



# Surveillance of chronic diseases challenges and strategies for India

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# Table of contents

## Executive summary

## Key facts and findings

1. Need for surveillance of chronic diseases (SCD) .....	1
2. Significance of SCD .....	2
3. Status of SCD .....	4
4. Challenges in SCD .....	5
5. Requirements for SCD .....	6
6. Recommendations for strengthening SCD .....	9
7. Recommendations for developing a population-based surveillance model.....	11

## Key recommendations



# Executive summary

The need to develop a robust public health surveillance system has increased manifold for India because of the ongoing demographic and epidemiological transition and the rising challenges of chronic diseases. In this regard, the presence of robust chronic disease risk factors, morbidity and mortality surveillance mechanisms can go a long way in prevention and reduction of socioeconomic costs associated with such illnesses.

In the last century, chronic disease surveillance was not a major health concern or policy focus although there were explicit policy efforts for collection of vital statistics related to cancer in India under the National Cancer Registry Programme (NCRP). However, with growing burden of chronic diseases, in the last decade two important chronic disease risk factor surveillance efforts were initiated in India. These studies are namely, WHO-ICMR Non-Communicable Disease (NCD) risk factor surveillance and NCD risk factor survey under the Integrated Disease Surveillance Project (IDSP).

Investing in chronic disease risk factors, morbidity and mortality surveillance is the need of the hour and desires greater social, political and governmental support. Moreover, the public health system in India should also be prepared to devote greater financial and human resources to support development of a robust chronic disease surveillance system. Although NCDs surveillance is outlined as an important strategy under the National Programme for Prevention and Control of Diabetes, Cardiovascular diseases and Stroke (NPCDCS), the focus is on early diagnosis and opportunistic screening at selected facilities.

Although, the public health system is grappling with resource constraints but there is room for more efforts to undertake systematic population-based chronic disease surveillance in India. Organization and implementation of population-based chronic disease surveillance requires additional resources and is dependent on ability to recruit appropriate human resources for the surveillance operations. In addition, local support is critical to create a conducive environment to contact respondents and for information recording.

Also, there is a need for developing mechanisms for engagement of AYUSH sector and community health workers (ASHAs or others) in population based surveillance. But it should be backed by a sound incentive mechanism to ensure good coverage and programme outreach. Incentives should also be provided for screening as well as follow up activities.

Private sector can be useful partner in NCDs surveillance. However, private sector would need support and enabling environment to come up with services through public-private partnership (PPP) mode. Also, the public sector should develop institutional capacity to facilitate and support PPP initiatives. Clearly, it is a major challenge ahead to ensure quality improvement as well as sustainability of efforts in the area of NCDs surveillance.





## Key facts and findings

- Surveillance at local, state and national level can be used by public health authorities for identifying need-based health interventions and also for development of national program, monitoring, mid-course corrections and impact evaluations.
- WHO-ICMR NCD risk factor surveillance and NCD risk factor survey under Integrated Disease Surveillance Project (IDSP) are two important NCD risk factor surveillance efforts initiated in India.
- Surveillance for chronic disease risk factors, morbidities and mortality is yet to receive adequate attention in India. Nevertheless, as an exception, there were explicit policy efforts for collection of vital statistics related to cancer in India under the National Cancer Registry Programme (NCRP).
- Also, surveillance of risk factors related to chronic non-communicable diseases does not find any mention in the draft National Health Policy 2015.
- Surveillance activities initiated under National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS) are functioning sub-optimally due to weak public health management, inadequate human resources, delays in fund release and underutilization of existing NPCDCS funds.
- NPCDCS has a clear emphasis on facility based opportunistic screening. However, opportunistic screening is turning out to be a one-time affair and there are no efforts to ensure appropriate treatment and follow up with identified NCDs cases.
- At present, the public health system in India is not prepared to devote additional resources towards active population based surveillance unless cost-effective technology /methods are identified for mass screening and surveillance activities. Also, local support is critical in this regard.
- Public sector should develop institutional capacity to facilitate and support public-private partnership (PPP) initiatives for chronic disease surveillance.
- Efforts taken for chronic disease surveillance by state governments, non-governmental organizations and private sector institutions are commendable. A few notable initiatives are Nalamana Tamizhagam of the Government of Tamil Nadu and Amrutham Aarogyam and LEAP programme by Government of Kerala. Similarly, Population Services International (PSI) has planned Sampoorna clinic in collaboration with Government of Uttar Pradesh.

