

PAHO/HCP/HCN/99.08
ORIGINAL: ENGLISH

PROPOSAL FROM PAHO

NETWORKING FOR THE SURVEILLANCE
of Risk Factors for Non-Communicable Diseases
in Latin America and the Caribbean



DIVISION OF DISEASE PREVENTION AND CONTROL
PROGRAM ON NON-COMMUNICABLE DISEASES

PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION

SEPTEMBER 1999

“Good surveillance does not necessarily ensure the making of the right decisions, but reduces the chances of wrong ones”

Institute of Medicine, 1988

Presentation

This report is a collaborative effort of the Program on Non-Communicable Diseases, Division of Disease Prevention and Control of the Pan American Health Organization with several partners who kindly provided comments and suggestions at different stages of the process. We are indebted to all of them.

Member countries have come forward requesting technical cooperation in this area. The vast literature on behavioral risk factor surveillance from industrialized countries provides technical elements for understanding the benefits as well as the caveats of undertaking this task. However, the adaptation to different conditions requires not only the technical input, but also the effort to make changes that are methodologically sound.

We look forward to working with member countries in putting these ideas into practice; to discovering and analyzing together the diverse reality of developing countries; and in drawing from their continual enthusiasm.

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Executive Summary

Non-communicable diseases (NCDs) account for approximately two thirds of the mortality of Latin America and the Caribbean (LAC), and this proportion is rapidly increasing. A critical component in preventing and controlling these diseases is monitoring their risk factors. Although several one-point-in-time risk factor surveys have been conducted in LAC their results are not comparable across countries and over time. To address this situation, PAHO has conducted a consensus process to recommend to its member countries a standard methodology to produce valid, reliable and comparable estimates of the prevalence of key NCD risk factors. This consultative process raised the following basic design issues: a) what variables should be measured, b) in which population groups, c) what sampling methodology should be used, and d) what logistical problems should be taken into account.

Three types of variables are recommended to be included, first, socio-demographic, individual level risk factors and, community-level and environmental factors, such as the availability and price of foods, availability of recreation spaces, and availability of transportation. Individual-level risk factors should be included based on the strength and consistency of the scientific evidence linking the factor to NCD and injuries and the expected prevalence of the factor. Accordingly, behaviors such as smoking, unhealthy diet, physical activity, alcohol consumption, and use of seatbelt and helmets, biological factors such as overweight, high blood pressure, blood cholesterol, diabetes, and psychosocial factors should be considered. In conjunction with, questions pertaining to the use of effective preventive services. Self-reported measurement of all these variables would be a core requirement for risk factor surveillance, while measurements requiring lab techniques or additional information could be left as an optional but nevertheless standardized component.

Cross-sectional surveys repeated every 3 to 5 years are proposed for surveillance at this time to obtain population-based estimates of risk factor prevalence and their trends. At an initial stage surveillance might be restricted to adults 18-64, with the option of extending surveillance to other age groups depending on feasibility and resources. Surveys should be conducted in representative communities because countrywide surveillance is likely to be unfeasible at this time in many countries of LAC for economic and logistical reasons.

Multistage cluster probability sampling with stratification is recommended. Clusters should be selected with probability proportional to size and stratified by socioeconomic factors and/or geographic location within the community. The suggested sample size would need to detect changes over time for risk factors with prevalence of 20% or more. For risk factors with lower prevalence, strata may have to be pooled.

The objectives of the surveillance system will be monitoring trends and distribution of risk factors, monitoring the impact of policies and programs, and disseminating appropriate information on a timely basis. Based on these recommendations, PAHO is working to create a Pan American Network to Monitor Risk Factors for NCD, which will provide the necessary quality assurance and technical support to countries and produce valid, reliable and comparable estimates.

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Surveillance of Risk Factors for Non-Communicable Diseases in Latin America and the Caribbean

1. Introduction

1.1. The Burden of Non-Communicable Diseases

Over the next ten years, it is estimated that 11,033,000 people in Latin American and Caribbean (LAC) will die from cardiovascular diseases, 5,724,000 from cancer and 3,334,000 from external causes. Nearly 23% of cardiovascular deaths and 39% from cancer deaths will occur among people under the age of 60, which clearly represents premature mortality that can be prevented or postponed (PAHO 1998). Research has demonstrated that much of this disease can be prevented if known risk factors are reduced. Consequently, in order to develop public health policies and programs it is necessary to know the prevalence and distribution of risk factors in the population, as well as trends in different population groups. Risk factor surveillance is, therefore, an important tool for the prevention of non-communicable diseases.

