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Summary

Surveillance of risk factors for noncommunicable diseases

The WHO STEPwise approach

Noncommunicable Diseases and Mental Health
World Health Organization
Geneva

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The content of the WHO STEPS document including the recommended core and expanded questionnaires is available on the Internet at:

http://www.who.int/ncd_surveillance

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Preface

The growing burden of noncommunicable diseases (NCD) represents a major challenge to health development. WHO has responded by giving higher priority to NCD prevention, control and surveillance in its programme of work. Surveillance involves ongoing collection of data for better decision-making. It underpins public health action and health promotion activities.

The WHO STEPwise approach to surveillance (STEPS) is the WHO-recommended NCD surveillance tool. We are building one common approach to defining core variables for surveys, surveillance and monitoring instruments. The goal is to achieve data comparability over time and between countries. STEPS offers an entry point for low and middle income countries to get started in NCD activities. It is a simplified approach providing standardized materials and methods as part of technical collaboration with countries, especially those that lack resources.

Too often countries take second STEPS too early. STEP 1 involves obtaining core questionnaire-based data on those risk factors that have a major impact on health and are most amenable to intervention. Once STEP 1 is in place, countries can build upon it: more complex data can be added sequentially as resources allow. STEPS implementation at the country level is strategic, coordinated, builds capacity and is sustainable.

It is surveillance data that unites all our programmes. Some countries need data to assess current levels of risk, and others to assess the effectiveness of policies and strategies. The STEPS framework is WHO's contribution to building sustainable surveillance systems which improve national capacity and provide the information necessary for NCD prevention and control. This approach will lead to better integration of NCD policy and programme development.

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Summary

The emerging epidemic of chronic diseases

Increased burden of chronic diseases

The increasing burden of noncommunicable diseases (NCD) (2), particularly in developing countries, threatens to overwhelm already-stretched health services. The factors underlying the major NCDs (heart disease, stroke, diabetes, cancer and respiratory conditions) are well documented. Primary prevention based on comprehensive population-based programmes is the most cost-effective approach to contain this emerging epidemic.

INCREASING NCD BURDEN THREATENS TO OVERWHELM ALREADY-STRETCHED HEALTH SERVICES

The basis of NCD prevention is the identification of the major common risk factors and their prevention and control (3). WHO recommends that, where resources are available, data on diseases (for example, heart disease, stroke, cancer) be included in the surveillance process. Such information is also important in assisting health services plan and determine public health priorities. From a primary prevention perspective, surveillance of the major risk factors known to predict disease is an appropriate starting point.

Scaling up WHO's response

In 2000, the 53rd World Health Assembly passed a resolution on the prevention and control of noncommunicable diseases (4) with the goal of supporting Member States in their efforts to reduce the toll of morbidity, disability and premature mortality related to NCDs. This global strategy has three main objectives:

- to map the emerging epidemics of NCDs and to analyse their social, economic, behavioural and political determinants to provide guidance for policy, legislation and finance;
- to reduce the level of exposure of individuals and populations to the common risk factors for NCDs;
- to strengthen health care for people with NCDs.

A well-functioning NCD surveillance system is an integral part of public health. As part of the wider health information system, surveillance provides information for better decision-making in countries. The use of the information determines the data collected and the speed necessary for the information flow within the system. The WHO STEPS document (5) argues for NCD surveillance as an essential national public health function.

A WELL-FUNCTIONING SURVEILLANCE SYSTEM IS AN INTEGRAL PART OF PUBLIC HEALTH

The goal of the WHO global NCD surveillance strategy is to provide standard methods and tolls to enable countries to build and strengthen their capacity to conduct surveillance. The underlying framework is an integrated, systematic approach aimed at sustainable national collection of data on NCDs and their risk factors.

STEPS is currently being carried out in four WHO Regions namely AFR, EMR, SEAR and WPR and covers more than 35 countries. Over 46 countries have been trained in regional and national training workshops increasing capacity building at country level, a key item of STEPS philosophy.(1)

The WHO NCD global surveillance strategy includes:

- identification and description of the key NCD risk factors, using recommended WHO definitions;
- a coordinated approach for conducting surveillance of risk factors that upholds scientific principles and is sufficiently flexible to meet local and regional needs;
- technical materials and tools, including training, to support the implementation of surveillance;
- effective communication strategies for providing data to planners of policy and intervention programmes, decision-makers, potential funding sources, as well as to the general public;
- affordable technology to share information within and between countries to allow international comparisons; and
- state of the art technology to allow harmonisation of data to provide comparable estimates in standard age and sex groupings.

