Methodology for the estimation of use of tobacco, alcohol and other drugs

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Abstract

The objective of this article is to revise the methods used for the assessment of the use of tobacco, alcohol and other drugs. Analysing the advantages of using one method or the other, as well as the most frequent methodological difficulties and problems in medication and classification of each one of these indicators.

The main sources of information available from European, National and Madrid Autonomous Community levels have been consulted to estimate the most relevant aspects of these forms of substance abuse.

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Key words: Alcohol drinking. Tobacco use. Substance abuse. Questionnaire.

Abreviaturas

SIVFRENT: Surveillance System for Non-transmissible Diseases Risk Factors.
FAO: United Nation Food and Agriculture Organization.
WHO: World Health Organisation.
Q/F: Quantity Frequency Indexes.
EESE: European Survey of Health in Spain.
NHS: National Health Survey.
EDADES: Household survey on alcohol and drugs in Spain.
ESTUDES: State survey on the use of drugs by students in secondary school.
ESO: Obligatory Secondary education.

Introducción

One of the crucial elements for planning and adopting Public Health measures is having precise information available about the health status of the population and about the indicators of greatest influence regarding this status.

To obtain this information it is possible to have recourse to different sources. Some of these, statistics found in registers that while being comprehensive, do not cover all of the aspects of health and cannot be linked in many cases with sociodemographic variables nor with other health status determinants.

At the European level, a Health Survey is currently used to gather this information. Nonetheless, no uniformity exists in the manner of conducting these surveys and this leads to difficulties in comparing data from the different countries within our sphere which in turn create difficulties in providing indicators for the planning of common European Union policies.

As well as relying on different, relatively isolated studies, Spain has at its disposal some national population-based surveys which are systematically applied and conducted over periods of time which allow approaches to situational knowledge. However, each one presents its own characteristics that condition the validity of the data obtained, availability and an interpretation of the results.
Since 1995 the Madrid Region has had the Surveillance System for Non-transmissible Diseases Risk Factors (SIVFRENT) at its disposal as a tool for monitoring the distribution and the evolution of risk factors related to behaviour and preventive practice. This information serves to elaborate public health intervention policies and to evaluate their impact on the population.

Differences and similarities exist between the three types of substances: alcohol, tobacco and other drugs. As will be shown later, in the case of the legal substances like alcohol and tobacco, production records are available through which, in spite of methodological limitations which will be commented on in each section, an indicator of per cápita use can be obtained. This is not the case with illegal drugs in which these types of records are unavailable.

### Tobacco and alcohol use indicators

Health interventions must be based in reality. To monitor conducts which have a strong influence on health (such as diet, tobacco use, alcohol and other drugs) it is necessary to use systematic information sources which provide valid data.

Smoking is one of the main public health problems in developed nations and is the main cause of avoidable premature death. Tobacco use not only damages those who consume it but also those exposed to tobacco smoke. For this reason it is interesting not only to know the frequency of tobacco use but also exposure to the smoke itself.

The estimation of tobacco use in the population can be achieved by utilizing *per cápita* indicators or indicators obtained through surveys.

With regard to the use of alcoholic beverages we find that it is currently one of the main factors related to individual and public health status. From a public health perspective, having an estimate of quantities of use levels available and their distribution between different population level trends, is one of the main tasks towards planning different intervention strategies.

Indicators related to alcohol use in the population can be classified as direct or indirect. In the first group, those in which the quantity and frequency of use within the study population are directly measured are included, regardless of method.

On the other hand, indirect indicators are all those directed towards estimating aspects related to, in greater or lesser degree, with alcohol use, but which in no case are aimed at observing the quantity/frequency of alcohol use by the study population. Some examples of these types of indirect indicators are: alcoholic beverage production, indicators of the impact of alcohol related problems such as fatalities attributed to use, hospital admissions and death by suicide or homicide.

### Per cápita use

#### Tobacco

An estimation of per cápita tobacco use when tax and sales statistics are exact can reflect how a society consumes tobacco.