1.2. Rationale for monitoring risk factors for non-communicable disease and injuries in Latin America and the Caribbean

Several surveys of non-communicable disease risk factors have been conducted in LAC, although only two countries, Cuba and Colombia, have conducted national risk factor surveys. (see for example Lessa et al 1996; Martins et al 1993; Piccini and Vitora 1994; of Lolio et al. 1993rd, 1993b; Rego et al 1990; Llanos and Libman 1995; Duncan et al. 1993; Litvak et al 1987, Ordúñez 1998, Jadue et al 1999). However, the lack of standardization of methodologies used across surveys and differences in the information collected makes the comparability of the results difficult (Lessa et al 1996; Llanos and Libman 1995; Rego et al 1990). In addition, most have been one-time cross-sectional surveys and have not been systematically repeated over time, making it impossible to assess time trends. To address this situation, PAHO is working to develop recommendations for its member countries on a standard methodology to produce valid and reliable estimates of the prevalence of risk factors, in a sustainable manner. For this purpose, the following definition of surveillance is proposed.

Public health surveillance system is the on-going, systematic collection, analysis and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. The final link of the surveillance chain is the application of these data to prevention and control. A surveillance system includes a functional capacity for data collection, analysis, and dissemination linked to public health programs. (CDC 1988).

By adopting this definition, there is recognition that the monitoring of risk factors is a critical component of the strategy for health promotion and non-communicable disease prevention. Therefore, it would be desirable for all member countries to develop a system that would provide estimates of the prevalence of risk factors, in order to favor a comprehensive and integrated approach to the prevention of NCD's. Since surveillance systems measure changes over time, they would eventually become an important tool in evaluating the effectiveness of prevention strategies and policies.

2. PAHO's approach to seek consensus on a standard methodology

At the end of 1996 the Program of Non-communicable Diseases at PAHO submitted for consultation the document entitled “*Recommendations on a standard methodology for the monitoring of risk factors for non-communicable diseases in Latin America and the Caribbean*” (Document PAHO/HCP/HCN/96.02). This document was circulated among selected experts, with experience in LAC. This consultative process raised the following four basic design issues: a) what variables should be measured, b) in which population groups c) what sampling methodology should be used and, d) what logistical problems should be taken into account. Consideration was given to the feasibility of surveillance in relation to cost and complexity.

A second version (Document PAHO/HCP/HCN/97.02), which incorporated suggestions and observations of the reviewers, was submitted for a second round of comments to the same expert group. As a result of this process, a final, Revised Version has been prepared. The result of this first phase is presented here. The last step of this process is a consultation meeting to discuss unresolved issues. The conclusions of this meeting will be included in guidelines recommended to member countries. The discussion on individual-level variables for surveillance is included in the annex.

3. Specific objectives of risk factor surveillance

The specific objectives of the proposed risk factor surveillance are the following:

- Monitoring trends and distribution of risk factors
- Monitoring the impact of interventions, and
- Timely and appropriate dissemination of information.

4. Desired characteristics of risk factor surveillance

The following are considered to be desirable characteristics of the proposed risk factor surveillance system:

- a) Ability to generate reasonably valid and reliable estimates of the prevalence of risk factors, and changes over time.
- b) Core standardized components common to all countries and all time periods.
- c) Flexibility to incorporate additional items according to needs and resources of different countries, or at different times.
- d) Information collected, analyzed, and reported at a level directly relevant to the implementation and evaluation of interventions.
- e) Information stratified by age, gender, and socioeconomic status, at least
- f) Simplicity.
- g) Standardization of methods to allow comparisons within countries and across countries over time.
- h) Non duplication of existing systems.
- i) Standardized quality control and quality-assurance mechanisms at the data collection

and data entry levels.

- j) Sustainability.
- k) Periodic evaluation of the usefulness of the information collected for public health policy decisions

5. What information should be included in surveillance?

5.1. Individual-level risk factors

Initially, two elements need to be considered in deciding which risk factors to include in surveillance: 1) the strength and consistency of the scientific evidence linking the factor to NCD and injuries and 2) the expected prevalence of the factor in the setting in which it is being measured. Modifiability of the risk factor is an additional consideration.

Several behaviors and biological measurements have been identified in the scientific literature as risk factors for NCD, of which the most important are cigarette smoking, sedentary lifestyle, high fat content diet, obesity, hypercholesterolemia, and hypertension. (DHHS 1991, Stamler 1987, WHO 1990) Excessive alcohol consumption is associated with chronic liver disease and is a major risk factor for disability and death associated with motor vehicle related injuries (DHHS 1991). Psychosocial factors, including social support, characteristics of the work environment and depression have been shown to be related to cardiovascular disease. (Marmot 1982; Berkman 1982; Rosenman 1982; Theorell 1992). Although not risk factors in the traditional sense, the use of selected preventive services has a demonstrated effectiveness in reducing mortality from cancer of the breast and cervix. There is general agreement that screening by mammography and clinical examination in women 50-69 years of age or older reduces breast cancer mortality (The Canadian Task Force 1994; US Preventive Services Task Force 1996), and early detection through PAP smears and others screening methods can decrease mortality from cervical cancer (The Canadian Task Force 1994; US Preventive Services Task Force 1996). Similarly, the use of seat belts and helmets has been found effective in reducing deaths and disabilities resulting from motor vehicle related injuries (The Canadian Task Force 1994, US Preventive Services Task Force 1996).

