in which 75% have previously tried to lose weight by dieting but failed to do so. It's pretty likely that you will show an effect of the medication since you are testing it in a population who are refractory to success by diet. So, Hajek's study is far from proof that e-cigarette users are more likely to quit rather than showing that those who have failed previous traditional nicotine-replacement therapy might successfully quit using e-cigarettes. This is a different answer to a different question. It speaks to the use of e-cigarettes as a treatment modality, not as a preventive technology.

Secondly, the Hajek study did not take as its end point quitting tobacco products but quitting cigarettes only. Those in the e-cigarette group were more likely than those in the nicotine-replacement group to use their assigned product at 52 weeks (80% [63 of 79 participants] vs. 9% [4 of 44 participants]), which is of concern as the differential pattern raises concerns about the health consequences of long-term e-cigarette use.

Lastly, the trial was conducted in the UK as part of an NHS treatment service for smoking cessation including behavioural support and its results are therefore not generalizable to other settings. It has little relevance to the recreational product use promoted by Vegter, which has no clinical supervision or behavioural support.

As for whether e-cigarettes are more effective than other nicotine-replacement therapies, the conclusion of the National Academy of Science review is simple – "There is **insufficient**

evidence from randomized controlled trials about the effectiveness of e-cigarettes as cessation aids compared with no treatment or to Food and Drug Administration–approved smoking cessation treatments."

Quoting a single NEJM article in favour of e-cigarettes is not the best science when the evidence is contradictory. For example, Weaver and colleagues found that there is no evidence that Electronic Nicotine Delivery Systems (ENDS) use helps adult smokers quit at rates higher than smokers who did not use these products. Moreover, at a population level, a systematic review found that smokers who use e-cigarettes are, on average, *less likely* to quit smoking.

> *We go back to the Journal of Tobacco Control for Hallingberg (2019), which concludes that e-cigarettes are not associated with a renormalisation of smoking, even during a period of rapid, unregulated growth in the sale and use of e-cigarettes, and that fears of a resurgence of tobacco smoking among teenagers as a result of vaping are unfounded.*

A systematic review of nine cohort studies quantifying the effect of starting tobacco use with e-cigarettes on progression to smoking conventional cigarettes found that e-cigarette use increased the risk of subsequent cigarette smoking four fold. In the US, the concerns about e-cigarette as a gateway to cigarette use are real. Why else would the US Surgeon General caution that e-cigarettes are "now a major public health concern", citing five longitudinal studies (Leventhal et al. 2015; Primack et al. 2015; Wills et al. 2016; Barrington- Trimis et al. 2016; Unger et al. 2016), suggesting that e-cigarette use is related to the onset of cigarette smoking and use of other combustible tobacco product use in youth and young adults. A 2018 National Academy of Sciences review confirmed that, based on consistent evidence from all 10 studies that met inclusion criteria, supported by supplementary lines of evidence, "there is **substantial evidence** that e-cigarette use increases risk of ever using combustible tobacco cigarettes among youth and young adults."

Hallingberg's study is a UK study where rates of vaping are noted to be low. Regular vaping amongst youth is reported at 3% or less – this is, in fact, from a study Vegter cited but appears not to have read. It is hard to imagine demonstrating a 'renormalisation' when between 1 and 3% of adolescents are using e-cigarettes. In contrast, US studies report that E-cigarette use has been "growing an astounding 900% among high school students from 2011 to 2015" and that in 2015, 16% of high school learners reported using e-cigarettes in the past month. More recent estimates put that figure at 21%, an 'exponential' rise.

In any event, Hallingberg's analysis is again based on a weak design, comparing time trends, and their conclusion is far more modest than the twist Vegter gives the study. All it showed was that during a period when e-cigarette availability grew widely, there was no apparent reversal of the trend in decline in cigarette smoking, indicating that there was no 'renormalisation'. The 'fears of a resurgence of tobacco smoking amongst teenagers' being 'unfounded' are entirely Vegter's words, not those of the researchers.

All my claims are supported by the academic literature, of which one might expect academics who claim to specialise in the field to be aware.

Vegter should expect rigorous evidence to support claims. This is provided in both our previous and current responses to his opinions. In contrast, Vegter's own claims are the ones not supported by a critical examination of the literature, and, in fact are based on very weak studies.

