ABSTRACT
Context: Despite the general decline in prevalence of smoking and actual consumption of cigarettes, there is a heightened concern that this decline has not been uniform throughout the population and that specific sub-populations are adversely affected by tobacco use.

Objective: To estimate smoking prevalence and cigarette consumption among Wisconsin sub-populations by demographic identifiers, gender, race, age, educational attainment, and income.

Design, Setting and Participants: We estimated tobacco use among primary sub-populations in Wisconsin in 2003 from the Wisconsin Tobacco Survey. Approximately 8000 interviews were completed via a telephone survey.

Main Outcome Measure: Smoking prevalence and tobacco consumption among sub-populations and related policy recommendations.

Results: Approximately 20% of the Wisconsin adult population smokes cigarettes. However, the prevalence of smoking is not the same among all population groups. There are also substantial group differences in how many cigarettes people smoke per day. The number of cigarettes smoked is closely tied to the risk of smoking-related illness.

The greatest disparities are associated with income and education. People with incomes between $10,000-$15,000 per year are more than twice as likely to smoke as people with incomes of more than $75,000. Also, smokers in the lower-income group smoke more cigarettes per day than those in the higher income group. There is also a consistent and major disparity in smoking behavior between genders. Within every income, racial, or educational group, men are more likely to smoke and, when they do, they smoke more cigarettes per day. There are significant but smaller differences in smoking behavior between rural and urban residents.

Conclusion: The pronounced differences in smoking rates and the number of cigarettes smoked among different population groups underline the need to focus prevention and treatment interventions on lower socioeconomic smokers with a specific emphasis on male smokers.

INTRODUCTION
The purpose of this report is to summarize findings from the Wisconsin Tobacco Survey (WTS) on the “group patterns” of smoking among Wisconsin adults. We review data on smoking by age group, gender, race, income, education, and urban/rural location. Finally, we comment on these findings and provide recommendations on how the problem of the disparate burden of smoking can be addressed.

METHODS
The WTS is a representative telephone survey of a sample of Wisconsin adult residents. The purpose of the survey is to gauge smoking patterns, attempts to quit, attitudes towards smoking, and tobacco-related health knowledge among Wisconsin adults. In 2003, over 8000 interviews were conducted with current and former smokers, as well as those who have never smoked. The survey included 114 questions on general health, tobacco use and cessation, smokers’ use of health care services, smoking during pregnancy, media campaigns, risk perception, and demographics. The Wisconsin Department of Health and Family Services provided funding for the 2003 WTS.
RESULTS
In 2003, approximately 1 out of 5 Wisconsin adults reported smoking cigarettes on 1 or more days per month. Smokers vary widely in how many cigarettes they smoke per day. Some consume 40 or more cigarettes per day, while a similar number smoke only a few cigarettes per day. On average, smokers report that they consume about 14 cigarettes per day, but this may be under-reported and will be discussed later.

Age
The prevalence (or the rate) of smoking is not equal among all sub-groups of the Wisconsin adult population. For example, young adults, ages 18-24, are almost 4 times more likely to smoke than people 65 years and older. Smoking among the elderly is much less prevalent than smoking among the young because most smokers either quit before age 64 or die early.1

Data from the WTS indicate that although young adults are much more likely to smoke than older adults, they report smoking fewer cigarettes per day. Many young people smoke relatively few cigarettes, sometimes on a less-than-daily basis under the belief that they won’t become addicted.2 However, data in Figure 1 show that the great majority of young smokers not only continue to smoke but later smoke many more cigarettes. Data from the WTS indicate that young adult smokers report smoking about 9 cigarettes per day on average whereas older adults (ages 45-64) smoke about 17.

Our analysis of self-reported data indicates that survey respondents smoke only about 60% of the cigarettes that are actually consumed when compared with actual sales data for Wisconsin. This difference between self-reported smoking and actual consumption has increased in recent years. Nonetheless, self-reported smoking remains a reliable measure of tobacco use.3 However, under-reporting may be greatest among “lighter” smokers and less common among heavy smokers and may make detailed analysis less precise.4

Gender
Smoking is more prevalent among men than women. Also, as noted in Figure 2, men smoke more cigarettes than women when viewed within each racial group. Nationally, this is a consistent disparity among all ages, socioeconomic groups, and ethnicities, with the exception of American Indians.5 Women consistently smoke less than men within each age, race, education, income, and even geographical group.