Existing evidence suggests that many of these factors are highly prevalent or are becoming highly prevalent in LAC countries. The prevalence of smoking in adults in LAC has been estimated to range from 30 to 50% in men and from 10 to 30% in women (PAHO 1992; Lessa et al. 1996; Duncan et al. 1993; of Lolio et al. 1993, Ordúñez et al 1998, Jadue et al 1999). Paradoxically, infant malnutrition may coexist with high prevalence rates of overweight in some adult populations, even as high as 30-55% in some groups (PAHO 1998; Foster et al 1993). The prevalence of hypertension has been estimated to range between 8 and 30% in existing studies (Lessa et al 1996; Duncan et al 1993; Rego et al 1990; Piccini and Vitora 1994; of Lolio et al 1993b; Berrios et al. 1990; Alvarez Perez et al. 1992)). Even higher prevalence of hypertension (over 40%) has been documented in some countries of the Caribbean (Foster et al 1993; Ordúñez et al 1998). High prevalence of hypercholesterolemia (as high as 30-40%) has also been documented in some areas (Lessa 1996). The few studies that have quantified physical activity have also documented high prevalence rates of sedentary lifestyle (as high as 50-90%) (Duncan et al. 1993; Rego et al. 1990; Berrios et al. 1990; Ordúñez et al 1998, Jadue et al 1999). Even diabetes, previously relatively uncommon in many developing countries, appears to be growing in importance (Vaughan et al 1989; Phillips and Salmeron 1992; PAHO 1998; Llanos and Libman 1995), with prevalence estimates for Latin American countries generally ranging between 5 and 10% (Llanos and Libman 1995). Much higher prevalence (as high as 18%) has been

documented in some countries of the Caribbean (Foster et al 1993). Although we do not have data on the prevalence of helmet and seat-belt use, motor vehicle related injuries are a major cause of death in the countries of LAC (PAHO 1998). The importance of cervical and breast cancer as causes of death in women emphasizes the potential preventive impact of screening, although traditional programs have not been successful in all countries (Robles et. al. 1996.). Unfortunately, there is no systematic information on the prevalence of psychosocial factors potentially related to NCD's and injuries.

In summary, surveillance should initially focus on factors strongly and consistently associated with NCD and injuries in existing scientific literature. Most of the associations described above have been investigated in industrialized countries, and it is possible that the strength of the associations, and relative importance of the risk factors may differ in other social and cultural settings. Additional risk factors particularly relevant to the context of LAC may be incorporated as more information and research on NCD and injuries in LAC countries becomes available.

5.2. Community-level and environmental factors

Traditional epidemiological studies of NCD and surveillance of risk factors for NCD and injuries have tended to focus on characteristics of individuals (biological measurements, behaviors, psychological characteristics). However there is substantial evidence that community-level and environmental variables may be related to NCD and injuries (Schmid et al 1995; King et al 1995; Glantz et al 1995; Brownson et al 1995). Community-level variables potentially related to NCD may include, for example the availability and price of foods, availability of public recreation spaces, proximity to sources of toxic substances, availability of public transportation, prevalent norms and behaviors, sources of socio-environmental stress, etc. Understanding the role these variables play may be important in strategies to modify individual-level factors.

Countrywide factors related to regulations, policy, and consumption may also be of use in understanding the determinants of population distributions. This country-level information may be an important complement to surveys of risk factors in individuals. The CINDI program, for example, has suggested measurement of variables related to food consumption and food policy on a national basis for dietary surveillance (Leparski and Nussel 1987)

The availability of community-level and country-level data will allow examination of associations of collective and individual variables with risk factor distributions. These preliminary analyses will also serve to stimulate debate, and possibly research on other community-level aspects potentially important in shaping the distribution of NCD and injuries, which can subsequently be incorporated into the survey instrument.

5.3. Demographic and socio-economic variables

Because risk factor prevalence and trends are known to vary by age and gender, it is important to generate age and gender specific estimates. In addition, socio-economic status is known to be a powerful predictor of risk factor prevalence and trends in industrialized nations and is also likely to be of substantial importance in countries of LAC. For this reason, the collection of information on socio-economic indicators is a crucial component of surveillance.

