

INTEGRATED DISEASE SURVEILLANCE PROJECT

NCD RISK FACTOR SURVEILLANCE

**TRAINING MANUAL FOR FIELD WORKERS AND
FIELD SUPERVISORS**

HANDOUTS

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1. What is Surveillance and its advantages?

Definition of Surveillance: Surveillance is ongoing systematic, collection, collation, analysis, and interpretation of health data; and dissemination of information to those who need to know in order that action is taken, in order to promote health and prevent disease.

Surveillance is continuous process of collection of Information for Action. **The potential advantages of surveillance include:**

- 1) It provides good quality, reliable data for decision-making and for development of effective public health policy to control and prevent NCDs in the population.
- 2) It is an essential tool for evidence-based public health decision-making and for monitoring of the success of public health interventions. It therefore provides information for evidence-based health care.
- 3) Surveillance is an effective tool for health advocacy.
- 4) It guides in optimum allocation of health resources.

A NCD Surveillance system would help in **assessing prevalence of NCD, establishing risk factors** among various populations, **monitoring trends** in population health behaviors and risk factors for chronic disease over time, determine the **need for chronic disease prevention and control programs** and help **prioritize the allocation of health resources**. It would **guide the planning and evaluation of prevention and control program**, Improve prevention and control programs by advancing clinical, epidemiological and health services research, provides a comprehensive database for public awareness, consumer input, and collective actions to improve the public health.

The ultimate aim is to contain and reduce the emerging epidemic of chronic NCD through development and implementation of effective surveillance mechanisms.

2. Rationale and Need for Non-communicable Disease (NCD)

Surveillance

Non-communicable diseases (NCD) are responsible for a high proportion of the death and disability in all countries. In developing countries the burden of disease caused by NCD is increasing rapidly and will have significant social, economic, and health consequences. Based on current trends, by the year 2020 non-communicable diseases are expected to account for 73% of deaths and 60% of the global disease burden. Most of this increase will result from the epidemiological transition in developing countries, although the burden of NCDs in developed countries also continues to increase steadily. The key to control the global epidemics of NCDs is primary prevention based on comprehensive population-wide programmes. The aim is to avert these epidemics wherever possible and to control them as quickly as possible where they are entrenched. Reliable and comparable analysis of risks to health is critical for previous disability and injury. The basis of NCD prevention is the identification of the major common risk factors and their prevention and control. The eight major NCD risk factors were identified in the World Health Report 2002 “Reducing Risks, Promoting Healthy Life”. Leading causes of risk factor burden vary between developed and developing populations, although several major risks such as high blood pressure, tobacco and alcohol have become generalized. Leading causes of disease burden in high mortality developing regions were childhood and maternal under nutrition including underweight (15%), micronutrient deficiencies (3% for each of iron deficiency, vitamin A deficiency and zinc deficiency), unsafe sex (10%), poor water and sanitation (5.5%) and indoor smoke from solid fuels (3.6%). It is noteworthy that tobacco, blood pressure and cholesterol are already among the leading causes of disease burden even in these regions.

In a world of finite resources, the priority is to collect data on risk factors for diseases, which will be included in the surveillance process. Such information is important in assisting health services plan and determine public health priorities by predicting the future caseload of NCDs. While data on major risk factors for NCDs are available in many developed countries, these data are scarce for many developing countries. Lack of

this information is seriously handicapping efforts to control NCD epidemics. Data must be collected, analyzed and used in a regular and systematic way using standard methods and instruments for comparability over time and across location. The interval between the episodes of data collection may vary depending on the different measurements involved and the infrastructure available to conduct surveys. Surveillance involves commitment to data collection on an ongoing (repeated) basis, combined with the use of data to inform public health policy.

3. How does NCD surveillance differ from CD surveillance?

NCD surveillance is challenging since NCDs are chronic diseases and have long latent period of exposure to risk factors and clinical manifestations. A surveillance system for a chronic disease is aimed at assessing its prevalence, identifying people at risk, establishing risk factors and monitoring trends over time. NCD risk factor surveillance is performed by determining the prevalence of risk factors as measured by periodic sample surveys conducted once in 3 to 5 years. It differs from usual surveys that capture information at only one period of time and yield data of limited interest. The frequency of reporting in NCD risk factor surveillance is much less as compared with CD surveillance.

