

## SHORT COMMUNICATION

# The Decline of Smoking in Northern Sweden

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### Abstract

For decades men in Sweden have smoked at far lower rates than those in comparable countries. Previous studies showed that snus use played a major role in low smoking rates among men in northern Sweden; daily smoking declined from 19% (95% CI 16–22%) in 1986 to 11% (CI 8.9–14%) in 1999. The prevalence of smoking among all men is now 9% (CI 7.0–11%) and only 3% (CI 0.1–5.4%) among men age 25–34 years; the prevalence of exclusive snus use is 27% (CI 24–30%) and 34% (CI 27–42%) respectively. Combined smoking and snus use, an unstable and transient category, was under 5% in all surveys and was 2.2% (CI 1.4–3.4%) by 2004. For the first time snus use is also associated with a decrease in smoking prevalence among women. These patterns of tobacco use have implications for all smoking-dominated societies.

**Key Words:** *smoking, trends, snus, moist snuff*

Cigarette smoking has been the predominant form of tobacco consumption in almost all developed countries for over a century. One notable exception is Sweden, where for decades men have smoked – and died from smoking-related illnesses – at far lower rates than those in comparable countries [1]. Until recently there was little interest in the low smoking rate among Swedish men, although it was generally known that many use snus, a form of moist snuff. Two recent reports showed that snus use played a major role in lowering smoking rates among men in northern Sweden from 19% in 1986 to 11% in 1999 [1,2]. This study documents a further decline in smoking over the past five years and also shows for the first time that snus use is associated with a reduction in smoking prevalence among women.

This study used data from the Northern Sweden component of the World Health Organization MONICA (Multinational Monitoring of Trends and Determinants in Cardiovascular Diseases) study. Details of sampling and subject selection have been published elsewhere [1]. Briefly, the

dataset contains information from five population-based surveys conducted in 1986 ( $n=1,583$  subjects), 1990 ( $n=1,561$ ), 1994 ( $n=1,531$ ), 1999 ( $n=1,415$ ) and 2004 ( $n=1,869$ ). Men comprised 49% of the study population. Subjects were randomly selected from population registers, stratified for age (25–64 years in the first two surveys, 25–74 in the others) and gender, in the two most northern Swedish counties, Norrbotten and Västerbotten (target population 320,000 in 1999).

In addition to the questions regarding cigarette smoking on standard MONICA surveys, the Northern Swedish version included detailed questions regarding snus. We classified subjects as smokers if they smoked at least one cigarette daily, as snus users if they used any amount each day, or as combined users if they used both products [1]. This study was approved by the Ethical Research Committee at Umeå University.

Figure 1 shows the prevalence of tobacco use among men and women, aged 25–64 years, from 1986 to 2004. Among men the prevalence of all

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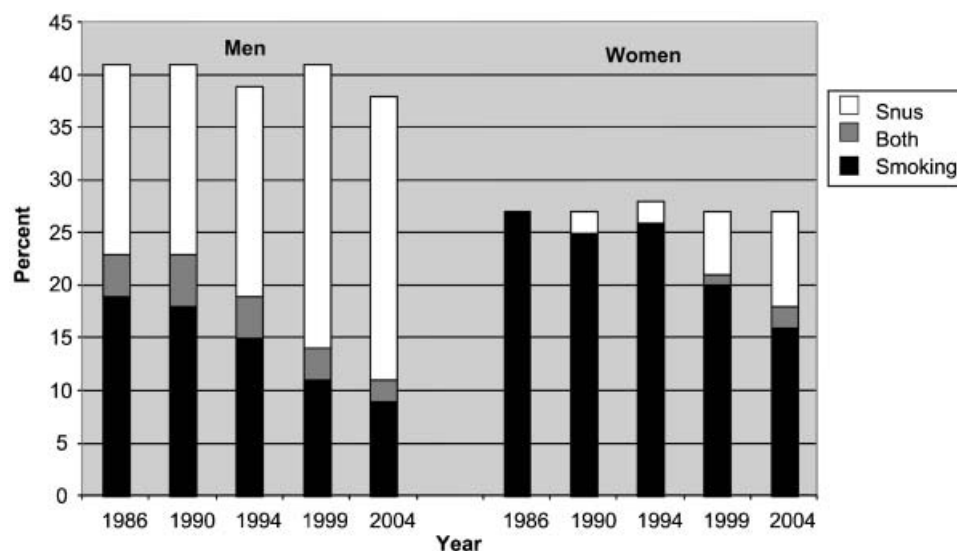


Figure 1. Prevalence of tobacco use among men and women, age 25–64 years, in northern Sweden, 1986–2004.

tobacco use was stable at about 40%. However, there were striking, and opposite, changes in prevalence of smoking and snus use. Smoking prevalence was 19% (CI 16–22%) in 1986, and it was lower in all subsequent surveys, reaching 9% (CI 7.0–11%) in 2004. The prevalence of exclusive snus use increased from 18% in 1986 and 1990 (CIs 15–20%) to 27% in the latter two surveys (CIs 24–30%). Combined use, reflecting both smoking and snus use, declined somewhat, from about 4% in the first three surveys (CIs 3–7%) to 2.4% in 2004 (CI 1.5–3.8%).

Among women the prevalence of all tobacco use also was steady at 27–28%. However, smoking prevalence was about 25–27% (CIs 23–30%) in the first three surveys but declined to 21% (CI 18–24%) in 1999 and 16% (CI 14–19%) in 2004. The prevalence of snus use was 0.5% (CI 0.2–1.3) in 1986 and increased to 1.9% (CI 1.1–3.1%) in 1990, 2.0% (CI 1.3–3.3%) in 1994, 5.1% (CI 3.8–7.0%) in 1999 and 8.9% (CI 7.0–11%) in 2004. In women the proportion of combined users was no more than 2% in any survey.