The framework for surveillance: a STEPwise approach

The STEPS approach provides a framework for surveillance of NCD risk factors, NCD-specific morbidity and mortality (Table 1).

Table 1: The WHO STEPwise approach to NCD surveillance

NCD	Step 1	Step 2	Step 3
Deaths *(the past)*	Death rates by age and sex	Death rates by age, sex and cause of death (verbal autopsy)	Death rates by age, sex and cause of death (death certificate)
Diseases *(the present)*	Hospital or clinic admissions, by age and sex	Rates and principal condition in 3 groups: communicable diseases, NCDs and injury	Cause-specific disease incidence or prevalence
Risk factors *(the future)*	Questionnaire-based report on key risk factors	Questionnaires **plus** physical measurements	Questionnaires **plus** physical measurements **plus** bio-chemical measurements

THE RISK FACTORS OF TODAY ARE THE DISEASES OF TOMORROW

The STEPs approach is based on the concept that surveillance systems require standardized data collection to ensure comparability over time and across locations. It is also sufficiently flexible to be appropriate in a variety of country situations and settings. The STEPwise approach, therefore, allows for the development of an increasingly comprehensive surveillance system, depending on local needs and resources. While the STEPS approach can be similarly applied to disease-specific mortality and morbidity, the focus of the first STEPS document (5) is its implementation for key NCD risk factors. This is in recognition of the fact that ongoing surveillance of even major diseases such as heart attack and stroke are complex, costly, and difficult to achieve on an ongoing basis. Similarly, while national registration of deaths is undertaken routinely in many countries, this is not the case in many developing countries.

Rationale for selecting a limited set of core risk factors

A "risk factor" refers to any attribute, characteristic, or exposure of an individual, which increases the likelihood of developing a noncommunicable disease. In the context of public health, population measurements of these risk factors are used to describe the distribution of future disease in a population, rather than predicting the health of a specific individual. Knowledge of risk factors can then be applied to shift population distributions of these factors.

Because many factors associated with disease cannot be modified, emphasis in any surveillance system should be given to those risk factors that are amenable to intervention (6,7). Surveillance of just eight selected risk factors (Table 2) which reflect a large part of future NCD burden can provide a measure of the success of interventions. For example, inappropriate diet and physical inactivity – resulting in high body mass index, raised blood pressure and unfavourable blood lipids – together with tobacco use, explain at least 75% of cardiovascular disease (8).

The rationale for inclusion of core risk factors is therefore that:

- they have the greatest impact on NCD mortality and morbidity;
- modification is possible through effective primary prevention;
- measurement of risk factors has been proven to be valid; and
- measurements can be obtained using appropriate ethical standards.

Table 2: Risk factors common to major noncommunicable conditions

Risk factor	Condition			
	Cardiovascular disease*	Diabetes	Cancer	Respiratory conditions**
Smoking	✓	✓	✓	✓
Alcohol	✓		✓	
Nutrition	✓	✓	✓	✓
Physical inactivity	✓	✓	✓	
Obesity	✓	✓	✓	✓
Raised blood pressure	✓	✓		
Blood glucose	✓	✓	✓	
Blood lipids	✓	✓	✓	

* Including heart disease, stroke, hypertension.

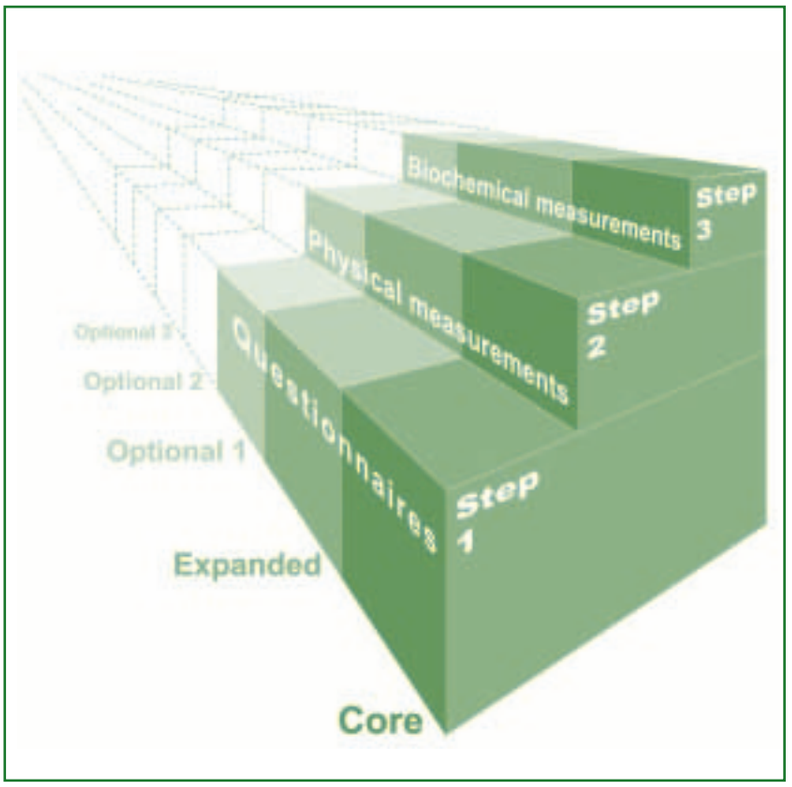
** Including chronic-obstructive pulmonary disease and asthma.