6. Population surveyed

6.1 Representativeness of surveillance and method of surveillance

Essentially three different populations can be used for risk factor surveillance: the general population, health services users, and captive populations. Surveillance of each of these groups has implications in terms of the generalizability of the estimates and the operational difficulties involved. Although conducting surveillance of risk factors among health services users or other closed populations such as students or workers may be logistically easier, it may lead to substantial bias in estimating prevalence and trends in the population as a whole. The surveillance system should therefore be capable of monitoring risk factor trends in persons who may not have reason to contact the health system frequently. A periodic cross-sectional survey approach is proposed for surveillance at this time as the most valid and reliable way to obtain population-based estimates of risk factor prevalence and trends. Although monitoring risk factors in adolescents and youths is an area of growing interest, we propose that at an initial stage surveillance be restricted to adults 18-64, with the option of extending surveillance to younger and older sectors depending on feasibility and resources

6.2. Areas for surveillance

The ideal surveillance system would be capable of generating both countrywide and regional estimates, but countrywide surveillance is likely to be unfeasible at this time in many countries of LAC for economic and logistical reasons. An acceptable population-based alternative is to conduct surveillance in communities selected to be as representative as possible of different areas within the country. In the selection process countries may take into account socioeconomic characteristics (including the existence of very poor or deprived groups), age distribution, and the potential importance of NCD in the area. The number of communities on which surveillance should start should be left up to each country: some may wish to start on only one community, others may wish to begin with two or more diverse communities. Likewise, the definition of “community” should be flexible.

7. Measurement issues

Standardized measures should be used whenever possible. This will allow comparisons within countries over time and across countries. For some items (e.g. social class, diet and exercise patterns) direct comparisons across countries may be difficult, since the same measure may imply different things in different contexts. Measures used in the past in the context of international studies and surveillance in other countries should also be adapted and used as much as possible. Unfortunately most of the measures used in risk factor surveillance and epidemiological studies have been used extensively only in industrialized countries. It is anticipated that risk factor surveillance will provide the opportunity to test the validity and reliability of some of these measures, and new measures more appropriate to the LAC setting may be developed as a result of this. Measurement tools need to be simple logistically and economically feasible. Each item should ideally be assessed with a short number of simple questions.

7.1. Individual-level variable

As a result of the consultation, there was consensus that there should be standardized core variables plus the flexibility to add variables of local interest. Inclusion of the required core component is based not only on the relevance of information on the subject but also on the ease of measurement in the context of surveillance and the availability of adequate measurement instruments. Several items are included in the optional component with the intent of moving them into the required core once countries have proposed and tested measurement instruments. It is anticipated that risk factor

surveillance is in place, modules on additional topics may be included as required by the countries when the table below enumerates the core requirement of and optional component of the proposed risk factor surveillance. A more detailed description of the variables, which resulted from the consultative process, is included as an annex.

| Measurement | Core requirement | Optional requirement |
|-----------------------------|--|--|
| Cigarette smoking | Self-reported tobacco consumption | Nicotine metabolites and questions about cessation |
| Blood pressure | Blood pressure measurement knowledge of problem and time elapsed since last measurement | |
| Cholesterol | Self-reported cholesterolemia | Blood cholesterol fractions measurement |
| Overweight/Obesity | Measurement of height and weight | Waist to hip measurement |
| Diabetes | Self-reported diabetes and medication | Blood glucose measurement |
| Diet | Brief questionnaire on food consumption and related behaviors | 24-hour food consumption questionnaire |
| Physical activity | Brief standardized questionnaire | Extended standardized questionnaire |
| Alcohol Consumption | Self-reported consumption | |
| Psychosocial factors | Stress scale | Social support, depression |
| Use seatbelt/helmets | Self-reported use | |
| Preventive Services | Self reported use | |
| Social class | Education, income, occupation | |
| General health | Self-reported health status | |

7.2. Community-level and country-level variables

As noted above, community-level variables add an important dimension to understanding the distribution of NCD risk factors. However, identifying, operationalizing and measuring relevant variables raise additional complex issues. At this point we propose that surveillance include available information on social and economic characteristics of community will contribute to the interpretation of survey results, and that efforts be made by interested investigators to develop and test additional variables to include in future surveys. Monitoring some of these countrywide factors may be of use in understanding the determinants of population distributions. This country-level information is an important complement to surveys of risk factors in individuals. Collecting this information as part of NCD surveillance will allow systematic comparisons across countries.

8. Survey design

Surveillance will be carried out by means of repeated cross-sectional surveys every 3-5 years. For some countries or cities, the possibility of telephone survey could be evaluated if phone coverage is adequate, so that frequency of surveys can be shorter.

8.1. Selection of communities

Communities for surveillance should be administratively and geographically defined, have an estimated adult population (aged 18-65) of at least 100,000, be representative of the country or an area within the country (eg. state or province). It is desirable that not be an area with a very high

population turnover. In countries where CARMEN demonstration site exist, it would be desirable that these be one of the selected communities for surveillance.

