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Should the European Union lift the ban on *snus*?

Evidence from the Swedish experience

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ABSTRACT

The very low smoking prevalence in Sweden has received considerable attention. Sweden was the only country in Europe to reach the World Health Organizations' goal of less than 20% daily smoking prevalence among adults by year 2000. Only 17% of Swedish men smoke. Some have argued that this has been achieved because Swedes use another form of tobacco instead. Sweden has a high level of use of a moist snuff product called '*snus*'. Nineteen per cent of adult men and 1% of women are daily users and the trend is increasing. Epidemiological studies have failed to find evidence that *snus* causes cancers, including oral cancer. Its adverse effects on the cardiovascular system are debated, but are certainly less than those of smoking. Recent studies among former smokers indicate that many men have quit smoking using *snus*. Forty-seven per cent of current *snus* users are former smokers and 28% of ex-smoking used *snus* at their last attempt to stop smoking. The association between high *snus* consumption and low smoking prevalence has been debated and challenged. It has been argued that *snus* may be a gateway to cigarette smoking. Recent data has found that among those starting tobacco use in the form of *snus*, 20% later go on to smoking while the same risk for those not starting with *snus* is 43%. On balance, there is reason to believe that having *snus* available to the Swedish population has been of benefit to public health. Repealing the ban on *snus* in the rest of the European Union might also have some positive effect, depending on the marketing.

KEYWORDS Gateway, safety, smoke-free tobacco, smoking cessation, *snus*.

INTRODUCTION

Tobacco use is dependence-producing and can be very harmful when the tobacco is smoked. Every second life-long smoker dies prematurely with a life-span shortened by, on average, 16 years [1]. The most common disease categories caused by tobacco smoking are respiratory and cardiovascular disorders and cancer. Smoke-free tobacco (SFT), such as chewing tobacco and moist snuff, has been reported to be linked with considerable harm, e.g. oral cancer [2]. It is mainly for this reason that the European Union (EU) has banned certain types of SFT. When Sweden joined the EU it negotiated an exemption from this ban. Around 15% of Swedish males were using '*snus*' (the Swedish version of the SF product) at that time. Since then the use of *snus* in Sweden has increased steadily,

while cigarette smoking has decreased. The *snus* ban has been challenged and referred recently to the European Court of Justice by local courts in Germany and the UK.

The purpose of this paper is to analyse the special situation of *snus* use in Sweden with regard to (a) the epidemiology of tobacco use particularly in males, (b) health risks and (c) whether use leads to more or less smoking, i.e. the so-called gateway process.

THE EPIDEMIOLOGY OF TOBACCO USE IN SWEDEN

In Sweden in 1980 36% of men and 29% of women between age 16 and 84 years smoked daily. Since then a steady decline has occurred, particularly among men. In

2000 17% of men and 21% of women were daily smokers. This is by far the lowest prevalence of smoking in Europe. The men have reduced their prevalence steadily by at least half a percentage point per year since 1985. More recent surveys, not yet analysed fully, suggest that the downward trend in smoking is continuing.

The daily smoking situation among adolescents also seems favourable compared with most other countries. In 2000 10% of boys and 15% of girls aged 15–16 years smoked [3].

However, the tobacco/nicotine use picture is not complete unless the use of *snus* is taken into account. In 1999 19% of men were daily *snus* users. For women the figure was 1% but in the very northernmost part of Sweden, where *snus* use is most prevalent, 6% of women were daily *snus* users [4]. Among adolescents (15–16 years old) 17% of boys and 0% of girls reported daily *snus* use in 2000. Recent surveys indicate that use of *snus* is increasing, both among men and women. While smoking is more prevalent in more deprived socio-economic groups no such association is evident with *snus* use [3]. Among physicians the prevalences of smoking and *snus* use were 6% and 11%, respectively, in 2001 [5]. The total consumption of cigarettes and *snus* in 1970 was 9187 tonnes, the weight of cigarettes being calculated using a conversion factor of 0.65 g per cigarette. Cigarettes accounted for 6675 tonnes and *snus* 2512 tonnes. In 1999 the total figure was 10170 tonnes. However, cigarette tobacco was down to 4479 tonnes and for the *snus* the consumption had more than doubled to 5691 tonnes [3].

In 2000 the first author estimated that each Swede over 15 years consumed on average 1.7 g of nicotine. Of the total amount of nicotine consumed, around 11 700 000 g, 46% came from *snus*, 2% from nicotine replacement products (NRP) and 52% from cigarettes. Among men the larger part of consumed nicotine comes from unburned sources. The underlying assumption was that from each cigarette and gram of *snus* 1 mg of nicotine was absorbed.

