TECHNICAL NOTE II

Smoking prevalence in WHO Member States

Monitoring the prevalence of tobacco use is central to any surveillance system involved with tobacco control. Reliable prevalence data provide the information needed to assess the impact of tobacco control actions adopted by a country and can be used by tobacco control workers in their efforts to counter the tobacco epidemic. This report contains country-provided data for both smoking and smokeless tobacco use among youth and adults, as well as WHO-modelled age-standardized prevalence estimates for smoking among adults (Appendix VII).

Collection of tobacco use prevalence surveys

For this report, the following sources of information were explored:

- reports submitted to the WHO FCTC Secretariat by Parties to the Conference of Parties;
- information collected through WHO tobacco focussed surveys conducted under the aegis of the Global Tobacco Surveillance System – in particular the Global Youth Tobacco Survey (GYTS) and the Global Adult Tobacco Survey (GATS);
- tobacco information collected through other WHO surveys including the WHO STEPwise Surveys, the Global School-based Student Health Surveys and the World Health Surveys;
- other systems-based surveys undertaken by other organizations, including surveys such as the (European-based) Health Behaviour in School-aged Children surveys and global Demographic Health Surveys.

In addition, an extensive search was conducted through WHO regional and WHO country offices where possible to try to identify as many country-specific surveys that are not part of an international surveillance system – such as the Survey of Lifestyles, Attitude and Nutrition in the Republic of Ireland, or the Social Weather Station Surveys in the Philippines.

Much of the information identified here is also stored on the WHO Global Infobase (a portal of information on eight risk factors for noncommunicable diseases including tobacco: http://www.who.int/infobase). Surveys that met the following criteria were collected:

- provide country survey summary data for one or more of six tobacco use definitions: daily tobacco user, current tobacco user, daily tobacco smoker, current tobacco smoker, daily cigarette smoker, or current cigarette smoker;
- include randomly selected participants who were representative of the general population;
- present prevalence values by age and sex; and
- are officially recognized by the national health authority.

Member States were contacted to obtain an official report from recently undertaken surveys.

Analysis and presentation of tobacco use prevalence indicators

Data collected from countries' prevalence surveys are presented in this report in two forms.

1. *Crude prevalence rates* (Appendix VIII): these present the actual estimate of tobacco use in a country as measured by the survey, and can be used to generate an estimate of the number of smokers for the relevant indicator (e.g. current smokers, daily smokers) in the population. Crude prevalence rates from the most recent youth and adult surveys from each country are presented in this report.
2. *Adjusted and age-standardized prevalence rates* (Appendix VII): these rates are constructed solely for the purpose of comparing adult tobacco use prevalence across multiple countries or across multiple time periods for the same country. These rates must not be used to estimate the number of smokers in the population. The methods for age-standardizing and adjusting for survey differences are described separately below. The estimates presented in Appendix VII have been both adjusted and age-standardized.

Crude prevalence. The crude prevalence, a summary measure of tobacco use in a population, reflects the actual use of tobacco in a country (e.g. prevalence of cigarette smoking by adults aged 15 years and above). The crude rate, expressed as a percentage of the total population, refers to the number of smokers per 100 population of the country. When this crude prevalence rate is multiplied by the country's population, the result is the number of smokers in the country.

Adjusted prevalence. Adjustments to data are typically done when collecting information from heterogeneous sources that originate from different surveys and do not employ standardized survey instruments. These differences render difficult the comparison of prevalence rates between surveys and between countries. The following four indicators of smoking were collated using all adult survey information identified in the search process described earlier:

- current prevalence of tobacco smoking;[1]
- daily prevalence of tobacco smoking;[1]
- current prevalence of cigarette smoking;
- daily prevalence of cigarette smoking.

These indicators provide for the most complete representation of tobacco smoking across countries and at the same time help minimize attrition of countries from further analysis because of lack of adequate data. Although differences exist in the types of tobacco products used in different countries and grown or manufactured in different regions of the world, data on cigarette smoking and tobacco smoking are the most widely reported and are common to all countries, thereby permitting statistical analyses.[2]

WHO developed a regression method that attempts to adjust the reported survey results to enable comparisons between countries. The general principle that underlies the regression method is that if data are partly missing or are incomplete for a country, then the regression technique uses data available for the United Nations subregion[3] in which the country is located to generate estimates for that country. The regression models are run separately for males and females in order to obtain age-specific prevalence rates for each region. These estimates are then substituted for the country falling within the subregion for the missing indicator. Note that the technique cannot be used where countries have no surveys at all, or insufficient data (i.e. one single survey run in 2009 or earlier, or no surveys run since 2002); these countries were excluded from the analysis.