8.2 Survey design and sample size

Multistage cluster sampling with stratification clusters was recommended to select the sample. If possible, clusters should be selected with probability proportional to size and stratified by socioeconomic factors and/or geographic location within the community.

A sample size of about 200 per subgroup is acceptable for cross-sectional estimates over the range of prevalence expected, and is also adequate to detect changes over time for risk factors that are continuous variables and for risk factors with prevalence of 20% or more. A sample size of 200 per group is consistent with the sample sizes estimated for the MONICA surveys (MONICA 1989). For risk factors with lower prevalence, important changes over time may go undetected with this sample size. However, if strata are pooled, the minimum differences detectable will be substantially reduced.

8.3 Quality assurance and quality control

Activities related to quality assurance and quality control will include among others: detailed development of standardized protocols and procedures for all aspects of the survey (including standardization and calibration of instruments), training sessions for survey staff and certification and periodic re-certification. Mechanisms will be put in place so that any problems identified can be quickly corrected in the field.

8.4. Miscellaneous issues: survey logistics, informed consent, feedback, and referrals

Conducting interviews and examinations at the participant's household is likely to result in higher participation rates than requesting that participants to centralized site. Possibility of telephone surveys as the utilized by the BRFSS will be considered.

Informed consent should be obtained from all participants informing them of the purpose of the survey, of any risk/benefits of participating in the survey, and emphasizing that no personal identifiers will be collected, and that their participation (or non-participation) will in no way affect their health care or access to services. Mechanisms will be put in place to inform participants in a timely fashion of any laboratory results. In addition, interviewers will be trained regarding procedures for any necessary referrals (for e.g. if hypertension or hypercholesterolemia is discovered as part of the survey).

9. Data analysis and dissemination

The group undertaking surveillance in each country should have good data analysis capabilities and access to the required computer packages. PAHO will provide technical assistance for analyses as needed. Each country will elaborate reports separately.

10. Final considerations

Surveillance of risk factors for NCD is a relatively new component of public health practice in LAC. A number of data sets are used, each with specific strengths and limitations. The goals of the surveillance differ at national, state, and local levels. The pace of demographic change and the growing societal burden of NCD in LAC will demand attention and, one would hope, will accelerate the development of better surveillance systems.

Another situation that should be taken into account for the implementation of surveillance systems is the current process of health care reform of which an important aspect is decentralization of public institutions. Local health services are strengthened and sometimes, acquiring more decision making capacities and resources. At the same time the role of the central ministry of health is redefined to provide leadership in its normative and regulatory functions in the context of a separation of health care providers from health financing.

Taking into account this scenario, surveillance systems could provide essential information for designing, implementing, and evaluating disease prevention and control activities specially in LAC, where surveillance data are often untimely, incomplete, and unrepresentative of populations and relative little available. Another factor that affects the demand for surveillance data is lack of epidemiologic skills most ministries of health. Improving surveillance in such settings is challenging, but not an impossible, task.

One strategy that could be successful is the process of consultation initiated by PAHO in order to recommend member countries a standard methodology to produce valid and reliable estimates of the prevalence of the risk factors. Such proposal offers an approach to improving surveillance by increasing the demand for high quality data, by applying the results of analysis to disease prevention and control activities, and by providing feedback to those involved in data collection.

PAHO is working to create a Pan American Network to Monitor Risk Factor for NCD. The proposal is that the net provides the necessary quality assurance and technical support. Regionally, information from countries that comply with quality standards will provide the basis for inter-country comparisons. Surveillance of risk factors for NCD is both necessary and practical in the LAC.

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Annex 1

Surfnets discussion document about individual-level variables

Cigarette smoking

Numerous questionnaires on smoking history have been used in epidemiologic studies and in surveillance. Self-reported smoking status has generally been found to be a valid estimate of true smoking status in the settings in which it has been tested (Bowlin et al 1993) although the validity of self-reported smoking in LAC has not been assessed. In order to monitor trends in smoking it is important to collect information not only on smoking status but also on age of onset, quantities smoked by current and former smokers, and quit attempts.

Core requirement

- Smoking status: information allowing categorization into current, former, and never smokers based on WHO criteria (1996).
- For current smokers:
 - age of onset
 - average number of cigarettes smoked per day
 - number of quit attempts in last year
- For former smokers:
 - age of onset and age quit
 - average number smoked at time of regular smoking

Optional component

- Validation of self-reported cigarette smoking by measuring nicotine metabolites (cotinine or thyocyanate) in saliva or urine in subsample
- Cessation method used to quit
- Type of professional, if any, involved or helpful in quit attempt
- Smoking status for pipe and cigars
- Second hand smoke (e.g. hours spent per day in closed environments where people smoke)
- Knowledge, attitudes, and beliefs about smoking.