## Need for surveillance of chronic diseases (SCD)

Globally, chronic diseases, particularly degenerative non-communicable diseases (NCDs) such as cardiovascular diseases, cancer and diabetes mellitus are causing more deaths than all other causes combined. The World Health Organization's (WHO) Global Status Report on NCDs 2010 suggests that out of the 57 million global deaths in 2008, 36 million, or 63%, were due to NCDs, principally cardiovascular diseases, diabetes, cancers and chronic respiratory diseases. Such increasing global burden of NCDs has major socioeconomic implications for low income countries that account for over 80% of the global burden of NCD-related mortality.

India, with a huge population, has very high-prevalence of chronic disease risk factors, chronic morbidities and mortality (RMM). As such, India accounts for over 14% (5.2 million deaths) of the global NCD deaths (36 million) and around 59% of these deaths occur before individuals attain age of 70 years. Further, it is estimated that about 3-4% of adults (aged 20 and above) in rural areas and 8-10% in urban areas suffer from coronary heart disease (Reddy et al 2005). Such high prevalence of NCDs is estimated to cause an annual income loss (arising from days spent ill and in care-giving efforts) of about US\$ 23 billion (0.7% GDP) in India in 2004 (WHO 2010). In fact, direct out-of-pocket (OOP) payments associated with chronic diseases have significant catastrophic and impoverishing effects on households.

Given such intricate concerns, health policies in India are displaying a greater commitment towards both prevention and treatment of chronic diseases to reduce the burden and possibly reverse the tide. However, to proceed with their intent, these interventions require greater attention and policy focus on surveillance of chronic disease risk factors, morbidity and mortality is required. Quantitative information regarding the magnitude, direction, and rate of change of chronic diseases can play a crucial role in creating and assessing policies aimed at reducing the disproportionate burden of NCDs in India.

Surveillance is defined as the continuous scrutiny of all aspects of the occurrence and spread of a disease that is pertinent to its effective control and can significantly contribute to the policy planning and implementation of preventive measures. The health surveillance system in India primarily focused on prevention and control of potential spread of disease outbreaks. For instance, the National Surveillance Programme for Communicable Diseases (NSPCD) is an important centralized system that focuses on strengthening of State, District and Taluka level identification of the epidemiology of communicable diseases to facilitate an effective and coordinated response.

This policy brief outlines the status, scope and challenges for strengthening surveillance of chronic disease risk factors, morbidities and mortality in India. It presents a brief overview of existing information base (health surveys, surveillance tools and similar other datasets) on chronic disease and disease risk factors in India. It also presents a framework for surveillance and recommendations in relation to financing, infrastructure, workforce and governance for the proposed framework and surveillance strategies.

## Significance of SCD

**P**atterns of prevalence of chronic disease risk factors, morbidities and mortality across regions and population subgroups informs about overall disease burden and can help decide upon interventions and strategies for primary, secondary and tertiary prevention.

Surveillance can inform about potential social, economic, behavioural and political determinants associated with chronic diseases and provide guidance for policy, legislation and finance to reduce exposure to risk factors both at individual and population level

Surveillance at local, regional and national level can be used by public health authorities for developing need-based health interventions and also support programme development, monitoring, mid-course corrections and impact evaluations.

Distribution of risk factors, morbidity and mortality can inform about engaging potential public and private sector stakeholders and outline their roles and responsibilities in policy planning, coordination and implementation.

Surveillance information can be used to decide upon financial, infrastructure, human resources and governance structure for programme implementation and also help prioritize between regions for programme investments across range of diseases and risk factors.

Surveillance can aid in successful primary, secondary and tertiary prevention which can increase population longevity, improve productivity of working age population and reduce financial and economic losses to both households and the national economy by curbing health care expenditure and consequent impoverishment.

Regular surveillance can help understand natural history of diseases and identify priority areas for epidemiological and policy research.