NCD risk factor surveillance in the WHO STEPwise approach

SMALL AMOUNTS OF GOOD QUALITY DATA ARE MORE VALUABLE THAN LARGE AMOUNTS OF POOR DATA

STEPS is a sequential process, starting with gathering information on key risk factors by the use of questionnaires (Step 1), then moving to simple physical measurements (Step 2), and only then recommending the collection of blood samples for biochemical assessment (Step 3). (See Figure 1.)

Figure 1: WHO STEPS – NCD risk factors: Concept



By using the same standardized questions and protocols, all countries can use the information not only for monitoring within-country trends, but also for between-country comparisons. The questionnaires and methods recommended must therefore be relatively simple. The assessment methods selected for STEPS were chosen on the basis of their ability to provide trends in summary measurements of population health. Hence they may not necessarily give a complete picture of each risk factor. Each country needs to determine which additional modules are appropriate and what can be accomplished in the context of an ongoing surveillance system.

Components of the WHO STEPwise approach

For surveillance to be sustainable, the STEPwise approach advocates that small amounts of good quality data are more valuable than large amounts of poor quality data.

The conceptual framework underlying STEPS is shown in Table 3. The key feature is the ***distinction between*** the *different levels of risk-factor assessment:*

- information by questionnaire (**Step 1**),
- physical measurements (**Step 2**), or
- blood samples for biochemical analyses (**Step 3**);

and the three modules involved in describing each risk factor:

- core, expanded core and optional.

Table 3: STEPS approach to risk factor assessment

Modules	Levels		
	Step 1: Questionnaire-based	**Step 2: Physical measurements**	**Step 3: Biochemical analyses**
Core	Socio-economic and demographic variables, tobacco use, alcohol consumption, physical inactivity, fruit and vegetable consumption	Measured weight and height, waist circumference, blood pressure	Fasting blood sugar, total cholesterol
Expanded core	Fat consumption, education, household indicators	Hip circumference	HDL-cholesterol, triglycerides
Optional (examples)	Other health-related behaviours, mental health, disability, injury	Timed walk, pedometer, skinfold thickness, pulse rate	Oral glucose tolerance test, urine examination

SURVEILLANCE SYSTEMS INCLUDE THE ONGOING COLLECTION, ANALYSIS AND USE OF HEALTH DATA

Step 1 – Questionnaire-based assessment

A Step 1 study is based on self-reported information. The core module of Step 1 contains as markers of current and future health status socio-economic data, data on tobacco and alcohol use, some measurements of nutritional status and physical inactivity. Standard WHO definitions for measuring the prevalence of tobacco use (9) and alcohol consumption (10) and internationally devised measures of physical activity are recommended (11,12).

All countries should be able to undertake the core items of Step 1.

Step 2 – Questionnaires and physical measurements

A Step 2 study includes as a minimum the Step 1 core module and *adds* simple physical measurements such as blood pressure, height, weight and waist circumference.

Step 1 and Step 2 are desirable and appropriate for most countries.

Step 3 – Questionnaires, physical measurements and biochemical assessment

A Step 3 study incorporates as a minimum the core modules from Steps 1 and 2 and adds measurements obtained from blood samples.

The additional information at Step 3 is of a biochemical nature and is therefore not recommended by WHO in less well-resourced settings unless low-cost technology is used.

Tailoring STEPS to suit local needs

One of the greatest challenges in developing STEPS has been to achieve a balance between ensuring standardized tools and methods, and flexibility for use in a variety of country situations and settings. STEPS allows all countries to contribute to improving global information about trends in key measures of health.

Expansion of the basic core questions is possible in settings where resources and local surveillance needs allow a more comprehensive assessment of these key risk factors. For both modules, core and expanded core, assessment guidelines and standard questionnaires are provided. Optional modules can also be added at Step 1 to include more data on risk and protective behaviours, for example information on seat-belt use, sexual behaviour, attitudes, beliefs, practices and health services use. A summary of the information procured at different levels – core, expanded and optional – is shown in Table 4.