Adjusting for differences between surveys

Differences in age groups covered by the survey. In order to estimate smoking prevalence rates for standard age ranges (by five-year groups from age 15 until age 80 and thereafter from 80 to 100 years), the association between age and daily smoking is examined for males and females separately for each country using scatter plots. For this exercise, data from the latest nationally representative survey are chosen; in some cases more than one survey is chosen if male and female prevalence rates stem from different surveys or if the additional survey supplements data for the extreme age intervals. To obtain age-specific prevalence rates for five-year age intervals, regression models using daily smoking prevalence estimates from a first order, second order and third order function of age are graphed against the scatter plot and the best fitting curve is chosen. For the remaining indicators, a combination of methods is applied: regression models are run at the subregional level to obtain age-specific rates for current and daily cigarette smoking, and an equivalence relationship is applied between smoking prevalence rates and cigarette smoking where cigarette smoking is dominant to obtain age-specific prevalence rates for current and daily cigarette smoking for the standard age intervals.

Differences in the types of indicators of tobacco use measured. If data are available for current tobacco smoking and current cigarette smoking only, then definitional adjustments are made to account for the missing daily tobacco smoking and daily cigarette smoking data. Likewise, if data are available for current and daily tobacco smoking only, then tobacco type adjustments are made across tobacco types to generate estimates for current and daily cigarette smoking.

Differences in geographical coverage of the survey within the country. If data are available for urban or rural areas only, then adjustments are made by observing the relationship between urban and rural areas in countries falling within the relevant subregion. Results from this urban-rural regression exercise are applied to countries to allow a scaling-up of prevalence to the national level. As an example, if a country has prevalence rates for daily smoking of tobacco in urban areas only, the regression results from the rural-urban smoking relationship are used to obtain rural prevalence rates for daily smoking. These are then combined with urban prevalence rates using urban-rural population ratios as weights to generate a national prevalence estimate as well as national age-specific rates.

Differences in survey year. For this report, smoking prevalence estimates are generated for the year 2011. Smoking prevalence data are sourced from surveys conducted in countries in different years. To obtain smoking prevalence estimates for 2011, trend information is used either to project into the future for countries with data older than 2011 or backtracked for countries with data later than 2011. This is achieved by incorporating trend information from all available surveys for each country. For countries without historical data, trend information from the respective subregion in which they fall is used. For countries that completed a survey in 2011, no adjustment is done.

Age-standardized prevalence. Tobacco use generally varies widely by sex and across age groups. Comparison of crude rates between two or more countries at one point in time, or of one country at different points in time, can be misleading if the two populations being compared have significantly different age distributions or differences in tobacco use by sex. The method of age-standardization is commonly used to overcome this problem and allows for meaningful comparison of prevalence between countries, once all other comparison issues described above have been addressed. The method involves applying the age-specific rates by sex in each population to one standard population. When presenting age-standardized prevalence rates, this report uses the WHO Standard Population, a fictitious population whose age distribution is largely reflective of the population age structure of low- and middle-income countries. The resulting age-standardized rates refer to the number of smokers per 100 WHO Standard Population. As a result, the rates generated using this process are only hypothetical numbers with no inherent meaning. They are only meaningful when comparing rates obtained from one country with those obtained in another country. The age-standardized rates are shown in Appendix VII.

1 Tobacco smoking includes cigarette, cigar, pipe, hookah, shisha, water-pipe and any other form of smoked tobacco.

2 For countries where prevalence of smokeless tobacco use is reported, we have published these data.

3 For a complete listing of countries by UN region, please refer to pages ix to xiii of *World Population Prospects: The 2010 Revision* published by the UN Department of Economic and Social Affairs in 2011 at http://esa.un.org/wpp/Documentation/pdf/WPP2010_Volume-I_Comprehensive-Tables.pdf. Please note that, for the purposes of this analysis, the Eastern Africa subregion was divided into two regions: Eastern Africa Islands and Remainder of Eastern Africa; and the Melanesia, Micronesia and Polynesia subregions were combined into one subregion.