Blood pressure

Self-reports of hypertension are unlikely to yield valid estimates of true hypertension, particularly in countries with limited access to health care. In addition, it is also important to obtain information on the distribution of systolic and diastolic blood pressure in the population (and not only whether they are categorized as hypertensives or not according to health providers' definitions). Blood pressure can be measured adequately and relatively simply as part of surveys as long as standardization, training and quality control mechanisms are put in place.

Core requirements

- Systolic and diastolic blood pressure measures: the average of last two of three measures will be used.
Measurement instruments and procedures will be carefully standardized and interviewers trained and certified in measurement techniques.
- How long since last had blood pressure measured by health professional
- Self-reported history of high blood pressure
- Has an MD ever recommended treatment because of high blood pressure:
 - lifestyle modifications (exercise, alcohol reduction, reduction of sodium intake, weight loss)
 - pharmacologic

This information will allow estimation of:

- percent hypertensives based on standard criteria (systolic blood pressure 140mmHg, or diastolic blood pressure 90 mmHg or current use of antihypertensive medication (NCHS 1994a).
- prevalence of hypertension awareness: percent of hypertensives by standard definition (whether aware or unaware of their condition) who self-reported hypertension
- proportion under treatment for hypertension: percent of hypertensives by standard definition who report being treated for hypertension (by means of non-pharmacologic and pharmacologic methods)
- -proportion under control for hypertension: out of all persons currently being treated for hypertension, what percent have normal blood pressure readings (<90mmHg diastolic and <140mmHg systolic).
- percent of persons who have had their blood pressure checked within the last two years.

Cholesterol

Several different blood lipids are important as cardiovascular disease risk factors, but for surveillance purposes total cholesterol with the optional addition of HDL-cholesterol is sufficient. As in the case of hypertension, self-reported hypercholesterolemia is not likely to be a valid indicator of population prevalence of hypercholesterolemia. However, laboratory measurements may be costly and blood extraction logistically difficult in the context of surveillance. In addition, in order to be useful and comparable across countries and over time, careful laboratory standardization is required. Methods of collection, storage and processing also need to be standardized. For these reasons, cholesterol measurements are initially proposed as an optional component, with the hope that they may be incorporated into the core as surveillance becomes better established. The interpretation of self-reported information will bear in mind the limitations outlined above.

Core requirements

- Ever had blood cholesterol measured
- Ever told by MD or other health professional that cholesterol was high
- Ever recommended treatment for high cholesterol by MD or other health professional
 - nonpharmacologic (diet, weight loss, exercise)
 - pharmacologic

Optional component

- Total cholesterol measured by venipuncture or finger stick methods (can be non-fasting)
- HDL-cholesterol

These measures may be performed by countries initially on a subsample in order to allow preliminary estimations and comparisons with self-reported information. All measures need to be performed by a central standardized laboratory.

Overweight/Obesity

Of the different indicators of obesity and overweight available, body mass index (weight in kg/[height in meters]²) is one of the most commonly used. Waist-to-hip ratio, an indicator of body fat distribution, has also been shown to be associated with cardiovascular risk. Although weight and height have been shown to be reported with acceptable validity in industrialized countries, the validity of these measurements in the countries of LAC has not been established. Direct measurement is therefore recommended. Measurement techniques need to be standardized and instruments regularly calibrated.

Core requirements

- Weight and height measured using standardized methods and calibrated instruments.

The information obtained will be used to categorize participants based on standard WHO categories for body mass index (WHO 1995a).

Optional component

- Waist-to-hip ratio measured using standardized methods
- Self-reported height and weight can be collected on a sample and validated for use of self-reported information in future surveys.

Diabetes

The validity of self-reported diabetes as an indicator of diabetes prevalence is known to have important limitations (Geiss et al 1993; Bowlin et al 1992; Harris 1990). The WHO recommends that venous plasma glucose ≥ 200 mg/dl two hours after an oral glucose load of 75 grams, be used as diagnostic criteria for diabetes (WHO 1985, 1994). Persons with levels 140-199 mg/dl after two hours are classified as having impaired glucose tolerance (IGT). However the feasibility of carrying out glucose tolerance tests in the context of the proposed surveillance is limited (at least in the initial round). An alternative is to complement self-reports with fasting glucose measurements.

Epidemiologic studies have used fasting plasma glucose ≥ 140 mg/dl (after an 8-10 hour fast) as a case-definition for diabetes, although this definition may have relatively low sensitivity (Harris et al 1987). Recently the American Diabetes Association has proposed using 126mg/dl as the cutoff. Given the logistical difficulties involved, serum glucose measurements are not proposed for inclusion in the core component at this time. However, in countries where a high prevalence of diabetes is expected (such as some Caribbean countries), it may be useful to include glucose measurements in the core component from the outset.