Data on sales of cigarette packs can be obtained from the Tobacco Market Commission and data on the Spanish population ages 15 to 16 from the National Institute of Statistics. In this way the number of cigarettes consumed by person and day can be estimated.

At the international level the population aged 15 or older is used as a denominator because it is assumed that minors below this age consume little of the available tobacco.

This indicator can show trends over time, that is to say, increases and decreases in global rates of use. However, it provides no information regarding consumer habits of different population groups. In this way, the indicator can remain stable if, for example, the number of male consumers decreases proportionally to an increase in the number of female consumers. It could also show a decreasing trend in spite of the fact that the index of adolescent smokers shows a significant increase (Table I).

A limitation of per cápita tobacco use is that it does not include illegal sales, for example, sales to tourists or tobacco smuggling. However it is a less costly method than surveys being that it is updated routinely with available statistics.

#### Alcohol

With regards to alcohol, annual (*per cápita*) use per person is a very direct population indicator for comparing geographical and/or temporal differences in morbidity and mortality, performing international comparisons, studying temporal series or carrying out ecological studies, thereby allowing for an approximation of its magnitude and evolution.

Sufficient epidemiological evidence exists to affirm that this indicator is strongly related to the distribution of alcoholic beverages throughout the population and spe-

<table>
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<tr>
<th>Advantages and inconveniences in estimating per cápita use of tobacco and alcohol</th>
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<tr>
<td><strong>Advantages</strong></td>
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<tr>
<td>Less costly</td>
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<tr>
<td>Indicator of use at a national level.</td>
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<td>Shows trends</td>
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cifically with the proportion of heavy drinkers that exist within it as well as with the frequency of problems related to alcohol. For this reason, the monitoring of global per cápita alcohol use trends over time is a useful tool for finding out the proportion of high-risk drinkers within the population⁶,⁷,¹¹.

Per cápita use calculation is based on information about production, importation, exportation and sales of alcoholic beverages made available from governmental statistics (taxes or fees), alcoholic beverage production data and estimates from the United Nation Food and Agriculture Organization (FAO)⁷.

It is expressed in litres of pure ethanol (overall or broken down by beverage type) assigning a standard alcoholic content for each type. Generally an estimation is performed on 3 groups of beverages: beer, wine and spirits, assuming average alcohol content. A fourth group of high grade wines can be added. Once the volumes of pure alcohol consumed have been obtained, the average quantity consumed during the year by each individual is calculated. This exact estimate takes the denominator of the legal drinking age population into consideration, eliminating the fraction of non-drinkers⁶,⁷.

However for international comparisons the 15 year or older population is usually used as a denominator taking into account data limitations.

Per cápita alcohol use is an indicator with many advantages, although there are also limitations (Table I). Regarding the advantages, it costs less with respect to survey methods, being that it is based on information regularly collected from many countries with a similar methodology, and therefore, it is used as an indicator of alcohol use at a national level⁶.

The inconveniences of this indicator can be classified in two categories: what they do not measure and what they cannot measure. Regarding the first, per cápita alcohol use estimates are generally derived from sales, manufacturing, commerce information and alcoholic beverage taxes. As such, neither illegal nor home-made alcohol production nor tourist use or alcohol smuggling are taken into account.

As for the second category, this type of indicator assumes that all of the alcohol available is consumed by the target population in the period of time being studied (usually a year). Therefore it does not allow for the identification of high risk groups in the population, problems related to excessive use nor does it identify population use patterns⁶,⁷,³,¹³.

At the international level, the World Health Organisation (WHO) annually publishes the per cápita use of multiple countries. In Spain, other sources of information are available such as the Food Use Panel which has published data on alcoholic beverage purchases in probability samples of households, eating establishments and institutions (quantity, price and expense). The National Institute of Statistics (NIS) annually performs the Family Budget Survey which includes information about alcoholic beverages consumed in households (litres and cost), and the Industrial Product Survey on national production of alcoholic beverages. All of these measure total litres of beverages that must be converted to pure ethanol to estimate per cápita use⁶,¹⁰,¹⁷.