Figure 2 shows the prevalence of tobacco use in 2004 according to gender and age. The patterns were similar for men and women. The lowest smoking prevalence was noted in the 25–34 year age groups among both men (3%, CI 0.1–5.4%) and women (12%, CI 7.2–17%), who also had the highest prevalence of snus use (men 34%, CI 27–42%; women 12%, CI 7.2–17%). Smoking prevalence was higher in each older age group among both genders, while the prevalence of snus use was lower. Smoking prevalence both among men and

women aged 65–74 years was much lower than that among 55- to 64-year-olds.

This study documents the continuing decline of smoking among men in northern Sweden over the past 18 years. In 1986 the prevalence of smoking among men already was 19%, a figure which was remarkably low at that time and which has been seen elsewhere only rarely in the past 18 years. Nonetheless, between 1986 and 2004 male smoking prevalence further declined by more than half, to 9%. The extent of this decline far exceeds that seen in countries such as the US and UK, in which smoking prevalence rates of 20–25% have not decreased significantly during the past decade [3,4].

In this study smoking prevalence rates are strongly and inversely correlated with prevalence of snus use, both across time and across age groups, for men and for women. In fact, snus use may lower smoking prevalence both through a reduction in smoking initiation and by enhancing cessation, as was discussed previously [1]. Combined use may reflect a temporary transition between cigarettes and snus, as this form of tobacco use is very unstable, with users showing a preference for snus at follow-up [2]. Snus use accounts for 90% of all tobacco use among men aged 25–34 and for 45% among women. That may explain the low prevalence of smoking among those young adults, which is the opposite of what is seen in other developed countries such as the UK and US. In those countries smoking prevalence is highest among people in their 20s (25–30% in the US and 35% in the UK) and declines with age [3,4].

Data from this cross-sectional study are not sufficient to establish a causal role for snus in

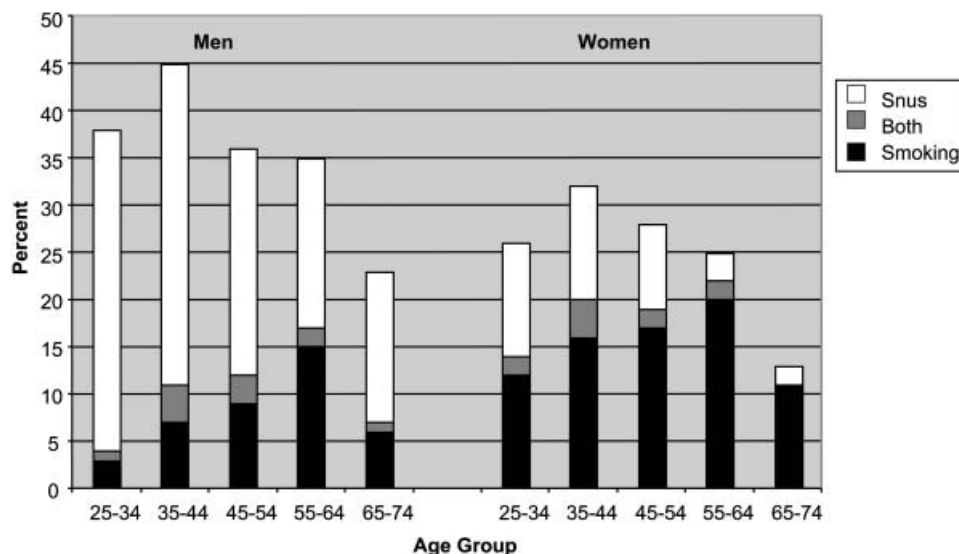


Figure 2. Prevalence of tobacco use in northern Sweden, by gender and age group, 2004.

smoking cessation. However, follow-up information on tobacco use among individuals in the first three surveys provides persuasive evidence that snus plays a major role in smoking cessation in this population [2].

The substitution of snus for cigarettes produces enormous health benefits to individual smokers. According to a 2002 report from the Royal College of Physicians (United Kingdom), "the consumption of non-combustible [smokeless] tobacco is on the order of 10–1,000 times less hazardous than smoking, depending on the product" [5]. An international panel of experts came to a similar conclusion in a 2004 study funded by the US National Cancer Institute [6].

The strong positions of these groups were based on evidence from Swedish epidemiologic studies on snus use and risks for cancer, cardiovascular diseases, and diabetes. With regard to cancer, epidemiologic studies are persuasively negative. A retrospective follow-up study showed that snus users did not have elevated mortality rates for all forms of cancer combined [7], and case-control studies have shown that users are not at increased risk for cancers of the oral cavity and pharynx [8,9] esophagus [8,10] or stomach [10]. With regard to cardiovascular diseases, evidence from epidemiologic studies is also largely negative. Case-control studies have found that snus users have no excess risk of myocardial infarction [11–13] or stroke [14]. One retrospective follow-up study reported that snus users have a modestly elevated mortality rate for all cardiovascular diseases (1.4, CI=1.2–1.6), which was similar to that of ex-smokers [7]. Diabetes risk among snus

users is unresolved but is likely to be very small. One cross-sectional study [15] found an odds ratio for diabetes among current snus users of 1.5 (CI=0.8–3.0), but a population-based cross-sectional and prospective follow-up study found no increased risk [16]. As an additional benefit, smokers who switch to snus may avoid the substantial weight gain often associated with quitting tobacco altogether [17].

The effectiveness of snus derives from its ability to provide nicotine-addicted smokers with similar, satisfying levels of the drug. For some health professionals any form of nicotine addiction is unacceptable. But in northern Sweden the high rate of snus use and the low rate of smoking among men, and among women, confer major health benefits.

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