Communicable Vs Non-Communicable Diseases	
<p><u>Communicable</u></p> <ul style="list-style-type: none"> • Sudden onset • Single cause • Short natural history • Short Treatment schedule • Cure achieved • Single discipline • Short Follow up • Back to normalcy 	<p><u>Non Communicable</u></p> <ul style="list-style-type: none"> • Gradual Onset • Multiple etiology • Long natural; history • Prolonged treatment • Care predominates • Multidisciplinary • Prolonged follow up • Quality of life after treatment

4. Overview of WHO STEPwise Approach to NCD

Surveillance:

The WHO STEPwise approach provides a framework for surveillance of NCD risk factors, NCD specific morbidity and mortality. It is based on two key premises: collection of standardized data, and sufficient flexibility for use in a variety of country situations and settings. This approach encourages the development of an increasingly comprehensive and complex surveillance system depending on local needs and resources. The STEPS approach can be similarly applied to disease-specific mortality and morbidity, the focus however is the 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.

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

NCD Risk factor surveillance: To start with, WHO recommends surveillance of risk factors for NCD and if funds permit this could be extended to NCD morbidity and mortality. This is because primary prevention is the key to control of this epidemic of NCDs. The major NCDs like cardiovascular diseases, cancer, chronic obstructive pulmonary disease and diabetes mellitus share common, preventable life style risk factors like, tobacco use, unhealthy diet and physical inactivity. Population measurements of these risk factors are used to describe the distribution of future disease in population. Risk factors of today are diseases of tomorrow. When NCDs become clinically manifest it is already very late in the natural history of the disease. The treatment of manifest NCDs like cardiovascular diseases and cancers is expensive, labor-intensive and needs technological sophistication. Many cannot afford the prohibitive costs of bypass surgery and angioplasty in treatment of coronary heart disease. India is a poor country with scarce resources and competing priorities. Hence, funds need to optimally utilized and prioritized for prevention of non-communicable diseases. Primary prevention and control of NCD risk factors by surveillance is, therefore, preferred and recommended. Emphasis

has been given to risk factors, which are measurable under field conditions and amenable to intervention. Identification of risk factors and its quantification is of great importance in order to calculate the avoidable burden of disease and framing of cost-effective strategies for prevention.

Risk factors common to major NCD's

Risk factor	Condition			
	CVD	Diabetes	Cancer	Respiratory
Obesity	+	+	+	+
Smoking/tobacco	+	+	+	+
Raised BP	+	+	+	
Raised blood sugar*	+	+		
Alcohol	+		+	
Nutrition	+	+	+	+
<i>Physical inactivity</i>	+	+	+	+
Blood lipids*	+	+	+	

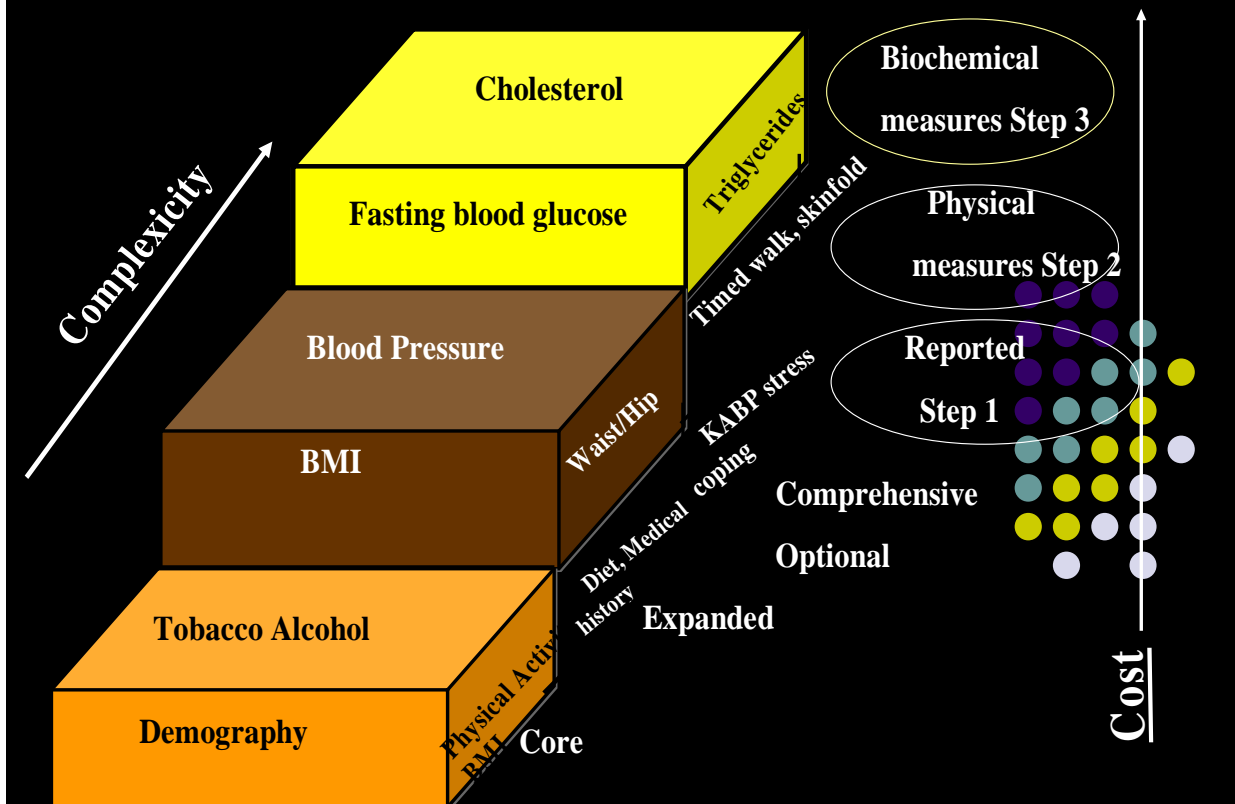
Source: WHO STEPwise approach to NCD surveillance