Population health surveys

Tobacco

Questionnaires are the most commonly used method for monitoring the prevalence of tobacco use and the number of cigarettes smoked by the general population.

To study the consequences of the tobacco habit, it can be useful to understand its utilization. For this reason, the questionnaire must include questions which collect information about the different ways in which tobacco is consumed (cigarettes, cigars, pipe tobacco, roll tobacco).

In the identification of tobacco use patterns, the most common indicators are the frequency and the quantity consumed. The World Health Organization (1998)⁰ proposes the following categories of tobacco use patterns: non-smokers, ex-smokers and current smokers, in agreement with the following definitions shown in figure 1.

What is more, when low incidence populations or group populations are studied it is advisable to separate smokers that are in an experimental stage, that is to say, those who have still not smoked more than 100 cigarettes.

It is also important to know the number of cigarettes that are being smoked or were smoked in the past and the exposure time to tobacco. What is more, the additional category of the passive smoker, those individuals exposed to tobacco smoke in their environment, must be taken into account. All of these factors allow for the evaluation of health risk problems¹⁰.

Although questionnaires are commonly used and present relative validity they are not free of problems such as an incorrect statement (deliberate or not) on the part of the person being interviewed and the following mistaken cigarettes use classification. Moreover, the low social tolerance towards non healthy habits like tobacco use, is a possible factor of under reporting in health surveys.

Some surveys show a certain variation in the use of cigarettes smoked according to health surveys and that shown by data on tobacco sales, which shows an under-reporting of the number of cigarettes smoked given in health surveys in comparison with official sales figures¹³.

Alcohol

It is internationally admitted that the best way of approaching an understanding of alcoholic beverage
use and its determining factors in the population are through surveys. These provide disaggregated information on alcohol use in a sample population, factoring indicators such as starting age, frequency of alcohol use, proportion between drinkers and non-drinkers, average use or alcohol intake patterns7, 9.

Surveys allow for the detection of risk population groups and establish more solid associations between drink patterns, social-demographic factors and effects on health. Carried out periodically, they are also useful for planning and evaluating the effectiveness of implemented health policies7.

Survey methods have advantages and inconveniences. Amongst the advantages of surveys are the fact that they indicate who drinkers are. Intake data per cápita does not report the number of people that completely abstain from alcohol, and therefore does not distinguish between changes resulting from increases or decreases in the proportion of abstainers from those that reflect varying volumes of use in drinkers (Table II).

A second advantage of survey data is that it allows for the comparison of use amongst diverse sub populations of interest. Moreover, a survey, being that it is conducted by an individual, gathers information of a social-demographic character that’s use can be of great assistance in the detection of high risk groups or groups of special interest for intervention thus serving as an instrument of great utility for planning and evaluating sanitary policies6.

A third advantage of survey data is that it allows for the exploration of multiple aspects related to alcohol use, describing not only drinking habits (frequency and quantity of use, place of use, beverage type) but also attitudes and knowledge about alcohol and its consequences or problems related to excessive use. A person that has one drink a day has the same ingested volume as one who drinks seven in a row once a week; however the consequences of these two drinking models can be very different6,13.

Moreover, surveys carried out on a regular basis can be an extraordinarily useful instruments for the supervision and monitoring of alcohol use in the population. Among the inconveniences are found limitations related fundamentally with methodology.

In the first place the difficulty exists of selecting population samples that are representative of the general population from the existing sample. Another problem is that of defining the minimum age within the target population in which alcohol use is going to be studied, being that the legal age limit for alcohol sales could be a reference being that use among the young is ever more frequent6.

A second methodological difficulty is the choice of a good measuring tool that is sufficiently precise enough for estimating alcohol intake. Indicators for characterising types of use are equally necessary and therefore it is important to establish consensual definitions for classifying these different forms7, 18.