Core requirements

- Ever been told by an MD that had diabetes. Age of diagnosis.
- Current use of insulin and current use of hypoglycemic agents

Optional component (particularly for countries where prevalence is believed to be relatively high):

- Fasting glucose (8-12 hour fast)
- Glucose tolerance in subsample

Diet

Diet is a combination of a series of related behaviors which are often culture-specific, and their measurement is complex. The same questionnaire will not necessarily yield equally valid and reliable results in all populations. Although it is desirable to include some measure of dietary assessment in risk factor surveillance, its inclusion is contingent on the use of measurement instruments whose use is not excessively cumbersome for surveillance and that yield reasonably valid estimates in the setting in which they will be used. We propose that the initial objective of dietary surveillance be to evaluate predominantly fat consumption.

Comprehensive dietary assessment involving detailed recall methods or extensive food frequency questionnaires and estimation of nutrients based on food composition tables may be excessively complex for surveillance purposes in many countries of LAC, at least in the initial stage. A feasible and useful alternative is to utilize brief food frequency questionnaires to focus on qualitative or roughly quantitative changes over time in the frequency of consumption of certain foods in the area (for e.g. foods high in fat or high in sodium) or on the prevalence of certain dietary behaviors such as trimming fat from foods, consumption of low-fat or low-sodium items etc. Several brief food frequency questionnaires focusing on dietary fat have been developed (Block et al 1989; Ammerman et al. 1991; Hopkins et al. 1989). A short dietary questionnaire assessing dietary behaviors and including a brief food frequency questionnaire was included in the CINDI proposal (Leparsky and Nussel 1987). These questionnaires can be modified to reflect regional dietary characteristics in consultation with local experts. Because of the complexities of dietary assessment, we propose that dietary questionnaires initially be included on an optional basis in some countries, and subsequently included in the core requirements.

Optional component

- Interviewer administered brief food frequency assessing intake of high fat foods (meats, dairy, eggs) and fruits and vegetables
- Interviewer administered brief questionnaire on dietary behaviors (adding salt, trimming fat, drinking low fat milk).

Or

- More extensive food frequency or dietary recall methods developed in consultation with local nutritional experts.

In the absence of already developed country-specific questionnaires developed by local experts, questions should be initially modeled on existing surveys (e.g. the CINDI questionnaire, BRFSS questionnaires or others). It is anticipated that efforts to develop more appropriate instruments will be undertaken simultaneously with surveillance.

Physical activity

Many different questionnaires have been designed to assess physical activity. Some questionnaires have been developed to yield precise quantitative estimates of physical activity or energy expenditure (for e.g. Helmrigh et al. 1991; Taylor et al 1978), others have developed physical activity scores or indices (for e.g. Baecke et al 1982; Kannel and Sorlie 1979), and still others have focused on more qualitative or semi-quantitative appraisals which allow categorization of persons into two or three categories based on their work and leisure-time activities, as is done in several reports of the BRFSS (Anda et al 1989; Marks et al. 1985) and other surveys (Gillum et al 1996; Salonen et al. 1982; Leparsky and Nussel 1987; Zimmet et al. 1991).

Although the most consistent evidence regarding the relationship between lack of physical activity and risk of cardiovascular disease refers to physical activity during leisure time (Salonen et al. 1982), in some populations work itself may be an important source of physical activity (or lack thereof). Housework may also be an important source of physical activity in some settings.

We propose to initially measure physical activity using a qualitative/semiquantitative approach (for e.g. the questionnaire used in the CINDI program). Countries may choose to include different assessments, including quantitative measures or indices on an optional basis. It is anticipated that the information gathered as part of surveillance and the systematic pilot testing of other questionnaires may lead to the development of better tools for the measurement of physical activity in the context of LAC.

Core requirement

- Semiquantitative/qualitative questionnaire adapted from existing surveys (CINDI, BRFSS or other)

Optional component

- Other quantitative measurement instruments (e.g. modified version of Baecke et al questionnaire, or Taylor's questionnaire), some of which have been validated in Spanish-speaking countries.

Alcohol consumption

Many different questionnaires to assess alcohol consumption have been reported in the literature. Unfortunately, the validity and reliability of these measures in LAC has not been established. Alcohol consumption has often also been assessed as part of global dietary assessment, but because the proposed surveillance does not include a comprehensive dietary questionnaire, this option is not feasible here.

We therefore initially propose to include a short series of questions to assess habitual alcohol intake, as well as the performance of activities such as driving or operating machinery while intoxicated.