Race/Ethnicity
There are substantial differences in the prevalence of smoking among black and white adults in Wisconsin and in the number of cigarettes smoked. Smoking is less prevalent among whites, but as a group, they report smoking more cigarettes per day. The converse is true for blacks, with a higher prevalence rate but smoking fewer cigarettes.

Data from the 1999-2001 National Survey on Drug Use and Health estimated smoking prevalence rates of 27% for whites and 26% for blacks. Among whites in Wisconsin, smoking prevalence is lower than the national average, while it is higher among black Wisconsinites. While the WTS sample is too small to report on other racial/ethnic groups, estimates of smoking prevalence can be determined from summarizing data from the Wisconsin Behavioral Risk Factor Surveillance System from 1996-2000. This survey estimates smoking among American Indians at 51%, Asians at 22%, blacks at 27%, and whites at 23%.6

Figure 1. Prevalence and average number of cigarettes per day among current Wisconsin smokers by age groups. Prevalence of smoking refers to the percent of each group that report having smoked 100 cigarettes in their lifetime and smoking every day or some days.

Figure 2. Prevalence and average cigarettes smoked per day among current Wisconsin smokers by race and gender.
While there is a general difference between whites and blacks in the amount smoked, there is also a substantial difference in smoking behavior between genders. As indicated in Figure 2, black women are one-third less likely to smoke than black men, while white women smoke only slightly less than white men.

**Income**

The reported level of income is strongly related to the prevalence of smoking. There is also a small but still significant relationship between income and the amount smoked. The prevalence rate for people with incomes over $75,000 per year is half that of those with incomes of less than $35,000. Higher-income individuals who smoke report that they smoke fewer cigarettes than lower-income individuals. The association between age and income should be noted. The decline in smoking associated with increasing income levels is in part explained by increases in age. The relationship between smoking and income is indicated in Figure 3.

While there are differences between genders at each increment of the income scale, these are not as great as the differences between income groups. However, the difference between gender smoking rates exacerbates the difference between income groups. Wealthier women have lower prevalence rates and when they do smoke, they consume fewer cigarettes per day than men in general, and especially lower-income men.

**Education**

Educational achievement is closely related to income. As such, the pattern of lower smoking prevalence and consumption as educational achievement increases replicates patterns related to income. However, as indicated in Figure 4, the relationship between educational level and smoking is even more pronounced than that between smoking and income.

Adults who did not graduate from high school smoke at 4 times the rate of college graduates and consume 50% more cigarettes. National data indicate that the smoking prevalence rate among persons with a graduate degree is even lower than among those with a bachelor’s degree.5

At each level of educational achievement, women report smoking cigarettes at a rate of about two-thirds that of men. The difference between men and women further increases the differences at each educational level. Men with less than high school graduate degrees have 3 times the prevalence rate and smoke 50% more cigarettes than women with college degrees.

**Rural/Urban**

Using the US Census definition of rural and urban counties, the WTS identified smokers in rural and urban counties. The data indicate that though the prevalence of smoking is the same in both areas, the average number of cigarettes smoked per day is higher in rural areas than urban areas. This higher rate of cigarette consumption may in part be the result of permissive workplace smoking environments, as well as lower socioeconomic status relative to the state as a whole.7

As noted in Figure 5, rural communities are the single exception to the pattern of higher smoking rates among males than females. However, though the prevalence rate is higher among rural females than among men, they smoke fewer cigarettes per day. The prevalence of smoking among urban males is significantly higher than among women, and they smoke more cigarettes per day.

**DISCUSSION**

In order to understand the role of social and economic forces in shaping the current and potentially the future use of tobacco by social groups, it is essential to grasp the level of change over time. When the first Surgeon
General’s Report on Smoking and Health was published in 1964, approximately 40% of Wisconsin adults smoked. Over 120 packs of cigarettes were consumed for each adult in the state. Now, 40 years later, results of the WTS indicate that about 20% of Wisconsin adults smoke cigarettes. That is equivalent to about 800,000 adults. In the same period, per capita consumption has declined as dramatically to 70 packs per capita—a 40% decline. Even more striking than the sharp decline in both consumption and prevalence has been the change in tobacco use from being common throughout all social classes and highly differential by gender. Currently, tobacco use is relatively segmented by income and education and less segmented by gender. Examples of tobacco use by social group highlight the differences generated in the past 4 decades:

**Age**—The 1964 Surgeon General’s Report noted a smoking rate among 12th grade students between “40 to 55 percent.” (See “Trends in Youth Smoking” p 23 in this issue.) For those aged 25, the Report cited a prevalence rate of 60% among men and 36% among women. Similar to the current trend, the smoking rate proportionately declined to 20% among persons aged 65 and over.