To accuse me of "deliberate misinformation" is therefore malicious and false.

Perhaps we are wrong in thinking it was deliberate misinformation, because on closer examination, it appears that Vegter does not actually understand the literature he claims as evidence. Vegter's bio on the Daily Maverick website does not indicate he has any qualifications in epidemiology or toxicology so it is not surprising he cannot understand how a set of data drawn from repeat cross-sectional studies is a much weaker study design than a cohort observational study following the same individuals over time, nor that a study modeling carcinogenic potency and summing the effects of various agents is fatally weakened by lack of data on the principle component of vaping fluid and inhaled vapours – viz. nicotine. However, if Vegter insists on continuing such misrepresentation, having had the science explained to him, then it would amount to deliberate misinformation.

These sources also directly contradict the claims they make themselves, for which they, incidentally, provide almost no evidence whatsoever.

In the scientific literature, it is normal to expect contrary findings. The key to scientific understanding is to exercise a modicum of critical analysis to understand contrary finding. As illustrated, all the studies cited above by Vegter are not strong support for the claims he tries to advance. All the studies on which we relied in our first response were available to the Daily Maverick and all the evidence we cite here is clearly hyperlinked.

They say there is "considerable evidence" that e-cigarettes have "introduced new toxic hazards" and "accentuated the problems associated with nicotine as a toxic agent", but they don't actually cite any. The latter is far-fetched. The former is plausible, but no discussion of toxic hazard is complete without also mentioning the degree of risk. There's toxic hazard in your shower gel. There's toxic hazard everywhere.

Firstly, there is zero dispute in the scientific literature that e-cigarettes have introduced new toxic agents. The additives in the form of flavourants are not innocuous. Diacetyl is known to be associated with a fibrosing lung disease in exposed workers but is being added freely to vaping liquids without any toxicology-based regulatory action. Propylene glycol and alcohol are added to e-cigarettes as base e-liquid ingredients or to dissolve flavourants. Secondly, nicotine is an addictive psychoactive substance. It is not harmless and it is not shower gel. It is used as a neurotoxic insecticide in agriculture and has a range of adverse health consequences. IARC has

yet to assess whether it is a carcinogen but there is sufficient experimental evidence for IARC to elevate it to a priority for development of an IARC monograph on its carcinogenicity.

> *This claim is misleading, and in any case, unsubstantiated.*
> *They say that I claimed e-cigarettes were designed to help smokers stop and that this claim is inaccurate. But I made no such claim. I never said for what purpose they were designed. I merely cited scientific evidence that they do help some smokers quit, and are twice as good at it than conventional therapies.*

There is likely to be a place for e-cigarettes as part of supervised quit programmes. But Vegter was not calling for including e-cigarettes as a medical treatment, he was asking the WHO to support the widespread and unregulated availability of e-cigarettes for recreational use to reduce harm. He has not produced the evidence to support such a claim.

> *They make the unsubstantiated claim that "e-cigarettes have emerged to maintain the industry's market share" because fewer people are using tobacco. This is patently false. The tobacco industry had nothing to do with the invention and development of e-cigarettes. They were invented by Herbert A Gilbert in 1963, who had no association with the tobacco industry and whose only goal was to create a healthier alternative to smoking. His invention was never commercialised. The modern e-cigarette was patented in 2007 by Hon Lik, a pharmacist in the Chinese Traditional Medicine tradition, who was inspired by his own smoking addiction and his father's death of lung cancer to develop a safer alternative to tobacco products. They were developed by multiple independent producers, and for years were dismissed by tobacco companies as a fad. Only recently have tobacco companies shown any interest in e-cigarettes.*

On this point, Vegter is both creating a straw diversion and plain wrong. Firstly, we actually never claimed that the industry invented it, nor that they patented it. Nonetheless, it is the case that Philip Morris (PM) started research into developing a precursor to the modern e-cigarettes many years before Hon Lik (Dutra, Grana and Glantz, 2017) as emerged from the analysis of tobacco industry documents. Even before 2013 PM had, in 1994, developed a capillary aerosol generator similar in technology to a modern-day basic e-cig. E-cigarettes have thus been identified by Big Tobacco as a growth opportunity at a time that the Framework Convention on Tobacco Control has put brakes on corporate ability to market their tobacco products at will. So, it would seem we agree on this point that it is in recent years that Big Tobacco has made it their business to promote e-cigarettes.