## Domains for SCD

Surveillance Approach	Target Age Group	Target Population
Population based surveillance	30+	Individuals
Employment based	30+	Employees
School Health	6-14	Students
Higher education	15-21	Students
Population based	All	Individuals
Opportunistic screening	30+	Patients, Relatives
Programme based screening	30+	Target group
Local level surveillance	30+	Individuals
Old age homes	60+	Elderly
Self-help groups	30+	Women
Urban slums	30+	Individuals

## Status of SCD

Chronic disease surveillance is yet to receive adequate focus in India although there are policy efforts for collection of vital statistics related to cancer in India under the National Cancer Registry Programme (NCRP). At present, India has 21 Population-based registries and 6 Hospital-based registries in different parts of the country. However, since 2001, data from all cancer registries and all medical colleges are collated for the “Development of an Atlas of Cancer in India” ([www.canceratlas.india.org](http://www.canceratlas.india.org)) to get an idea of patterns of cancers in several other parts of the country, including those not covered under the NCRP. Nevertheless, with growing burden of NCDs, in the last decade two important NCD risk factor surveillance efforts were initiated in India. These studies are namely; the WHO-ICMR NCD risk factor surveillance and the NCD risk factor survey under the Integrated Disease Surveillance Project (IDSP).

In 2008, Government of India launched the pilot phase of NPCDCS (National Programme for Prevention and Control of Diabetes, Cardiovascular diseases and Stroke) with two objectives: 1) risk reduction for prevention of NCDs (diabetes, CVD and stroke), and 2) early diagnosis and appropriate management of diabetes, cardiovascular diseases and stroke. In 2010, the Government of India launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) by merging the National Cancer Control Programme (NCCP) and the National Programme for Prevention and Control of Diabetes, Cardiovascular diseases and Stroke (NPDCS). The programme is under implementation in 100 districts and will be expanded to cover all districts nationwide during the 12th Five Year Plan in a phased manner. NCDs surveillance is outlined as an important strategy under the NPCDCS. The focus particularly is on early diagnosis and the programme has emphasized on strengthening opportunistic screening at selected facilities.

The opportunistic screening involves clinical examination comprising of relevant questions and easily conducted physical measurements (such as history of tobacco consumption and measurement of blood pressure etc.) for persons above the age of 30 years at the point of primary health facility to identify those individuals who are at high risk of developing diabetes and CVD, warranting further investigation/action. It is expected that screening will have inherent elements of mass awareness creation, self-screening and trained health care providers. The screening activities are linked to NCD clinics established under the programme at Community Health Centre (CHC) and District Hospital.

There are some efforts by state governments, non-governmental organizations and private sector institutions to strengthen surveillance of chronic diseases. A few notable initiatives are Nalamana Tamizhagam of the Government of Tamil Nadu and Amrutham Aarogyam and LEAP programme by Government of Kerala. Similarly, Population Services International (PSI) has planned Sampoorna clinic in collaboration with Government of Uttar Pradesh. Sai Rural Diabetes Specialties Centre (SRDSC) and Kidney Help Trust (KHT) in Chennai have also launched important non-governmental initiatives for surveillance and primary prevention.

## Challenges in SCD

**N**eed to raise awareness of the importance of NCD surveillance: The draft National Health Policy 2015 acknowledges the rising burden of NCDs and calls for developing of a comprehensive model by drawing lessons from States where NCD prevention and treatment interventions have been rolled out. It is important to highlight the need for a robust NCDs and NCDs risk factors surveillance system as part of the policy document.

Need to enhance surveillance capacity at local level: Development of a robust surveillance system involves establishing a number of surveillance units at local level and staffing them with appropriately trained and qualified personnel. However, infrastructure and human resource are the major handicap for most of the Indian states and therefore establishment of a robust surveillance system with local capacity will be challenging task for such states.

Timely fund release, management and utilization: A major challenge is also in the area of regular and effective fund release and utilization for the planned screening and surveillance activities.

Challenge of designing a NCDs surveillance system: Chronic diseases are caused by the complex interaction between the risk factors and the social, economic, political, cultural, environmental factors. This makes the surveillance of chronic diseases challenging as this poses a question as to what and how the data has to be collected to reflect on the rising burden of chronic diseases. This also questions as to how the surveillance system for chronic diseases has to be designed so that it captures the risk factors and the determinants which will direct for better health planning and making policy decisions.

Network of Health Information Systems (HIS): There is a need to establish a nationwide Health Information System (HIS) for networking of all health service providers, establishing state level disease surveillance systems, universal registration of births and deaths to give accurate picture of health of the population. Moreover, for effective use of data for decision-making, its use for policy evaluation and planning can be enhanced with official protocols and guidelines.