*Not being included in Phase 1

WHO STEPS approach to NCD Risk Factor Surveillance

The WHO STEPwise approach for NCD risk factor surveillance 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). Each step has core, expanded and optional components. It is a framework which is flexible, resource sensitive and can be modified and adapted for different settings.

WHO-Step-wise Approach to NCD Risk Factor Surveillance



5. Selection of Risk Factors for surveillance under IDSP:

A “risk factor” refers to any attribute, characteristic, or exposure of an individual, which increases the likelihood of developing a non-communicable 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. Emphasis in any surveillance system should be given to those risk factors that are amenable to intervention.

Criteria for selection of core risk factors for surveillance under IDSP:

- They have greatest impact on NCD mortality and morbidity;
- Their modification is possible and effective in primary prevention;
- Their measurement is easy, feasible, affordable and
- Standardized, validated and repeatable measurement is possible and can be obtained while following appropriate ethical standards.

6. Selected risk factors

1. Smoking/Tobacco

Tobacco is commonly smoked or chewed or inhaled. About one in three or 1.1 billion people worldwide smoke. Among these, about 80% live in low- and middle-income communities. By 2020, the tobacco epidemic is expected to kill more people than any single disease. By 2020, tobacco use will cause about 18 percent of all deaths in developed countries and about eleven percent of all deaths in developing countries. Tobacco use is a known or probable cause of about 25 diseases including heart disease; cancer, stroke, chronic obstructive pulmonary disease and digestive tract disease, as well as, has significant adverse effects on pregnancy. Smokeless tobacco use causes oral cancer in the lip, tongue, mouth, and throat areas and digestive system cancers. In India, the use of smokeless and chewed tobacco (zarda or with pan) is common particularly in rural areas. Tobacco is smoked in various forms in India like cigarettes, beedis, hooka, chillum, pipe and all are harmful.

Tobacco smoke contains 4000 harmful or poisonous chemicals like nicotine, tar, carbon mono oxide and many others.

Use of tobacco (both smoked and smokeless form) is determined by a pre-tested questionnaire and determines a current user (daily or occasional), past users and non-users.

Definitions (according to 'Guidelines for controlling and monitoring Tobacco epidemics')

Current Smoker/tobacco users: someone who at the times of survey, Smokes/uses tobacco in any form either daily or occasionally.

Daily Smoker/tobacco user: Someone who smokes/uses tobacco at least once day. People who smoke/use tobacco every day with rare exceptions such as not on days of religions fasting or during acute illness are still classified as daily smokers.

Occasional Smoker/ Tobacco user (Non daily smoker / Tobacco user): Someone who smokes / uses tobacco, but not on every day.

