Patterns of Global Tobacco Use among Young People
and Implications for Future Chronic Disease Burden in Adults

Nathan R. Jones, PhD
Wick Warren, PhD
Samira Asma, DDS

For the GTSS Collaborating Group

Summary

Data collected by the Global Youth Tobacco Survey (GYTS) between 1999 and 2005 suggest the impact of tobacco use on global mortality may be even greater than previously expected. This report presents findings from 395 sites in 132 countries. The difference in current tobacco use between boys and girls is smaller than the difference among adults by gender. Use of tobacco products other than cigarettes by students is as high as cigarette smoking in many countries (nearly 10% each). Almost 1 in 5 never smokers aged 13-15 indicated they were likely to initiate smoking in the next year. Student exposure to second-hand smoke was high both at home (over 4 in 10) and in public places (over 5 in 10). High cigarette smoking among girls and high use of tobacco products other than cigarettes by both genders is troubling for the future of chronic disease and tobacco-related mortality.

Introduction

Tobacco use is the leading preventable cause of death in developed countries and the second leading cause of death globally. Some estimates of the future burden of tobacco-related disease are based on lung cancer mortality and calculation of the "smoking impact ratio."[1] The Global Burden of Disease estimates a doubling in the annual number of deaths from tobacco use from five million in 2005 to ten million in 2020.[2] In generating these estimates, the authors acknowledge that a missing critical determinant in calculating the future burden of chronic disease is the cumulative exposure to tobacco.

The Global Youth Tobacco Survey (GYTS) may begin to provide the requisite data to allow for projection of the cumulative exposure to tobacco. GYTS is a joint project of the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), the Canadian Public Health Association (CPHA), and the majority of WHO Member States. For the first time, standardized behavioral data from same-aged youth were collected on prevalence of cigarette and other tobacco use, perceptions and attitudes about tobacco, access and availability of tobacco products, and exposure to secondhand smoke, school curricula, media and advertising, and smoking cessation interventions.

Detailed surveillance on youth tobacco use prevalence was not available prior to the development and expansion of GYTS. In 1999, WHO and CDC initiated the GYTS in an effort to provide recent, high quality, international data on youth

tobacco use. Consistency and comparability across GYTS surveys were key design elements of the surveillance system. GYTS sites in 131 countries and the Gaza Strip and West Bank have employed similar sampling strategies and field procedures; GYTS participants have answered a core set of questions; and GYTS data have been processed using consistent procedures. The result of six years of GYTS surveillance is the world's largest body of comparable data for youth tobacco use.

This report presents findings from the Global Youth Tobacco Survey (GYTS) on current cigarette smoking, current use of tobacco products other than cigarettes, likely initiation of smoking among nonsmokers, and exposure to secondhand smoke at home and in public places. GYTS data collected around the world between 1999 and 2005 suggest higher prevalence among adults in the future as the adolescents age into adulthood. Findings from the GYTS suggest that the dire projections of a doubling of the death toll to ten million annual deaths by 2020 may be a conservative estimate and the true toll from tobacco use could be even greater.

Methods

Data and Sampling

Data included in this report come from GYTS surveys conducted in 395 sites in 131 countries and the Gaza Strip/West Bank among students aged 13-15 years between 1999 and 2005. National level data has been collected in 93 countries, and state, province/region, or city data in 38 countries. GYTS has been repeated

in 32 countries and the most recent data are included for all countries that have completed a second round. WHO counts 192 member states distributed among six regions. The GYTS has been conducted in 59 sites in 25 countries in the African Region, 118 sites in 37 countries in the Region of the Americas, 40 sites in 20 countries and the Gaza Strip and West Bank in the Eastern Mediterranean Region, 99 sites in 26 countries in the European Region, 36 sites in 7 countries in the South-East Asia Region, and 43 sites in 16 countries in the Western Pacific Region. The median student response rate was 88.2%, only 5 of the sites reported a school response rate less than 80% and, in total, over 2 million students in more than 18,000 schools have completed the GYTS.

Prevalence estimates assessed in this study were for current cigarette smoking (defined as "the percentage of students who smoked cigarettes on one or more days during the past 30 days"), current other tobacco use (defined as "the percentage of students who had used any form of tobacco products other than cigarettes during the past 30 days"), and never smokers who indicated they were likely to initiate smoking during the next year (defined as 100% minus [the percentage of never smokers who stated they "definitely would not smoke if offered a cigarette by their best friend" AND "definitely do not think they will smoke in the next year"]). Two measures of exposure to second-hand smoke are used in this study: exposure at home (defined as "the percentage of students who had people smoke in their home, in their presence during the past 7 days") and exposure in public places (defined as "the percentage of students who had

people smoke in their presence, in places other than their home during the past 7 days").