> *And so what if they do? I'm all for tobacco companies selling things that do less harm than tobacco products and actually help people to quit smoking. My argument is about public health, not an emotional vendetta against the tobacco industry.*

Our argument is also around public health. It is precisely because of the long-term consequences for population health that we believe promoting unregulated recreational e-cigarette use as harm reduction is currently not supportable. For individuals seeking to quit, e-

cigarettes may possibly play a role, but to argue that e-cigarettes should be freely available because of public health benefit is seriously misinformed.

> *It should also be noted that the biggest lobbyist for regulating e-cigarettes as tobacco products – as South Africa proposes to do – was the tobacco industry.*

It is strange that Vegter argues that the tobacco industry welcomes regulation of e-cigarettes because that is not what the tobacco industry submitted in their comments to the Department of Health when the latter put out the Draft Control of Tobacco Products and Electronic Delivery Systems Bill for comment. As we are informed, the Tobacco industry submissions were uniformly opposed to the regulations proposed in the Bill. Unless Vegter has inside information not available to the public, we can only assume this is hearsay.

> *The other big lobbyist was the pharmaceutical industry, which wanted them regulated as pharmaceutical products. Both wanted that regulation because it would hamstring their competition. It is ironic that an anti-tobacco group is lobbying for the same policies as the tobacco industry lobbied for itself.*
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> *One of the only two scientific studies our activists bother to cite is one that I also cited, namely Hajek (2019). They choose to highlight the finding that 80% of ex-smokers who quit using e-cigarettes were still using them a year later, compared to 9% of former smokers who used conventional nicotine-replacement therapy (NRT). This, they cite in support of their argument against e-cigarettes.*
>
> *What they neglect to mention is the headline conclusion from that study: that the one-year success rate for e-cigarette users was 18%, compared to 9.9% for NRT users. Ignoring the primary conclusion of a study because it contradicts their view is, to use their phrase, "deliberate misinformation".*

The point that Vegter fails to grasp is that if you want people to quit, you have two choices. You can expect that they will stop all tobacco product consumption, or you can anticipate that they will replace tobacco with nicotine and continue as nicotine users (addicts). Which outcome do you consider a success? If the latter, well, then an outcome where 80% of smokers are still nicotine users would be a good outcome. But if the purpose is quitting tobacco products, then it is a hopeless outcome. In any event, the Hajek study is not generalizable as we pointed out, because the majority of participants were previous nicotine replacement treatment failures. It's a common theme that e-cigarette studies suggest short – term benefits but show no impact in quitting either cigarettes or all tobacco products over the long-term.

> *If they want to mention secondary conclusions, they should also point out that although e-cigarette users reported a little more throat and mouth irritation than NRT users (which stands to reason), they also reported a little less nausea, as well as less coughing and phlegm production. Based on those results, I'd choose e-cigarettes over NRT any day, even if I'm still vaping a year later.*

> *The only other academic study they cite is in support of the claim that "e-cigarettes create new health risks". It found that daily e-cigarette users (but not former users, or occasional users), had 1.79 times the risk of heart attacks than those who smoked neither tobacco nor e-cigarettes. What they neglect to mention is that this risk was much lower than that in cigarette smokers (including former and occasional smokers), which had 2.72 times the baseline risk. The study, therefore, does not support their claim of "new health risks". On the contrary, it supports the view that e-cigarettes pose less risk than tobacco products.*

Other health risks linked to e-cigarettes are multiple, including, by way of example, a) the potential for inducing pulmonary inflammation, albeit much less than smoking; b) impacts on children's respiratory health including the effects of prenatal exposure; c) cardiovascular harms; d) Animal studies suggesting maternal exposure is associated with cognitive and epigenetic alterations in newborns; and e) adolescent cognitive and social impairment. The risk of e-cigarettes exploding due to battery failure in the US has been of sufficient magnitude to warrant calls for urgent improvements in surveillance of e-cigarette injuries and regulation of e-cigarette devices.