The group of **non-smokers** comprises individuals who are **never-smokers** (those who have never smoked at all) and **Ex-Smokers**: People who were former daily smokers but currently do not smoke at all or those who were **former occasional smokers**, i.e. ex-occasional smokers). They can be sub-classified by:

Time elapsed since quitting

Those who had ever smoked daily, and

Those who never used to smoke daily but only occasionally in the past.

2. Alcohol consumption

Worldwide, alcohol consumption causes 3% of deaths (1.8 million) annually, which is equal to 4% of the global disease burden. Besides the direct effects of intoxication and addiction, alcohol use causes about 20% to 30% of esophageal cancer, liver disease, homicide and other intentional injuries, epilepsy, and motor vehicle accidents worldwide.

While adverse health consequences from long-term chronic alcohol use may not cause death or disability until fairly late in life, acute consequences of alcohol use, including intentional and unintentional injuries, are far more common among young adults.

The relationship between alcohol consumption and health and social outcomes is complex and multi-dimensional. Average alcohol consumption is linked to more than 60 disease conditions (in a series of recent meta-analyses) including liver cirrhosis, several cancers (liver, laryngeal, esophageal and oropharyngeal cancers), injuries and hemorrhagic strokes. Effects of alcohol consumption can be through biochemical effects on chronic diseases, through increased risk (by intoxication) to injuries, accidents and domestic violence and through alcohol dependency. Because consumption of alcohol may be episodic, asking individuals about their average (daily) consumption is problematic. Type of alcoholic beverage consumed also has not been found to have significant bearing on NCDs. Therefore, for ease of recall and relevance, surveys of drinking would attempt to capture both amount and pattern through the questionnaire (in spite of strong tendency to under report).

Alcohol consumption has a U-shaped relationship with ischemic heart disease. For a given level of average daily consumption, the pattern of drinking itself strongly influences the risk of non-communicable diseases, with bouts of heavy drinking being closely related to at least injury and to hemorrhagic stroke. Therefore, for ease of recall and relevance, surveys of drinking should attempt to capture both amount and pattern.

However, patterns of drinking vary considerably depending on the cultural setting. While some

Communities abstain from alcohol entirely or may use alcohol on very rare and specific occasions, such as the birth of a baby, others usually consume it at different times of day and days of the week. Some factors may affect drinking patterns, such as the payment of salaries or wages on a weekly, fortnightly or monthly basis, or simply the end of the working week. Drinking may also be traditionally associated with particular religious or other holidays, and may also vary in a more general way with the season of the year.

Definitions:

Current Drinker: Those who consumed 1 or more drinks of any type of alcohol in the year preceding the survey.

Former drinker: Those who have ever drunk alcohol but those who did not consume 1 or more drinks during the year preceding the survey.

Lifetime abstainer: Those who never consumed 1 or more drinks of any type of alcohol

High-risk drinker: those who drink more than 5 (for women 4) standard drinks on any single day.

Note: “standard drink” would be defined keeping in mind local patterns of consumption. The net alcohol content of a standard drink is 10 g. of ethanol.

3. Diet

Consumption of **fruits and vegetables** reduces the risk of NCDs, like cancers and cardiovascular diseases. Fruits and vegetables are good sources of complex carbohydrates, vitamins, minerals, and other substances important for good health. The antioxidant, potassium, fiber, and folate content of fruits and vegetables partially explain their protective effect. Other compounds such as flavonoids, phytates, lycopene, carotenoids, and other phytochemicals in vegetables may also have significant protective effects in reducing NCD risk. Dietary patterns that include higher intakes of fruits and vegetables are associated with several health benefits, including a decreased risk for some

types of cancer. Consumption of diet rich in cholesterol increases the risk of NCDs, particularly cardiovascular diseases.

India is experiencing a 'nutritional transition' characterized by a shift towards consumption of atherogenic and thrombogenic, high cholesterol 'fatty' diet and decreased consumption of fruits and vegetables, which is contributing to the advancing epidemic of NCDs.

Low consumption of fruit and vegetables has been identified as a risk factor in the development of a range of chronic diseases, including coronary heart disease, stroke and many forms of cancer.

Research has indicated that the required intake of fruit for optimal health benefits is five daily servings of fruit and vegetable.