The GYTS uses a two-stage cluster sample survey design that produces representative samples of students in grades associated with ages 13-15 years. The sampling frame includes all schools containing any of the identified grades. At the first stage, the probability of schools being selected is proportional to the number of students that are enrolled in the specified grades. At the second sampling stage, classes within the selected schools are randomly selected. All students attending school the day the survey is administered in selected classes are eligible to participate.

Statistical analysis

A weighting factor is applied to each student record to adjust for non-response (by school, class, and student) and variation in the probability of selection at the school, class, and student levels. A final adjustment sums the weights by grade and gender to the population of school children in the selected grades at each sample site. SUDAAN, a software package for statistical analysis of correlated data, computes 95% confidence intervals.[3] Differences in rates were considered statistically significant at the p<0.05 level.

Regional aggregations were calculated as means weighted by the population of the sampling frame. In many cases, the sampling frame was the country, but in areas where samples were drawn to be representative of a sub-national

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population, estimates were weighted by the population of the city, state, or administrative region and included in the regional aggregation.

Results

Prevalence

Almost one in five students (17.3%) currently used any tobacco product (smoked cigarettes or used other tobacco products during the past 30 days) (Table 1). Current any tobacco use was highest in the Region of the Americas (22.2%) and lowest in the South-East Asia Region (12.9%) and the Western Pacific Region (11.4%). Boys were significantly more likely than girls to currently use any tobacco products in the Eastern Mediterranean Region, South-East Asia Region, and the Western Pacific Region.

Overall, 8.9% of students were current smokers. The rate of current smoking was highest in the Region of the Americas (17.5%) and the European Region (17.9%) and less than 10% in the four other regions. Boys were significantly more likely than girls to currently smoke cigarettes in the African Region, the South-East Asia Region, and the Western Pacific Region.

More than one in 10 (11.2%) students currently used tobacco products other than cigarettes (e.g., chewing tobacco, bidis, water pipes, etc). The rate was highest in the South-East Asia Region (13.3%) and the Eastern Mediterranean Region

(12.9%); and less than 10% in the Western Pacific Region and the European Region. Boys were significantly more likely than girls to currently use other tobacco products overall and in the Region of the Americas, the European Region, and the South-East Asia Region.

Boys were significantly more likely to smoke cigarettes than use other tobacco products in the European Region; and significantly more likely to use other tobacco products than smoke cigarettes in the Eastern Mediterranean Region and the South-East Asia Region. Girls were significantly more likely to smoke cigarettes than use other tobacco products in the Region of the Americas and the European Region; and significantly more likely to use other tobacco products than smoke cigarettes in the Eastern Mediterranean Region and the South-East Asia Region.

Among students who had never smoked cigarettes, 18.3% indicated that they were likely to initiate smoking during the coming year. The rate of likely initiation was highest in the European Region and the Region of the Americas (29.8% and 24.8%, respectively) and lowest in the Western Pacific Region (8.3%). Boys were significantly more likely than girls to indicate likely initiation in South-East Asia Region.

For boys, the likely initiation of smoking among never smokers was significantly higher than for current cigarette smokers overall and in the Region of the Americas, the Eastern Mediterranean Region, and the South-East Asia Region.

For girls, the likely initiation of smoking among never smokers was significantly higher than for current cigarette smokers overall and in all regions.

Exposure to Second-hand Smoke

Over four in 10 (44.1%) students had been exposed to tobacco smoke in their homes in the past week, and that figure was nearly eight in 10 (78.0%) in the European Region (Table 2). Over half (54.2%) of all students reported that they had been exposed to secondhand tobacco smoke in public places; exposure was highest in the European Region (84.8%).

<u>Discussion</u>

Tobacco use increases the risk of developing several cancers, cardiovascular disease, and respiratory disease; thus tobacco use is a leading preventable risk factor for many chronic diseases.[1, 2, 4, 5] Chronic diseases are expected to account for an increasing share of the global disease burden. Deaths due to chronic diseases are expected to rise from 43% of all deaths in 1998 to 73% by 2020.[1]

Data collected from the Global Youth Tobacco Survey (GYTS) between 1999 and 2005 suggest the impact of tobacco use on global mortality may be greater than recent projections.[6-14] Findings from this report and previous GYTS research[8, 12, 15] show: the difference in current tobacco use between boys and girls is smaller than the difference among adults by gender; use of other tobacco

products by students is as high as cigarette smoking in many countries (nearly 10% each); almost 1 in 5 never smokers indicated they were likely to initiate smoking in the next year; student exposure to second-hand smoke was high both at home (over 4 in 10) and in public places (over 5 in 10).