Limitations of opportunistic screening: The NPCDCS has a clear emphasis on facility based opportunistic screening of persons above the age of 30 years at the point of primary contact (village, CHC, District hospital, tertiary care hospital). However, opportunistic screening has its own limitations and it will be unable to capture huge sections of population who are at risk of NCDs. Also, this will not lead to early diagnosis of cases.

Poor data sharing by the private sector: Private sector can be useful partner in NCDs surveillance. However, private sector would need support and enabling environment to come up with services. Also, government departments should develop institutional capacity to facilitate and support such initiatives.

# Requirements for SCD

## Financing

- Central government and state governments should allocate more resources towards health sector in general and chronic diseases in particular. State government should adopt a proactive approach to generate resources for the health sector. The state should approach private sector and non-governmental organizations for resource mobilization and strategic partnerships in service delivery.
- It is important to strengthen the NPCDCS programme by providing additional funds for consistent implementation and further planning of outreach activities. Wherever practicable, future NPCDCS activities should seek to put in place contractual arrangements which facilitate timely, efficient and effective programme roll-out, without compromising transparency and accountability, and should ensure that local government and implementing agencies responsibilities do not conflict.
- Establishment of district-level NCDs fund mechanism can be an effective strategy for capacity building and decentralization efforts. Alternative sources of contribution for the NPCDCS programme should be identified. As such, in many districts considerable NPCDCS funds are left unutilized and therefore efforts for its effective utilization are desirable.
- The states should learn about efficient ways and means of sub-contracting processes such as community outreach and IEC activities including monitoring of partner efforts to build the capacity of local NGOs. This will also support the local NGOs to be able to implement IEC activities independently.

## Human Resources

- Creation of public health cadre with sub-divisions a) public health doctors b) health sector managers and c) data and research wing is critical. Such cadre can have required skills for planning, implementation, capacity building, data management and evaluation of the health policies and programmes.
- Management of human resources for health (HRH) is a neglected aspect in the design of the national programmes. In this regard, it is critical to put in place HR management systems along with greater assurance for a career in public health by strategic planning and long-term vision for integration of the contractual staff in the state health system.
- There needs to be a greater emphasis on capacity building and skill development of AYUSH doctors for their utilization in NCDs programme with involvements in the areas of screening, primary prevention and early treatment.

Recruitment of one additional community health worker for primary prevention and screening activities is critical. This community health worker can be entrusted with task of community mobilization, follow-ups and screening for risk factors. Recruitment of community health worker for urban areas is also desirable as a significant share of the incidence of NCDs is likely to be in urban areas.

## Infrastructure

- Use of ICT platform for NCD surveillance (screening and data management) is important. States should increase computerization of facilities with adequate IT infrastructure and manpower for enabling data capture and transmission to higher levels. Standard features of data portal such as dash board and query builder should be integrated.
- Improved accessibility through the provision of infrastructure both large and small scale through NPCDCS can prove significant in improving primary prevention and surveillance activities in rural areas. It is recommended that improvement of CHCs and PHCs should be emphasized and given importance in future NPCDCS activities.
- Screening and prevention of NCDs need integration with tertiary-level institutions for continuity of care. There is a gap of such institutions and specialists in high-focus districts of Rajasthan and Uttar Pradesh. Arrangement for referral transport and communication between the two facilities should also be improved.
- There is a need to improve data management and reporting for outpatient and inpatient attendance with at least disaggregated recording by gender and age and for the nature of ailment. This huge data base can provide a reasonable starting point for passive surveillance of NCDs.

## Governance

- States and districts should work to ensure greater inter-sectoral convergence. At a local level such convergence should be in the areas of health, school education, sports, law and order at the grass root level. At the district and state level, convergence between health departments and industrial organizations is recommended for IEC, screening and primary prevention activities.
- Regular review meetings of programme management unit on NCD programmes is necessary for sensitizing senior officials regarding the needs and concerns and also to discuss strategies for resource allocation and activity planning. Senior officials should not be burdened with management and coordination of multiple programmes.
- Linkages with schools are an important aspect of IEC activities for primary prevention of NCDs. Awareness through screening, identification and management of chronic illnesses among students, teachers and parents should be encouraged. Community health workers and local health providers at the PHC level should be entrusted with follow-up activities and accountability, respectively.