WHO recommends consumption of at least 400 grams of vegetables and fruits per day – or 5 servings of 80 grams of fruits and vegetables per day. One serving= 80 grams standard (translated into different units of cup depending on type of vegetable and standard cup measures. Tubers such as potato and cassava are not included in this recommendation. The questionnaire measures the number of servings of fruits and vegetables consumed per day and the **type of oil or fat** most commonly used for cooking.

4. Physical Inactivity:

Lack of physical activity leads to obesity, dyslipidemia (lower high-density lipoprotein levels), insulin resistance, diabetes mellitus and high blood pressure levels. Physical inactivity is a well-established risk factor for coronary heart disease (CHD) and is associated with about a twofold increase in risk of CHD. In India, major lifestyle changes have occurred with increasing rates of urbanization in India, with a trend towards decreasing physical activity due to improved transportation and availability of energy saving devices. This has led to increasing weight and consequently increasing rates of diabetes, hypertension, and dyslipidaemia in urban Indian populations. There is evidence that increased physical activity would be an important measure for prevention of coronary artery disease in Indians since physical activity may offer additional advantages for risk reduction in Indians by improving insulin sensitivity and high-density lipoprotein cholesterol, and reduce central adiposity, risk factors highly prevalent in Indians. Moderate intensity exercise such as brisk walking for a frequency of 35–40 minutes a day, on most or preferably all days of the week, is protective for CHD. Sedentary activity such as television viewing is also associated with increased CHD risk independent of leisure-time activity.

Participating in adequate physical activity throughout the life span and maintaining normal weight are the most effective ways of preventing many chronic diseases, including cardiovascular disease and diabetes. The prevalence of type 2 diabetes is increasing in India, which can be prevented by increasing physical activity and dietary

interventions. Participating in adequate physical activity also helps build and maintain healthy bones and muscles, control weight, build lean muscle, reduce fat, reduce feelings of depression, anxiety and mental stress, and promote psychological well-being.

Physical activity levels are assessed using a validated physical activity questionnaire, which focuses on three domains: 1) work related (occupational), 2) transportation to work and 3) leisure time: sports, fitness, recreational and leisure-time exercise.

WHO recommends at least 30 minutes or more of moderate-intensity physical activity like brisk walking on most, or preferably all, days of the week in Indians, which are consistent with the US recommendations.

5. Obesity

Weight

Weight is related to blood pressure, blood lipids and propensity to develop Type 2 diabetes. Being overweight exacerbates symptoms from osteo-arthritis in weight bearing joints and spinal disorders, if it does not actually cause these conditions. It is also a risk factor for colo-rectal cancer, uterine prolapse and uterine fibroids and, in pre-menopausal women, for breast cancer. Weight is used to calculate Body mass index (BMI), which is used as an indicator for obesity. Weight is a continuous variable, measured to the nearest 0.1 Kg, reflecting a person's body mass in light clothing. Weight can be measured by standing on a bathroom scale placed on a hard, smooth horizontal surface.

Height

Height is a key variable in the calculation of relative body weight. Exceeding the normal range of weight for height is related to risks of hypertension, hyperlipidaemia and Type 2 diabetes. Height is used to calculate Body mass index (BMI), which is used as an indicator for obesity. Height is a continuous variable measured to the nearest 0.5 cm to reflect a person's measured height. Height can be measured against a tape fixed to a vertical wall, with the participant standing on a firm/level surface. The participant is asked to remove all footwear and to stand, with feet together, with heels, calves, buttocks, dorsal spine and head touching the wall.

Body Mass Index (BMI)

BMI is used as an indicator of underweight, overweight and obesity. BMI indicates whether the body weight is appropriate for his height. BMI is calculated from height and weight measurements (weight in Kg/ height in metres²). Epidemiological research shows

that there is a strong association between BMI and risk to health. Excess adipose tissue in adults is associated with excess morbidity and mortality from conditions such as hypertension, unfavorable blood lipid concentrations, diabetes mellitus, coronary heart disease, some cancers, gall bladder disease, and osteo-arthritis. Thinness (low BMI) is also an indicator of risk to health, often being associated with general illness, anorexia, tobacco use, alcoholism and drug addiction. Low BMI is consistently associated with increased risk of osteoporosis and fractures in the elderly. Definitions for categories of relative weight are shown in table 1.2.