There are different methods for projecting the future burden of chronic diseases. No method is perfect, but methods to predict the burden of disease caused by tobacco use may be improved by the availability of data from the GYTS. Previous projections incorporate the impact of tobacco on mortality using historical observed differential in lung cancer rates among smokers and non-smokers.[1] This methodology avoids reporting bias from survey respondents who are reluctant to report their smoking status and produces epidemiologically plausible projections. However, findings in this report suggest that the gender distribution of cigarette smoking and other tobacco use has changed considerably across cohorts. Adult males are four times more likely than adult females to smoke.[16] In comparison, previous research has shown that boys aged 13-15 years were only 2.3 times more likely to smoke than girls, and in many countries there are no gender differences in cigarette smoking and other tobacco use.[8] This shift will have important implications for the global burden of chronic diseases and should be considered in future mortality projections.

The GYTS findings are subject to at least three limitations. First, because the sample of youth surveyed was limited to those who attend school, it may not be representative of all youth aged 13–15 years. However, in most countries, the

majority of students in this age group attend regular, private, or technical schools.[17] Second, the data apply only to youth in school the day the survey was administered who actually participated in the survey. Third, data are based on self-reports from students who may under- or over-report their behavior. Though the extent of potential reporting bias cannot be determined, responses to questions about cigarette smoking and other tobacco use show good test-retest reliability.[18]

Patterns found using GYTS data have led to a number of cross-country studies that show very important changes are occurring in world-wide tobacco use.[7, 8] Increased tobacco use among girls and the narrowing of gender differences in tobacco use is a recent and, in many parts of the world, unexpected behavioral shift. GYTS data reveal high prevalence of tobacco use other than cigarettes among boys and girls across all regions. Prevalence of other tobacco use is as high as or higher than cigarette prevalence in many regions. This finding suggests overall tobacco use is a major public health issue and prevention programs must incorporate information about a variety of tobacco products to be effective. Finally, this report finds likely cigarette smoking initiation among never smokers to be equal to or higher than current smoking levels in many regions indicating further potential increases in smoking prevalence.

The findings in this report and data supporting these findings can be used to enhance projections of the future burden of tobacco. Projections of mortality based on historical tobacco use patterns likely underestimate the impact of

recent cohort changes in tobacco initiation and consumption. The continuing

challenge to tobacco control practitioners is designing and implementing effective

comprehensive tobacco control programs. Evidence from GYTS has shown that

reducing tobacco consumption will require a redoubling of efforts to prevent

initiation and promote cessation among the large proportion of young people who

currently smoke and use other tobacco products.

A number of factors have been identified that may contribute to the relative lack

of emphasis and investment placed on chronic disease as part of the global

health agenda.[1, 2, 19] These misconceptions are particularly relevant for tobacco

use. First, chronic diseases are often seen as by-products of affluence and

economic development. While this may be true to a degree, the relationship

between tobacco use and economic development is neither simple nor

straightforward. In many developed countries, those who continue to smoke tend

to be in more disadvantaged social position. The GYTS data indicate relatively

high tobacco use rates among youth in the developing world, irrespective of level

of social or economic development. Second, there is the suggestion that chronic

diseases may be seen by some to be solely the result of individual choice, with

little or no societal or environmental influences. Surely, as the GYTS data

illustrate, this cannot be the case for use of an addicting product by young

adolescents. Third, some may feel that chronic diseases only effect older men in

high-income countries. Again, the GYTS data clearly illustrate that the

antecedents of chronic disease in adults begins in the teenage years, with nearly

one in five of every 13-15 year old using some type of tobacco product, and an equal proportion likely to start smoking in the next year.

Conclusions:

Tobacco use is a major contributor to global chronic disease mortality and results from the GYTS suggest that current dire warnings of the increasing burden of disease caused by tobacco use may be an underestimate. Small differences in patterns of tobacco use between boys and girls, high use of tobacco products other than cigarettes, high likelihood of initiation of smoking among never smokers, and widespread exposure to secondhand smoke all suggest even more morbid future outcomes caused by tobacco use.