- Gender sensitivity in screening, prevention and treatment activities is important and should be made part of quality management protocols. This also includes sensitizing and training service providers on gender concerns and gendered patterns of certain chronic NCDs such as cervical and breast cancer.
- State governments should link all the existing economic and social welfare programmes for the elderly with the health sector to facilitate exchange of data and information and also to promote prevention and early treatment of NCDs. Community-based activities should promote elderly clubs for information dissemination on aspects of NCDs and to discuss the various benefits and components under the NCDs programmes.

## Recommendations for strengthening SCD

**I**ncreasing investment for NCDs surveillance: It is necessary to increasing public spending for health sector in general and a fair amount of resources need to be devoted for strengthening the existing screening and surveillance system. This is also a productive investment if screening activities are able to identify NCD cases and reverse or delay onset of multiple morbidities.

**I**ntegrated data management across hospitals and laboratories: A cross cutting recommendation was that Health Management Information Systems (HMIS) across all hospitals and laboratories engaged in diagnostics should be integrated to gather information about the patient ailments and to monitor incidence across hospitals through a nationwide HMIS system.

**R**ecruitment of male community health workers: Recruitment of one more community health worker both in rural and urban areas for primary prevention and screening activities is critical. This community health worker who in addition to the existing ASHA worker can be entrusted with task of community mobilization, follow-ups and screening for risk factors. Recruitment of community health worker for urban areas is also desirable as a significant share of the incidence of NCDs is likely to be in urban areas.

**S**trengthening ICT platform: Use of information and communication technology (ICT) platform for NCD surveillance (screening and data management) is important. States should increase computerization of facilities with adequate IT infrastructure and manpower for enabling data capture and transmission to higher levels. Standard features of data portal such as dash board and query builder should be integrated.

**L**inkage with School Health Programmes: School Health Programmes can help in screening activities at community level. Schools have good geographic spread and coverage of population. Even with the existing infrastructure, it is feasible to engage schools in supporting surveillance activities. A direct benefit of such initiative would be observed in the form of greater awareness of NCDs and its impact on primary prevention.

**I**nvolvement of AYUSH in NCDs screening and surveillance: There needs to be a greater emphasis on capacity building and skill development of AYUSH doctors for their utilization in NCDs programme with involvement in the areas of screening, primary prevention and early treatment. With increasing demand of AYUSH for the management of chronic ailments it is advisable to develop a cadre of AYUSH specialists who can be posted at PHCs, CHCs as well as district hospitals. AYUSH practitioners should further be considered for training and certification in skills related to NCDs screening and prevention activities.

**Commitment of programme officials and managers:** It is important to recruit motivated programme managers and officials who have passion for public health surveillance and display greater commitment towards collection, classification, storage, retrieval, analysis and presentation of surveillance data.

**Designing behavioural risk factor surveillance system:** India should develop a community-based Behavioral Risk Factor Surveillance System (BRFSS) to collect data on health related risk behaviours and chronic health conditions on a regular (annual) basis. Community health workers (ASHAs or male health workers) can be the key HR in this exercise supported by a robust ICT system for data management.