Another difficulty in surveys are the important resources needed for their execution. To this can be added the problem of the studying a habit that is very rooted socially but that has important negative connotations that make obtaining valid information on alcohol use, frequently underestimated, even more complex6,7,18.

In surveys for determining alcohol use, there exist two strong methods for collecting information by individual self-declaration: asking about characteristics of habitual use or asking that the respondent report daily use during a recent period of time.

With regards to the first method, two questions must be asked to the respondent: How frequently do you consume alcoholic beverages? and What is the quantity

<table>
<thead>
<tr>
<th>Nonsmokers</th>
<th>People who have never smoked</th>
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<tbody>
<tr>
<td>Ex-smokers</td>
<td>People that smoked more than 100 cigarettes in the past but not on a daily basis</td>
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<tr>
<td>Occasional</td>
<td>People that smoked more than 100 in the past during their lifetime and on a daily basis</td>
</tr>
<tr>
<td>Daily</td>
<td>People that smoked more than 100 cigarettes during their lifetime and currently smoke occasionally</td>
</tr>
<tr>
<td>Occasional smokers</td>
<td>People that smoked on a daily basis but do not now</td>
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<tr>
<td>Reduced smokers</td>
<td>Smokers that have smoked more than 100 cigarettes during their lifetime and currently smoke occasionally</td>
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<tr>
<td>Experimental</td>
<td>People that never smoked on a daily basis, that have smoked at least 100 cigarettes during their lifetime and currently smoke occasionally</td>
</tr>
<tr>
<td>Daily smoker</td>
<td>People that smoke everyday</td>
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</table>

you usually consume? This data, when properly dealt with, provides an average of the volume of alcohol habitually consumed6,9.

This type of measurement tool, denominated Quantity Frequency Indexes (Q/F) give information on the two dimensions of use. Frequency and quantity, it being necessary to bear in mind both when studying use patterns Q/F indexes serve as a global measurement of individual use. Their use is limited to those situations in which very limited space is available in a national survey on more general topics6,13.

Another mode of questioning called the graduated frequency and quantity questionnaire exists. In this case, subjects are asked about the frequency with which they consume specific quantities of alcoholic beverages in a single day, beginning generally with larger quantities and reducing to lesser quantities to encourage complete information. This is an efficient method regarding costs and the greater part of the essential information can be retrieved with 8 questions.

With the second method of self-declared alcohol use (daily use over a period of time) the respondents must state on a daily basis their use over a specific and concrete period of time, showing the quantity of alcoholic beverages consumed on each one of the last days6,9,13.

A quite generalised opinion exists that the measurement of alcohol use via surveys produces an underestimation of levels of use, although other studies detect the opposite phenomenon. Some reasons given to explain said underestimation have been a certain underrepresentation of heavy drinkers in the samples studied, being that confidential questionnaires provide more extensive information on alcoholic behavior than personal interviews13.

With regards to the ingested alcohol measurement unit, volumes ingested by the individual are usually measured by “drinks” being that this unit of measurement is easier to understand amongst consumers. To this end, investigators should define “drink” for the different beverage types, based on the quantity of grams of alcohol that they contain6.

The diverse typology and presentation of drinks that contain alcohol and the irregularity of consumer patterns over time, demand the use of very extensive questionnaires to estimate weekly ingestion, even more so during adolescence. The truth is that no common methodology is available that assures that the measurement of ingestion are comparable and sufficiently valid, a problem repeatedly pointed out by different authors that invoke the necessity of better standardization for measuring alcohol use1.

Table II

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Inconveniences</th>
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<tbody>
<tr>
<td>Identifies alcohol consumers</td>
<td>Methodological difficulties: simple selection, choice of measuring tool and indicators</td>
</tr>
<tr>
<td>Allows for comparisons between population subgroups</td>
<td>Needs important resources for implementation</td>
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<tr>
<td>Detects high risk groups</td>
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<tr>
<td>Useful in planning and evaluation Health policies</td>
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<tr>
<td>Describes habits, attitudes y knowledge</td>
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<td>Instrument of surveillance and monitoring</td>
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Types of interviews

With regards to the ways in which information is collected, the most common are telephone interviews, personal interviews and self-administered questionnaire.