Efforts to ameliorate the current and projected harm caused by tobacco use are urgently needed. Countries need to develop and implement comprehensive tobacco prevention and control programs. WHO is working with countries to prepare National Tobacco Action Plans that include public education campaigns, cessation-assistance programs, enforcement of existing tobacco restrictions, and related policy efforts to support tobacco control programs. For many countries, the WHO Framework Convention on Tobacco Control (WHO FCTC) provides a useful framework for implementing such a comprehensive approach. The WHO FCTC was unanimously adopted by the World Health Assembly in May 2003, was signed by 168 nations and as of the time of this writing, has been ratified by 74 nations.[20] Full implementation of the principles and obligations contained in

the WHO FCTC should begin to limit tobacco use, initiation of smoking, and

exposure to secondhand smoke.

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Table 1: GYTS Measures of Tobacco Use Prevalence, by Gender and WHO Region, 1999-2005.

	Current Any Tobacco Use*			Current Cigarette Smoking**			Current Other Tobacco Use***			Never Smokers Likely to Initiate Smoking in the Next Year		
	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl
TOTAL	17.3 (±2.5)	20.1 (±3.4)	14.3 (±2.8)	8.9 (±1.7)	10.5 (±2.4)	6.7 (±1.7)	11.2 (±1.5)	13.8 (±2.1)	7.8 (±1.8)	18.3 (±2.0)	20.1 (±2.9)	15.8 (±2.6)
African Region	16.8 (±2.7)	19.7 (±3.9)	13.9 (±3.1)	9.2 (±2.2)	13.0 (±3.6)	5.8 (±2.3)	10.5 (±2.2)	10.9 (±2.9)	9.9 (±2.6)	17.7 (±4.0)	18.2 (±5.8)	17.4 (±4.2)
Region of the Americas	22.2 (±2.4)	24.0 (±3.0)	20.4 (±2.8)	17.5 (±2.3)	17.4 (±2.7)	17.5 (±2.6)	11.3 (±1.5)	14.8 (±2.2)	7.8 (±1.6)	24.8 (±2.5)	24.3 (±3.1)	25.6 (±3.3)
Eastern Mediterranean Region	15.3 (±2.6)	18.8 (±3.6)	11.3 (±3.3)	5.0 (±1.7)	6.7 (±2.3)	3.2 (±2.1)	12.9 (±2.3)	15.6 (±3.2)	9.9 (±2.6)	13.4 (±2.2)	16.1 (±3.0)	10.9 (±2.8)
European Region	19.8 (±3.2)	22.3 (±4.3)	17.0 (±3.2)	17.9 (±2.7)	19.9 (±3.8)	15.7 (±3.1)	8.1 (±2.3)	10.0 (±3.3)	6.0 (±2.0)	30.5 (±3.9)	26.9 (±5.7)	33.0 (±5.1)
South-East Asia Region	12.9 (±2.7)	18.4 (±4.1)	7.1 (±2.4)	4.3 (±1.2)	5.8 (±1.7)	1.9 (±0.9)	13.3 (±1.0)	16.4 (±1.4)	8.4 (±1.6)	17.0 (±1.1)	21.2 (±1.7)	10.7 (±1.6)
Western Pacific Region	11.4 (±1.9)	15.0 (±2.8)	7.8 (±2.0)	6.5 (±1.6)	9.9 (±2.8)	3.3 (±1.2)	6.4 (±1.2)	7.7 (±1.6)	5.4 (±1.5)	8.3 (±1.5)	10.0 (±2.6)	7.1 (±1.6)

*   Smoked cigarettes or used other tobacco products during the past 30 days
**   Smoked cigarettes on one or more days in the past 30 days
*** Used other tobacco products (chewing tobacco, cigars, bidis, waterpipe, betel nut with tobacco) during the past 30 days

Table 2: GYTS Measures of Second Hand Smoke Exposure and Support for Banning Smoking in Public Places, by Gender and WHO Region, 1999-2005.

	Exposure to second-hand smoke at home during the past 7 days	Exposure to second-hand smoke in public places during the past 7 days
TOTAL	44.1 (+ 2.5)	54.2 (+ 2.6)
African Region	30.4 (+ 3.8)	46.3 (+ 4.0)
Region of the Americas	40.9 (+ 3.3)	54.2 (+ 3.8)
Eastern Mediterranean Region	37.6 (+ 3.5)	46.3 (+ 4.4)
European Region	78.0 (+ 2.6)	84.8 (+ 2.2)
South-East Asia Region	37.0 (+ 1.6)	49.4 (+ 1.7)
Western Pacific Region	50.5 (+ 3.2)	53.6 (+ 2.8)