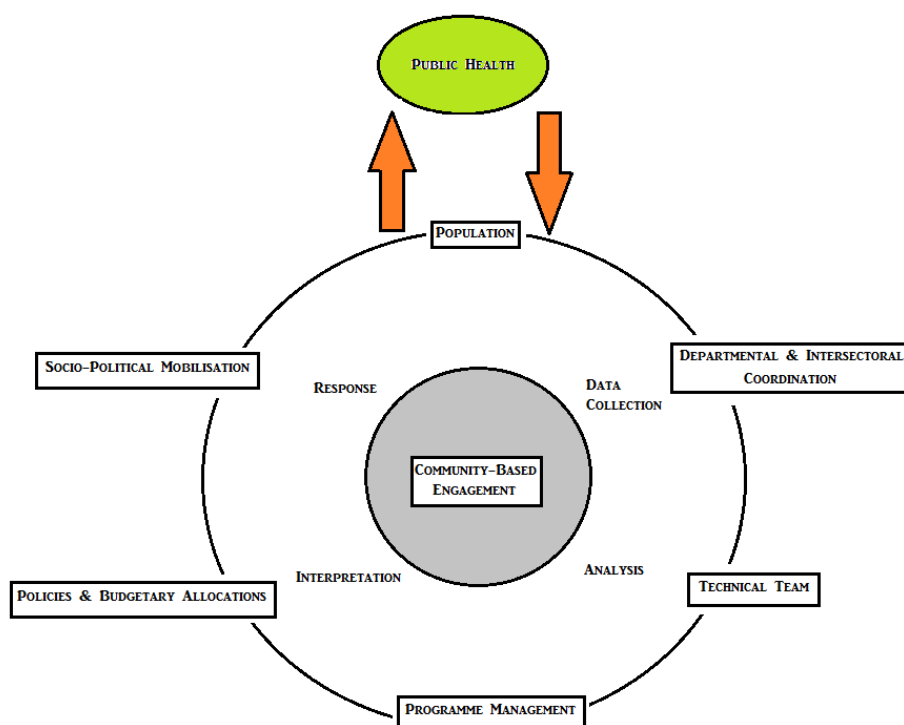
**Inter-sectoral convergence and engaging private/NGO sector:** NCD surveillance should not remain within the boundaries of health and government departments and should also involve private sector and NGOs. The panchayat meetings can also be a useful platform for promotion of surveillance activities and for information sharing to gain cooperation for population-wide surveillance in rural areas. Gender sensitivity in screening, prevention and treatment activities should be made part of quality management protocols.

**Creation of public health cadre:** Creation of a separate public health cadre is an important governance challenge at the state level. This will ease out administrative, teaching and clinical roles of health officials and will allow scope for improving programme management through development of professional expertise. This will further attract medical personnel toward public health. Currently, there is a lack of capacity to carry out policy formulation and planning at the state levels. Also, medical officers are reluctant in community interaction and are disinterested with increasing burden of administrative tasks. Such issues lead to a clear divergence between the National NCD Policy and delivery mechanism at the grass root level.

# Recommendations for developing a population-based surveillance model

**C**onceptual framework: The surveillance and response framework presented here is adapted from the basic notion of the two hemispheres of surveillance: data generation and data use. At the core of the framework is a community-based approach for surveillance. The framework calls for departmental and inter-sectoral coordination for production of surveillance data on critical aspects of public health. It identifies a significant role for the technical team in terms of data analysis and interpretation. The interpretation is further dependent on the capacities of the programme management who have a strong role in deciding upon policies and budgetary allocations for the concerned public health problem. The data is then expected to be disseminated for greater socio-political commitment towards public health.

## Surveillance and response conceptual framework



Source: Adapted from surveillance and response conceptual framework in Nsubuga et al<sup>1</sup> (2006)

<sup>1</sup> Nsubuga et al (2006) Public health surveillance: A tool for targeting and monitoring interventions in D T Jamison et al (eds) Disease control priorities in developing countries, second edition, The World Bank and Oxford University Press, United States.

Indicators for surveillance: The WHO STEPS methodology is a standard approach for NCD and NCD risk factor surveillance. This methodology is particularly useful for countries who are aiming to initiate and establish a chronic disease and risk factors surveillance system. The STEPS methodology suggests data collection in three STEPS: Step 1 –behavioural information; Step

### STEPS core, expanded and optional items for SCD

Step	Core Items	Expanded Items	Optional Items
Step 1 - Behavioural	Basic demographic information, including age, sex, literacy, and highest level of education	Expanded demographic information including years at school, ethnicity, marital status, employment status, household income	Mental health, intentional and unintentional injury and violence, oral health and sexual behaviours
	Tobacco use Alcohol consumption Fruit and vegetable consumption Physical activity	Smokeless tobacco use Past 7 days drinking Oil and fat consumption	
		History of blood pressure, treatment for raised blood pressure	Objective measure of physical activity behaviour
		History of diabetes, treatment for diabetes	
Step 2- Physical measurements	Weight and height, waist circumference, blood pressure	Hip circumference	Skin fold thickness, assessment of physical fitness
Step 3 - Biochemical measurements	Fasting blood sugar, total cholesterol	HDL-cholesterol and fasting triglycerides	Oral glucose tolerance test, urine examination

Source: WHO (<http://www.who.int/chp/steps/Part1.pdf> accessed on April 9, 2015)

2 –physical information; Step 3 – biochemical information. Under each step, data collection on core items is mandatory whereas countries depending on their resource and capacity can choose to gather information for items mentioned under the expanded and optional list.