The advantage of using self-administered questionnaires is that information about aspects which people may feel embarrassed to tell an interviewer is obtained. The disadvantage is that it is necessary to have a high level of education. One option that seems quite interesting is a combination between them all, where the interviews have self-administered sections for the most conflictive parts.

When it comes to the interview modal, this can be carried out face to face or by telephone. The telephone interview is an option only in those countries in which practically every household has a telephone. In those cases, the cost of a telephone interview is substantially lower than those of personal interviews4,13.

At times a self-administered section is included in a personal interview so that the interviewer can collect information that the respondent possible would find uncomfortable giving verbally. This option requires a relatively high level of literacy in all of the population sectors included in the survey sample. However it appears that confidential questionnaires provide more extensive information on alcoholic behavior than personal interviews13.

The use of telephone surveys has increased notably in the last few decades owing, above all, to the good price-efficiency ratio and the possibility of quickly having collected information available.

Different studies have compared telephone interviews with those performed face to face and, in general, the results have shown very similar estimations, with a tendency towards a reduction in differences between both methods in the most recent work.
In a study conducted in the Madrid Region, it was shown that the prevalence of diverse health risk factors related to behavior and preventative practices is similar when the data is obtained by home telephone interview as well as in household face to face interviews. However the reduction in the economic cost, as well as the greater flexibility in speed of execution, made this first methodology an efficient technique for utilization in monitoring systems in geographic areas with high telephone coverage, obtaining as well, a good questionnaire reproducibility, with consistently high estimations in the prevalence of groups when repeatedly applied to the same individuals, and also describe a good individual conformity. These results agree with those observed in other studies, which also utilize continual survey methods based on telephone methodology as a source of information in monitoring systems based on these factors.

Indicators of use of other drugs

Surveys are the best way of estimating illegal drug use.

In the case of some substances used prevalently by adolescents, such as cannabis, it is necessary to have indicators available which permit the differentiation of use levels which show greater risk or reflect the existence of a disorder (such as harmful use, abuse or dependency). In the case of other drugs, the low prevalence that are generally observed in population studies require a search for more significant indicators, this being the case of the indicator: number of times the drug has been used. Through the use of this indicator, it is possible to distinguish experimental users (those that have only tried the drug 1 to 5 times without continuing use upon having experienced the effects), regular users (those that have used the drug more than 5 times) and heavy users (those that have used each substance on more than 50 occasions).

Some available sources of information

Some of the sources of available information for the three types of substances (alcohol, tobacco and other drugs) at the European level, Spanish level and Madrid Region level will be set out below, as well as methodological criteria that is used.

At European levels

European Survey of Health in Spain (EESE)

This survey is promoted by the Directorate General of Health and Consumer Protection of the European Commission (DGSANCO) and coordinated by the European Statistics Office (Eurostat). The first edition took place in 2009 and since then take places every five years. It is carried out in 18 EU countries using a common European questionnaire about 16 year olds. Its main objective is to obtain data about health status, lifestyles and the use of health services in a harmonic fashion which is comparable at a European level. This information permits planning and evaluation of European and national performance in health matters.

The questionnaire consists of five modules. In one of them, a self-administered part is included in which the respondent report their tobacco, alcohol and drug use habits.

At Spanish levels

In Spain, the Ministry of Health periodically carries out diverse population studies. One of these is the National Health Survey (NHS) which has been conducted since 1987 and takes place with irregular frequency in the 15 year and older population. The Government Delegation for the National Plan on Drugs carries out the Home Survey on Drugs and Alcohol in Spain on the population between the ages of 15 and 64 and the State Survey on Drug Use in Secondary Education on the population between 14 and 18 years of age. Both are published have been biannually since 1997 and 1994 respectively, allowing for an assessment of the evolution of alcohol use.