> *They quote a random paediatrician, who says there is increasing but unspecified evidence "showing that both nicotine and the aerosols from these products result in harm such as pulmonary inflammation, impaired immunity and reduced lung function". Why this guy has any standing to say so is beyond me. In any case, all he is saying is that there is some risk. Nobody – not even e-cigarette manufacturers – denies this. What the good doctor does not say is how big the risk is, compared to the risk of smoking cigarettes. Therefore, he does not contradict anything I wrote in my column in support of e-cigarettes.*

Vegter is not following. Acetyl, for example, is not present in tobacco smoke. The chemicals 2,3-pentanedione and acetoin are not present in tobacco smoke. These introduce new inflammatory risks in the lungs.

> *"Studies have also shown that young people are increasingly progressing to smoke cigarettes after trying out electronic cigarettes," our intrepid activists parrot. "Global evidence suggests e-cigarettes are a gateway to the use of other tobacco products, especially among adolescents."*
> *They don't cite any of this supposed evidence, and the actual evidence I cited directly contradicts these claims.*

Actually, Vegter quotes one study undermined by a design that provides very weak support for his claim and a second study, examining a very specific hypothesis related to 'normalisation" which he misinterprets as evidence for claiming that "fears of a resurgence of tobacco smoking among teenagers as a result of vaping are unfounded." Neither study contradict the evidence we cite, since they are based in the UK where vaping rates are very low.

On the other hand, here is the evidence from settings where vaping rates have been exploding: The US National Academy of Sciences: "there is **substantial evidence** that e-cigarette use increases risk of ever using combustible tobacco cigarettes among youth and young adults." The US Surgeon General: "E-cigarette use is strongly associated with the use of other tobacco products among youth and young adults, including combustible tobacco products." Does Vegter really believe the US Surgeon General is too stupid to understand the science of e-cigarettes, or should we rather rely on Vegter's opinion in this matter?

> *The activists' primary claims – that e-cigarettes pose a substantial risk of harm compared with tobacco products, are not useful as quitting aids, and encourage young people to smoke tobacco – are exposed as misleading propaganda under even the most cursory scrutiny.*

We would welcome it if Vegter were actually to read the articles that he cites (and the ones we have cited) rather than relying on skimming the abstracts, which is what he seems to have done. Once he has done that, he will see that e-cigarettes do pose a substantial risk of harm even compared with tobacco products. Promoting e-cigarettes as quitting aids is very different from encouraging their unregulated use. What is beneficial in an individual context can be disastrous in a population context. And, most certainly, encouraging widespread use of an addictive substance, nicotine, to replace smoking tobacco may generate new problems as well as exacerbate the existing epidemic of tobacco-related disease.

> *Instead, the scientific evidence supports my allegedly "unsupported and incorrect" claims.*

We disagree and have systematically dissected where Vegter's arguments are wrong and provided more than enough evidence.

> *Their accusation that I spread "deliberate misinformation" is false, and therefore defamatory.*

Defamatory implies that the argument is false. Now that we have read Vegter's response and the material he bases it on, we are not sure if he is spreading misinformation deliberately. He is most certainly spreading misinformation, since he is wrong on almost all his claims. If he persists in repeating unscientific inference, then we can only conclude it is deliberate.

> *Far-reaching restrictions on the sale and advertising of e-cigarettes in the face of this mounting evidence would be against the interests of public health.*

This may be his opinion, but the mounting evidence is in the opposing direction.

> *Advocating such restrictions, as the mysterious Tobacco Control Advocacy Alliance does, is in my view deeply immoral.*

This was a discussion about the science of e-cigarettes. Immoral is what the Tobacco Industry is – having lied to the public and knowingly deceived the world about the carcinogenic effects of their products for decades. Immoral is what a vaping company is when it knows that its product is creating an addiction epidemic amongst teens but it elects to ignore possible engineering modifications to e-cigarettes which would limit the dosage of nicotine delivered through its products.

> *But then, what would one expect from propagandists who aren't afraid to stoop to defamation?*

Vegter's byline of the Daily Maverick website at one point claimed Ivo Vegter is a columnist "who is seldom wrong." This must have been one of those occasions since the byline is no longer to be found on his Daily Maverick page.

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Leslie London, University of Cape Town
Peter Delobelle, University of the Western Cape
Catherine Egbe, SA Medical Research Council
Savera Kalideen, National Council Against Smoking

Tobacco Control Advocacy Alliance