Strategy: Following WHO STEPs approach, surveillance strategy can have two stages:

- **Stage I: Population based behavioural risk factor assessment**
  - This component of surveillance will be an annual home-based population wide surveillance for NCDs related behavioural risk factor assessment of all individuals aged 30 and above. This mapping exercise can come up with number of cases with or at risk of NCDs.
  - State-specific approach may be devised by considering aspects such as cost and human resources requirement. However, it is suggested that this activity may be conducted in collaboration with volunteers (with secondary education) who should be provided with three-day training on behavioural risk factor assessment related to NCDs.
  - The activity planning can be carried out at the block level and volunteers can be assigned different villages for risk factor assessment. At the block level, household identity number and patient identity number should be generated.
  - Overall, a two-week work plan has to be generated including training of volunteers. Incentives / honorarium should be considered for such activities. Community health workers at village level should be engaged in risk-factor screening.
  - The volunteers will have to calculate NCDs risk factor score, get information regarding treatment and care seeking status as well as inform the concerned person about clinical tests and diagnosis at the PHC level.
  - The volunteers can submit the behavioural risk factor assessment forms to the Block Programme Manager. This two-week community volunteers based process should be conducted annually.
- **Stage II: Clinical tests and diagnostics of high risk cases**
  - In Stage II, the role of community health workers is critical as they will be provided with the list of high risk cases for clinical tests and diagnosis at PHC level for follow-up.
  - Unique identification number for each patient should be generated with adequate information retained by the system in order to ensure quick search of patient history during visits.
  - At the PHC level, clinical tests and diagnostics for diabetes and hypertension can be performed under the supervision of medical or AYUSH doctor.
  - The data on total screening, total high risk cases, total confirmed NCD cases, total cases aware of condition, total cases under treatment, total cases initiated treatment and total referrals to higher facilities should be collected through an online data management system.
  - For selected higher level clinical tests, PHCs can refer the patient to CHCs and DHs. Community health workers should motivate regular visits and treatment follow-up.

# Key recommendations

Theme	Problem	Policy recommendation	Potential impact	Concerned agency
Financing	Inadequate investment for chronic disease surveillance	Increased investments by Central and state governments for chronic disease surveillance	Greater scope for building a strong surveillance system with appropriately trained HR and robust infrastructure	Ministry of Finance (MOF) Ministry of Health and Family Welfare (MOHFW)
	Limited involvement of private sector in surveillance	Facilitating and ensuring enabling environment for private sectors including NGOs and other stakeholders to participate in surveillance activities	Cost-effective approach to capture the population which is seeking care in private sector	Ministry of Corporate Affairs MOHFW
	Unavailability of funds on time and underutilization of existing funds under NPCDCS	Establishment of district level NCDs fund mechanism	Effective strategy for capacity building and decentralization of available resources	MOF MOHFW
Governance	Lack of robust chronic disease surveillance network	Adoption of systematic approach for developing chronic disease surveillance system at local, state and national level	Informed policymaking at local, state and national level	MOHFW
	Weak inter-sectoral coordination	Improved inter-sectoral coordination between government departments, industrial organizations, non-governmental organizations for chronic disease surveillance	Improved horizontal and vertical collaboration will further strengthen the coverage of surveillance activities	Various concerned ministries
Infrastructure	Lack of adequate IT infrastructure	Development of Integrated Health Management Information System across public and private facilities	Information symmetry across public and private facilities for effective surveillance and policy formulation	Ministry of Communications and Information Technology MOHFW
	Lack of models and alternatives for surveillance	Encouraging pilot initiatives for surveillance across states and adopting cost-effective scalable models	Identification of barriers for surveillance at the local level	MOHFW
Manpower	HR for population-based surveillance	Envisaging role of additional community health workers (CHWs) for chronic disease surveillance	CHWs can act as a bridge between individuals and primary health systems, thereby reducing potential economic and human loss	Ministry of Skill Development and Entrepreneurship MOHFW
	HR for opportunistic screening and surveillance	Involvement of AYUSH doctors for opportunistic screening and surveillance at the level of primary health systems	Capacity building, data management and implementation of surveillance activities	Ministry of AYUSH MOHFW



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