Table 1.2 Definitions for categories of relative weight

BMI	Category of relative weight
< 18.5	Underweight
18.5-24.9	Normal weight
25.0-29.9	Grade 1 overweight
30.0-39.9	Grade 2 overweight
≥ 40.0	Grade 3 overweight

Source: WHO STEPwise approach to NCD surveillance

Note: These categories have been based on studies principally from studies in developed countries. Risk of NCD may increase at lower (or in some cases higher) levels of BMI in developing countries like India, where WHO recommends a cut-off level of 23 for overweight instead of 25.

Reducing weight in overweight and obese individuals will help to prevent diabetes mellitus, high blood pressure, coronary heart disease, paralytic strokes, certain cancers, osteoarthritis, reduce harmful cholesterol and increase good cholesterol (HDL), increase life span, help to look younger, and increase your physical stamina.

Abdominal Obesity:

Abdominal obesity (measured as waist circumference or waist to hip ratio) is more strongly associated with coronary heart disease than BMI. Waist measurement is taken at the level of mid point between the inferior margin of the rib and crest of the ileum in the mid-axillary plane, using a non-stretchable tape, without clothing, that is, directly over the skin (or over light clothing).

A cut-off level of 102 cms in males and 88 cms in females have been recommended for developed countries (ATP 3 Guidelines), however, much lower cut-off levels are appropriate for Indians of 90 cms in males and 85 cms in females. (South Asia Pacific Guidelines)

5. High Blood pressure

Blood pressure is an important determinant of risk of cerebrovascular disease, ischemic heart disease, congestive cardiac failure and renal failure. There are also relationships between blood pressure and risk of peripheral arterial disease, retinopathy and abdominal aortic aneurysm. The relationship of blood pressure with cardiovascular disease is continuous, graded and extends below the cut-off levels for hypertension. The optimal blood pressure level is 120/80 mm Hg. after which the blood pressure increases in a linear fashion with no threshold. However, blood pressure is labile and its level will vary with factors related to the individual, the observer, the setting, the equipment and the technique employed in making the measurements. The BP will be measured using a standard OMRON Digital Automatic Blood Pressure Monitor (appropriately calibrated and maintained) and a trained health professional. The use of mercury sphygmomanometer is not recommended. It will be measured in a quiet room, on the right arm (specified because differences in arterial anatomy for the right and left arms mean that the blood pressure is not same in each), while sitting. In order to provide more consistent advice to clinicians the WHO-ISH Guidelines Committee has agreed to adopt in principle the definition and classification provided in **JNC VII**. Hypertension is defined as a systolic blood pressure of 140 mm of Hg or greater and/or a diastolic blood pressure of 90 mm of Hg or greater in subjects who are not taking any anti-hypertensive medication. A classification of BP levels in adults over the age of 18 is provided in following table

Definitions and Classification of BP levels (JNC 7)

Category	Systolic (mm of Hg)		Diastolic (mm of Hg)
Normal	<120	and	<80
Prehypertension	120-139	or	80-89
Stage 1 Hypertension	140-159	or	90-99
Stage 2 Hypertension	>=160	or	>=100

Controlling and preventing high blood pressure will help to prevent coronary heart disease, paralytic strokes, congestive heart failure and all cause mortality.

The following biochemical investigations included in Steps 3, though desirable, would not be included in the first phase of the NCD Risk factor surveillance under IDSP:

Blood sugar

Raised fasting blood sugar gives sufficient validity to estimate population changes in diabetes and related impairment of glucose tolerance. Diabetes mellitus (DM) is an important marker of risk for arterial disease of the coronary, cerebral and peripheral arterial trees, and for micro vascular disease leading to blindness and renal failure. For surveillance purposes, mean fasting blood sugar is sufficient as the population-wide indicator of the likely burden of DM. Fasting blood sugar (FBS) can be measured in the field from a finger prick using a blotting paper technique (or glucometer), which has been standardized.

Blood cholesterol

The concentration of cholesterol in the blood shows a continuous and graded relationship with risk of coronary heart disease. The relationship between total cholesterol and risk of cerebrovascular disease (stroke) remains less clear, though lowering cholesterol has shown reduced incidence of stroke in patients on medication. Indians have shown to be at high risk even at significantly lower values of cholesterol and hence a lower range of values for normal cholesterol will have to be decided upon. Total blood cholesterol can be measured in the field from a finger prick using a dry chemical technique, which has been standardized.