SNUS AND HEALTH EFFECTS

There are many different types of SFT, from the highly standardized production of *snus* through chewing and plug tobacco and moist snuff products sold in the United States to more or less homemade forms of SFT in, e.g. Sudan and India that can contain much higher concentrations of carcinogens such as nitrosamines. In contrast to the most common form of SFT in the United States, moist snuff, the Swedish *snus* is not fermented and it is more or less sterilized before packaging by heat treatment. Even among different types of SFT products

manufactured in Europe and the United States the risk of oral, pharyngeal and larynx cancer vary among reports and products. In a recent meta-analysis the highest risk was associated with use of dry snuff and the lowest with moist snuff, the latter apparently carrying no detectable increase in risk [6]. The safety data summarized briefly below pertain only to the Swedish product *snus*.

Cancer

Two case-control studies have investigated the risk of oral cancer in Swedish *snus* users [7,8]. In both studies *snus* found no increased risk of oral cancer while smoking and alcohol were associated with increased risk. In fact, the incidence of oral cancer in Sweden is among the lowest in Europe [9]. Lagergren *et al.* [10] found heavy smoking but not *snus* use to be associated with gastric carcinoma and oesophageal carcinoma. Similarly, Ye *et al.* [11] found no increased risk for gastric cancer among *snus* users. In two other studies analysing cancer at all sites no increased risk among *snus* users was found compared with non-tobacco users [12,13].

Cardiovascular risk

In a Swedish cohort study of construction workers carried out during the 1970s it was found that *snus* users had an increased risk of dying from cardiovascular disease, although the risk was lower than in cigarette smokers [12]. In the WHO cardiovascular risk factor project in northern Sweden two case-control studies investigated whether *snus* use was associated with myocardial infarction. No such increased risk for myocardial infarction could be observed [14,15]. From the many studies on the effect of *snus* on cardiovascular risk factors it seems that the risk factor profile of *snus* users is closer to non-tobacco users than to smokers [16–20]. With other disorders much less is known, but there are some data suggesting that *snus* use can lead to increased risk of type 2 diabetes [21].

In summary, it seems clear that while smoking tobacco is the skyscraper in terms of health risks the use of *snus*, although not risk-free, is a two-storey building and on a par with risks from many other unhealthy habits or products.

IS SNUS A GATEWAY TO SMOKING OR A ROUTE AWAY FROM SMOKING?

A potential issue with *snus* use in adolescents has been that it might lead to cigarette smoking. It has been argued that some people who would not have smoked would become smokers because they had first used *snus*. Ram-

ström [22] reported that among 18–34-year-old men, 25% of those starting with *snus* switched to cigarettes. Half of that 25% then stopped smoking within a few years and the other half continued smoking. Among those starting with cigarettes 40% switched to *snus* and the other 60% continued smoking. In a very recent study of a nationally representative sample of 6700 Swedes aged between 16 and 79 years and sponsored by The National Institute of Public Health it was found that of all Swedish males 15% started tobacco use with *snus*. Of the *snus* starters, 3% then switched to smoking and the other 12% maintained *snus* use. Ever daily smoking among those starting with *snus* was thus $3/15 = 20\%$. Of the 85% of the males who did not start with *snus* 37% went on to start smoking, which gives an ever daily smoker ratio of $37/85 = 43\%$. Looking at it in another way, of all current daily smokers 6% had started with *snus* and 94% with smoking [23]. Two recent studies among young boys (11–16 years) using *snus* have shown that parallel cigarette smoking is common as well as the risk behaviours that usually goes with smoking [24,25]. One of the studies [24] is a prospective study and will give information on what tobacco product is finally preferred.

It is also increasingly evident that *snus* is used as a product to aid smoking cessation. Forty-seven per cent of current *snus* users in 2001 were found to have been smokers previously, according to a study commissioned by Swedish Match, the manufacturer of *snus* [26]. In another study, commissioned by The Swedish Cancer Society and the Pharmacia Corporation [27], 1000 ex-smokers were asked about their quitting methods. It was found that 50% had not used any help to stop, 33% had used *snus* and 17% NRPs at some quit attempt. Twenty-eight per cent of men had used *snus* at the last quit attempt. In a more recent study [23] it was found that among males using a cessation aid at the last quit attempt, 55% used *snus*. For females the figure was 15%. The non-smoking rate after use of *snus* was 65% for males and 52% for females. For nicotine gum and patch the figures were 46% and 32% for males and 37% and 30% for females, respectively. That many smokers seem to stop with the aid of *snus* is also supported by data from local studies in Northern [4] and Southern [28] parts of Sweden. In Sweden it seems that *snus* is used at least as often as NRPs for quitting smoking and is also at least as effective.

A special feature with *snus* seems to be that those more vulnerable to smoking-related disease, i.e. the highly dependent smokers, have had the same chance of giving up smoking as those lower in dependence when *snus* has been used as a method of quitting smoking [29]. When smokers try to stop without help the likelihood of giving up is related directly to the strength of the nicotine dependence [30]. One explanation for *snus*' apparent efficacy as a smoking cessation aid might be the similarity in

nicotine concentrations obtained from *snus* and cigarette smoking [31].