Core requirement

- Questions aimed at quantifying drinking.
- How many times over the past month have you had 5 drinks or more on one occasion?
- Over the past month, have you ever driven a vehicle when you'd perhaps had too much to drink?
- Over the past month, have you ever operated machinery when you'd perhaps had too much to drink?
- Additional questions from standardized questionnaires aimed at identifying problem drinkers (e.g. presence of legal/work/social problems related to alcohol consumption)

Types of beverages considered alcoholic as well as the size of a "drink" of each beverage will be specified.

Psychosocial factors

Because of their complexity, psychosocial factors are difficult to measure and standardize in a valid and reliable manner. In addition, instruments often need to be culturally-specific. Numerous different scales and measurement instruments addressing different aspects of psychosocial factors potentially related to NCD (particularly cardiovascular diseases) have been developed and used for research purposes. The areas assessed have included stress, social support, personality, psychosocial characteristics of the work environment, and others. There is no one measurement instrument which has been systematically used in surveillance. This is an area definitely in need of further development. In order for results to be meaningful, questionnaires applicable in the surveillance setting in LAC will need to be developed and tested. We propose that psychosocial measurement be included at minimum as an optional component in order to begin to test and validate measures. An alternative is to include at least a small set of these measurements in the core component, based on standard questionnaires used in other settings such as the CHEWE (Coronary Heart Disease in East and West Europe) study or MONICA.

Core component

Brief questionnaire on stressful life events, or psychosocial characteristics of the work environment.

Optional component

Additional more extensive questionnaires for validation.

Use of seatbelts/helmets

Seatbelt and helmet belt use can be assessed by interview questions or by direct observation. Direct observation implies the selection of a sample of vehicles on the streets and recording the use of seatbelts or helmets in selected vehicles by a trained observer. Cases presenting at emergency rooms can also provide useful information for surveillance. Although the validity and reliability of self-reported use in LAC has not been established, we currently propose to collect information on self-reported seat-belt and helmet use as part of the cross-sectional surveys. This information may be complemented with that obtained from other sources as surveillance is established, and its validity and reliability tested.

Core requirement

- Frequency of using seat-belts when driving or riding a car.
- Frequency of wearing a helmet when driving or riding a motorcycle.

Preventive services

Many different items in reference to use of preventive services may be useful in the surveillance of NCD risk factors. Questions on having had blood pressure and cholesterol checked have been discussed above in the corresponding section. In addition, we propose the inclusion of a few general questions on access to care. These questions may be more relevant in some countries than in others, but will allow general comparisons across countries and regions. Because of the importance of cervical and breast cancer as causes of death among women, and the documented utility of screening in preventing deaths from these diseases, we also propose including questions on history of having had mammograms and PAP smears in women of the appropriate ages.

Core requirement

- Health care coverage
- Time since last visited a doctor or health professional for a routine check-up
- Time since last visited a doctor for other reasons
- Knowledge of PAP smear test, history of ever having had a PAP smear among all women, and of having had a PAP smear within previous three years among women aged 35-65.
- History of having had a mammogram within previous two years among women aged 40-69 years

Social class

In industrialized countries, social class has been found to be associated with nearly all risk factors for non-communicable diseases, with risk factor levels increasing in the lower social classes. Trends over time have also been found to vary by social class. Similar patterns are likely to be emerging in

many developing countries, as the importance of chronic diseases increases. Social class indicators should therefore be included as part of surveillance systems for non-communicable disease risk factors in order to allow monitoring of social class differences over time.

The operationalization and measurement of social class is a complex issue. The specific indicators used and their categorization may need to differ in different societies. These indicators may include a variety of measures such as occupation, income, and skills or education. The information collected on occupation should include type of occupation as well as additional detail on relationship to the organization of work (e.g. differentiating self-employed, salaried employees, and employers; supervisory and non-supervisory positions; skilled and unskilled occupations; workers who own their workplace and those who do not; number of employees etc). They should allow categorization into at least three groups (more if possible). The traditional approach used in many epidemiologic studies has been to stratify persons by income, education, or occupation. However, more complex operationalizations of social class combining several indicators which may more adequately capture social class differences have also been proposed and tested in LAC (Lombardi et al. 1988; Barros 1986; Bronfman and Tuirán 1984).

Core requirement

Information on household income (as well as number of adults and children in household) and education (years and degrees obtained). Information on employment status (employed, unemployed, homemaker). Information on occupation should include brief job description (and employment sector) as well as additional questions differentiating employers (with number of employees), salaried or hourly employees, and self-employed, as well as non-supervisory and supervisory positions. Initially information should be collected with as much detail as possible and subsequently used to categorize individuals.

General health

Information on self-reported general health (and possibly quality of life) may be useful in interpreting risk factor distributions. A multitude of quality of life instruments have been developed, many quite specific and extensive. At this point we propose the inclusion of a simple set of questions on self-reported health status, which has been validated in many contexts. Additional modules on this topic may be incorporated in future surveys.

Core requirement

- Questions on self-reported health status.

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