Throughout the STEPS document (4), however, WHO recommends a limited set of key risk factors for NCD surveillance. Within the selected core variables, choices must be made which distinguish between surveillance purposes and research purposes.

The cost of collection of data as well as its analysis, interpretation and use must be kept in mind when planning the implementation of STEPS.

Table 4: Modular listing of information procured at each step

	Core	Expanded	Optional (examples)
Risk factors at Step 1			
Demography	Age (25-64; 10-year groups), sex, education (years), urban/rural	15-24 and/or 65-74 years, ethnicity, highest level of education, occupation, household income	75-84 years, household size, marital status, household amenities, etc.
Tobacco	% current daily smokers (+ frequency, duration); % ex-smokers (daily), mean age starting	Amount, time since quitting, type of tobacco consumed	Passive exposure to smoke, attempts to quit, beliefs, knowledge, attitude, behaviour (KAB), etc.
Alcohol	% who consume alcohol currently and in past	Quantity: average volume, binge drinking	Problem drinking, knowledge and attitudes, etc.
Nutrition	% who eat high/low serving of fruit/vegetable	Dietary patterns	Food frequency questionnaire, etc.
Physical inactivity	% sedentary during occupation and non-occupation, physical activity related to transport patterns	% very active during occupation and non-occupation, mean energy expenditure	Mean energy expenditure at occupational and non-occupational times, etc.
Other			Other risk factors (self report), mental health, perceived health, oral health, violence, intentional injury, unintentional injury, risky behaviour; ARV use; etc.
Added risk factors at Step 2			
Obesity	[M] Height, weight, waist	[M] Hip circumference	[Q] hx of weight loss, of maximum weight; [M] Bioimpedance; etc.
Blood pressure	[M] mean levels of systolic and diastolic blood pressure	[Q] % on treatment for raised blood pressure (diet, drugs)	[Q] % aware of blood pressure measurement, heart disease, stroke; compliance, [M] heart rate, family hx cardio-vascular disease; etc.
Added risk factors at Step 3			
Diabetes	[B] mean levels of fasting blood glucose	[Q] on treatment for diabetes (diet, drugs, insulin)	[Q] Family hx diabetes; [B] Oral glucose tolerance test; etc.
Blood lipids	[B] mean levels of blood cholesterol	[B] Triglycerides [B] HDL Cholesterol	[Q] hx of cholesterol awareness, hx of treatment (diet, drugs), etc.
Tobacco			[B] Carbon monoxide; [B] Serum cotinine; etc.
Alcohol			[B] Serum gamma GT; etc.

Key:
[Q] Questionnaire-based information, either self- or interviewer administered
[M] Physical measurement
[B] Biochemical measurement
hx history

Towards an NCD surveillance system

RESEARCH AND SURVEILLANCE TOGETHER ENSURE BETTER QUALITY DATA FOR DECISION-MAKING

The critical components of a surveillance system include the ongoing collection, analysis and use of health data (13,14). Demographic or health information systems (for example, registration of births and deaths, routine abstraction of hospital records, health surveys in a population) that are not linked to specific prevention and control programmes, do not constitute a surveillance system. However, data collected from ongoing health information systems may be useful for surveillance when systematically analysed and applied to policy in a timely manner.

In some countries, surveillance of NCD risk factors is already under way. For other countries, an appropriate first step towards initiating surveillance is to conduct a "baseline" survey of sufficient sample size to have the power to detect changes over time. To achieve this, STEPS recommends that a basic survillance site includes, as a minimum, surveys of an approximate sample size of 2000 individuals depending on the age group of interest. For example, a sample of 2000 adults from the core age group, 25-64 years, would ensure adequate power to detect trends in key risk factors by sex and age (14). Additional variables such as ethnicity or rural/urban residence will require larger sample sizes. Repeat surveys are then undertaken to identify trends. Intervals between data collections will vary depending on the nature of the data to be collected and the infrastructure available.

The establishment of routine and continuous risk factor surveillance as a dedicated entity within a department or ministry of health, while ideal, may only be achievable for some countries.

While surveys can be a one-off exercise, surveillance involves commitment to data collection on an ongoing (repeated) basis, as well use of the data for informing public health policies and programmes (16). There are different aspects of ongoing versus periodic data collections (Table 5) that need to be considered in planning NCD surveillance.