National Health Survey (NHS)

The National Health Survey is an investigation directed towards the general population of 15 and older which allows us to obtain information about the health status of the Spanish population, and compare morbidity life styles and the use of health services with each other and with certain socio demographic and geographic characteristics.

Information collected through personal interviews made to adults (individuals 16 and over) through interviews with the mother, father or tutor in the case of children (individuals from 0 to 15 years old)

Questions that are related to the smoking habit and alcohol use are placed in the section about habits and lifestyles but only in the questionnaire directed to the adult population sample (population 16 and older) and do not appear in the child sample (population 0-15 years). The method of collection is a personal interview via computer.

Household survey on alcohol and drugs in Spain (EDADES)

This survey is directed towards the general population ages 15-64. The questionnaire is conducted in the
person’s household. The first part is given in a face to face interview and a second part dealing with questions about drug use are self-completed by the respondent with the object of facilitating the confidentiality of the answers. The questions lead to a better understanding of drug availability, the inherent risk of different forms of use, ways of obtaining drugs, preferred and utilized information to do so, as well popular opinion about the importance of the drug problem and ways of reducing it.

State survey on the use of drugs by students in secondary school (ESTUDES)

This survey is directed to students between the ages of 14 and 18 with the objective of knowing the situation and trends of drug use, patterns of usage, associated factors and the opinions and attitudes of this population group towards drugs.

Self-completed questionnaires are used and the confidentiality of the respondents is guaranteed.

**AT Madrid Region level**

The Surveillance System for Non-transmissible Diseases Risk Factors (SIVFRENT) was put into practice in 1995 for adults in (SIVFRENT-A) and in 1996 for young people (SIVFRENT-J).

With this system an attempt is made to learn about the distribution and the evolution of risk factors related to behavior and preventive practices. Information serves to elaborate public health intervention policies and evaluate their impact on the population.

**Sivfrent A**

Results are based on a telephone survey conducted annually to a sample of 2000 people from ages 18 to 64 residing in the Madrid Region. The questionnaire consists of a central core questions that remain the same over a period of time so as to be able to make comparisons, grouped together in the following sections: physical activity, nourishment, anthropometry, tobacco use, alcohol use, prevention practices, road safety and accident rates (Table III).

**Sivfrent J**

This is directed to the young population between the ages of 15 and 16 and measures the prevalence, distribution and characteristics of the major risk factors related to behavior. It is based on annual serialized surveys undertaken with a sample of approximately 2000 schooled individuals in the 4º course of Obligatory Secondary education (ESO) in The Madrid Region.

### Table III

<table>
<thead>
<tr>
<th>Methodological characteristics and questionnaire sections related to alcohol, tobacco and other drug use, Surveillance system of risk of non-transmittable disease. (SIVFRENT)</th>
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<tbody>
<tr>
<td><strong>SIVFRENT-A</strong></td>
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<tr>
<td><strong>Starting Date</strong></td>
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<td><strong>Target population</strong></td>
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<td><strong>Sample design</strong></td>
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<td><strong>Sampling size</strong></td>
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<tr>
<td><strong>Method</strong></td>
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<tr>
<td><strong>Alcohol use</strong></td>
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<tr>
<td><strong>Tobacco use</strong></td>
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<tr>
<td><strong>Illegally purchased drugs</strong></td>
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</table>
The questionnaire is made up of core questions that remain unchanged over time so as to be able to make comparisons, and a flexible section that is periodically modified according to public health necessities. Aspects of physical activity, nutrition, behavior related to food disorders, overweight and obesity, tobacco use, illegal drug and alcohol sales, sexual relations, accident rates and road safety (Table III).

Conclusion

There are many valuable information sources available to estimate the use of alcohol, tobacco and other drugs based on the method used. It is necessary to have valid and comparable data available on health status and its determinants as a key element of a health policy based on evidence.

The survey method provides information not only in relation to use but to other important aspects. Nonetheless, to be able to compare different surveys it is necessary to homogenize the questionnaires considering some methodological aspects like: volume measurement in the case of alcohol, categorization of use, age groups, etc.

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