**Income and Education**—The 1964 Report found “Income does not seem to be related in a consistent manner to prevalence of smoking either in England or in the USA.” It also noted, opposite to the current trend, that “income does relate positively to the quantity of cigarettes consumed.” Our data from the survey indicates that earnings are negatively related to per capita consumption of cigarettes as well as prevalence.

In 1964, the relationship between educational attainment and smoking prevalence or consumption was described as “unclear.” A number of studies cited in the 1964 Report indicated “no relationship” between smoking and educational attainment, but the data from these studies contradicted other evidence of a relationship between smoking and occupations.

**Gender**—As noted above, the proportion of women who smoked 40 years ago was substantially lower than the current trend. It did note that the rate of increase in smoking was much greater among women.

**Race**—The 1964 Report found “roughly the same proportion of smokers among whites and non-whites.” Higher smoking rates are found with black Wisconsinites. It also found that, similar to current trends, heavier smoking is more common among whites.

**Rural/Urban**—In 1964, prevalence was lower among rural residents, with substantially lower proportion of smokers among the rural farm population.

Though the data from the 1964 Report is limited and national in scope, it does provide sufficient information to grasp the dramatic change in prevalence and consumption in higher-level socioeconomic groups and marginal change in lower-level groups. It also underlines the socially malleable quality of tobacco use.

**CONCLUSION**

Forty years after the 1964 landmark Surgeon General’s Report on Smoking and Health, tobacco use in the nation and in Wisconsin has declined nearly by half. However, the reduction has not been uniform throughout the population. Even among those sectors of the population that have higher levels of prevalence, there are substantial subgroup differences in tobacco consumption.

The clearest disparity in tobacco use is between socioeconomic classes. While tobacco use has declined by almost three-quarters since 1964 among the highest socioeconomic groups, the decline has been far less dramatic for persons in the lower socioeconomic groups. The poorest half of the population consumes a disproportionate share of tobacco and with it suffers most of its ill effects. And within this half, white males with the lowest level of education and income are most at risk.

Disparities among non-white minorities are less clear. While blacks have a higher prevalence rate than whites, they report smoking fewer cigarettes. Nevertheless, the death rate from lung cancer among blacks in Wisconsin is 50% higher than among whites.

While the Wisconsin sample is too small to report on other racial/ethnic groups, national data are available and indicate that American Indians have a higher prevalence rate than whites and blacks. Also, while Asians
and Hispanics are reported as a single entity, there is great variation within each group (e.g. Asian Indians at 13% and Koreans at 27%). Because the smoking rate for the upper-income population with a college education is relatively low (about 10%), progress on smoking reduction for the greatest number of people will be most successful if it reaches lower socioeconomic groups.

This analysis indicates that smoking is an addiction heavily concentrated in specific socioeconomic groups. Given the highly delineated forms of communication within and between subcultures, it appears that evidence-based interventions directed towards specific groups would be most efficacious. These include the following:

**Target tobacco control programs to lower socioeconomic groups**—Individuals with lower incomes smoke at 3 to 4 times the rate of those at the highest income levels. Similar disparities exist between groups based on educational attainment. Men, also, are more likely to smoke than women and to smoke more cigarettes per day. Campaigns to prevent smoking and control smoking environments, as well as appeals to smokers to quit should be targeted to specific populations such as low income groups, individuals with lower educational attainment and to men. Institutions that have not previously been considered as partners for tobacco control efforts should be solicited. Media should reflect and speak to the populations with the greatest burden of tobacco use. Given common knowledge of the dangers associated with tobacco use, it is not clear why specific socioeconomic groups have continued to smoke.

**Smoke-free workplace policy**—Much of the difference in the number of cigarettes smoked between lower and upper socioeconomic smokers may be due to workplace smoking policies. Smoke-free workplaces reduce the amount of cigarettes smoked. Low-income workers have much higher exposure to secondhand smoke as a result of more permissive rules on smoking in the workplace. Smoke-free workplaces not only protect employees from secondhand smoke, but also reduce the amount smoked by employees. This helps reduce illness caused by high levels of tobacco consumption and protects non-smoking employees from exposure to secondhand smoke.

**Increase cigarette taxes to encourage reductions in smoking and quitting**—The health benefits of increasing cigarette taxes are well documented. Excise tax increases on cigarettes, as a form of health intervention, is particularly effective for low-income smokers because of their sensitivity to cigarette prices. Low-income smok-

REFERENCES

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