It is difficult, if not impossible, to give a precise estimate as to what extent *snus* is responsible for the very low and declining smoking prevalence, 17% (2000), in Swedish men. A number of factors determine smoking in a society, such as attitudes to smoking, cigarette price, laws and regulations, information to the public and awareness of the harmful effects of smoking. It is surprising that the use of *snus* has increased so much in Sweden over the past 20 years, despite all warnings and campaigns against it. Few public health advocates, including the governmental agencies, have up to very recently not admitted any reduced harm from *snus* compared with smoking. On the other hand, it is also hard to find other factors or variables that would have made Sweden so special, 19% of the adult population smoking regularly while adult smoking prevalence is 31% in the neighbouring countries of Norway and Denmark. Sweden has not been in the forefront with regard to laws or regulations against smoking until quite recently, when smoking regulations have been brought up to the best of the European standards. In fact, *snus* has been included alongside cigarettes in many information campaigns. However, what is known is that among today's *snus* users 47% are former smokers. Would these smokers all have managed stopped smoking had *snus* not been available? Possibly not, as among the former smokers now using *snus* there are many highly nicotine-dependent individuals that would have found it difficult to be without tobacco/nicotine [29]. It is also known that some smokers do not have giving up tobacco as their main goal, but conform to what is becoming the predominant use of tobacco or just use a less harmful tool for providing them with the nicotine. The other question is whether any of the other 53% that have only used *snus* would have smoked if *snus* had not been available. Again, there are no data to answer this, but it seems reasonable to suppose that at least some *snus* users would have smoked.

If the use of *snus* was one-tenth as harmful as smoking, the product would need to be used at least 10 times more often in order to offset its benefit to public health.

The relatively low prevalence of smoking in Swedish females (21%) despite any substantial use of *snus* appears to go against the role of *snus* in reducing smoking prevalence. This prevalence compares very favourably with that of the women in the neighbouring countries of Norway (32%) and Denmark (29%). There are European countries, e.g. Italy, Portugal and the Czech Republic, that have even less smoking among women [32]. However the fall in women's smoking prevalence is not nearly as steep as the fall seen among men. It is also possible that the reduction in smoking prevalence among men may have influenced women's smoking patterns positively. Low smoking visibility may promote low smoking prevalence.

How many smokers would there be among Swedish males if *snus* had been banned in Sweden 1992? This is, of course, an unanswerable question but the fact is that 15% of adult men were using *snus* daily at that time. If there had been no more *snus* on the market it is likely that at least some would have turned to cigarettes. If we assume that 50% had turned to cigarettes we would have seen an increase in prevalence of 7.5% in cigarette smoking, from 24.3% to 31.8%.

Because roughly 50% of *snus* users were former smokers, this figure is not unrealistic. A smoking prevalence of approximately 32% among males in Sweden would have been close to its neighbours, Denmark and Norway. Assuming a yearly reduction in prevalence of 0.5% from 1992 the smoking prevalence would have been approximately 27% in 2002. On the other hand, if none of the *snus* users today had been smokers we would have had a smoking prevalence of 14% (17–3% = 14%).

The authors are aware of the delicate situation when arguing for a positive impact of *snus* and that this may be seen as playing in the hands of tobacco manufacturers. The 'Swedish experience' has been evident for many years, but silence prevailed among anti-tobacco activists until scientists began focusing on the record low smoking prevalence among Swedish men. To some extent, the scientific evidence gathered on *snus* was a reason for Action on Smoking and Health in the United Kingdom, together with a group of researchers to petition the EU that products that deliver nicotine in a less harmful form than cigarettes should be regulated rather than banned (<http://www.ash.org.uk/html/regulation/html/eusmokless.html>). If the availability of certain products play into the hands of tobacco manufacturers and public health interest simultaneously, then public health interest must take priority. The main objective with tobacco control must be to reduce death and disease.

In conclusion, there is clearly no certainty with regard to whether continued *snus* availability has helped Sweden to reduce its smoking prevalence in men; however, the fact that few *snus* users go on to become smokers while many smokers use *snus* to stop smoking suggests that, on balance of probability, *snus* has played a beneficial role. Taken together with the epidemiological evidence that Swedish *snus* is considerably less harmful than cigarettes, and that oral cancer in Sweden is less than in countries with higher smoking rates but lower SFT prevalence, suggests that not banning *snus* has probably been beneficial to Swedish public health. If the European Union were to repeal the ban on *snus* in other countries, it is far from clear what would happen—repealing a ban on a product is not the same as not banning in the first place. However, a credible case can be made that it would have a modest beneficial impact on cigarette smoking and thus reduce the burden of tobacco

related disease, the more so if the EU were to regulate the concentration of toxic compounds allowed in the products.

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