Table 5: Ongoing versus periodic information collection

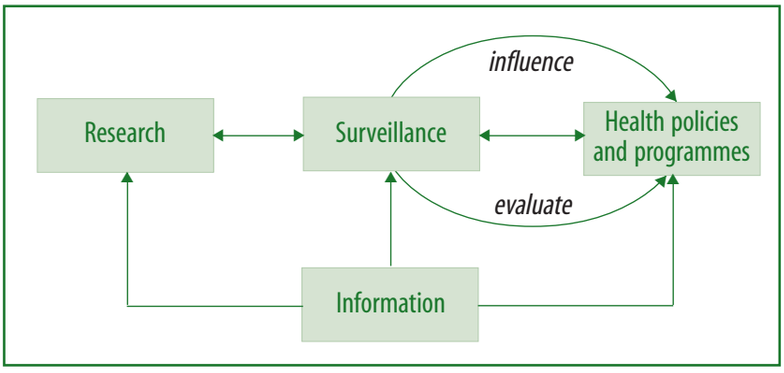
	Continuous collection	Periodic collection
Data collection	Smaller teams	Larger teams or multiple teams
Data accessibility	Initially slow	Faster turnaround for cross-sectional status report
Data for trend analyses	Provisional trends provided on ongoing basis	Trend data after three rounds of data collection
Evaluation of health intervention	Monitoring of impact of specific programs	Not necessarily linked to intervention
Budget	Line item in health budget	One-off investment at each cycle

Nevertheless, surveys undertaken on a periodic basis are more often seen as easier to implement than large-scale national surveys.

THE OVERALL GOAL IS TO DEVELOP SUSTAINABLE SURVEILLANCE INFRASTRUCTURE

The link between information collected and its use to influence health policies is a characteristic of a surveillance system. Furthermore, surveillance can be used to evaluate health policies and preventive interventions (Figure 2). Research and surveillance interact to ensure that recommended policies and interventions are cost-effective and that surveillance methods are valid. In this sense, better quality data improve decision-making.

Figure 2: Characteristics of a surveillance system



The information contributing to an integrated surveillance system can come from multiple sources ranging from population-based surveys to indicators from data monitoring economic activity (Table 6).

Table 6: Information sources for surveillance purposes

Source	Information
Surveys	Population-based data
Disease registries	Incidence and case fatality
Hospital activity data	Morbidity and health service use indicators
Administrative data	Births, deaths, insurance claims, medication use, health systems performance, hospital audits
Aggregate consumption data	Per capita consumption
Economic activity data	Economic indicators

Most countries have well-established infectious disease surveillance systems. Surveillance of both infectious and non-infectious diseases share similar functions and can use the same structures, processes and personnel. Sharing of experiences and resources also avoids duplication of efforts and addresses the needs of public health programmes. However, one of the key differences between communicable and noncommunicable disease surveillance is that the first focuses mainly on identifying individuals and reporting counts, and the latter focuses on the population burden and distribution of risk factors and conditions. Hence, integration presents particular challenges and could result in restriction of the usefulness of either approach. Nevertheless

synergies based on common principles and logistics, including training, should be explored in the context of an overall public health surveillance system.

Future development of WHO STEPS

The overall goal of the WHO STEPS Programme is to develop sustainable infrastructure for NCD surveillance in countries. Improved NCD surveillance will ultimately be reflected in more effective health policy. The WHO STEPS approach represents the WHO-recommended NCD surveillance tool. The content of the WHO STEPS document including the recommended core and expanded questionnaires is available on the Internet at:

http://www.who.int/ncd_surveillance

We expect the STEPS process to continue during the implementation phase and, as a tool, to evolve further over time. After addressing risk factors the STEPS approach will be applied to include surveillance of NCD and to develop rapid assessment methods for describing country capacity of NCD surveillance. In the meanwhile, WHO will foster and encourage participation in the growing WHO STEPS network which includes training and ongoing support in data analysis and use. Countries wishing to implement the WHO STEPS approach are invited to join this growing network.

Strategic alliances are necessary at the global, regional and national levels to implement the WHO STEPS strategy effectively. These are fostered and encouraged by participation in the STEPS network and the WHO Global NCD Infobase.

The WHO STEPS programme is coordinated by the Director of Surveillance in the Noncommunicable Diseases and Mental Health Cluster at WHO Geneva. Close collaboration with the WHO regional offices, WHO collaborating centres and nongovernmental organizations has already enabled the implementation of STEPS in 7 countries following the first STEPS training workshop in Australia. The next four regional workshops will take place in Fiji, South Africa, Lebanon and Thailand in 2002. This will help a further 18 countries to prepare implementation of the WHO STEPS approach.

By the end of 2003, participants from 49 countries will have attended the WHO STEPwise training and implementation workshops in four of the WHO Regions, AFRO, EMRO, SEAR, WPR.

AMRO/PAHO is introducing STEPS in 2004.

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