World Health Day 2016

Diabetes
Scale up prevention, strengthen care and enhance surveillance
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Technical paper on diabetes in India
Message from WHO Representative to India

World Health Day 2016

This World Health Day 2016, with its focus on ‘diabetes’, presents an excellent opportunity to turn our attention on one of the most pressing public health priorities of our times, globally and in India: noncommunicable diseases (NCDs).

The World Health Organization (WHO) estimates that globally, high blood glucose is the third leading risk factor for premature mortality after high blood pressure and tobacco use. The overall risk of premature death among people with diabetes is at least double the risk of their non-diabetic peers.

Globally, the number of people living with diabetes was estimated to be 422 million (8.5% of adults 18 years and over) in 2014.

In 2015, an estimated 7.8% adults in India had diabetes. A large number of those with diabetes are unaware of their status. Even when this is known, many do not access regular treatment for various reasons like lack of availability, affordability or awareness about the need for adherence to treatment. Diabetes can lead to complications that may cause blindness, kidney failure or loss of limbs. High blood sugar that has not reached the diabetes threshold can also increase the risk of heart diseases, strokes and other complications.

The rising prevalence of diabetes and other noncommunicable diseases is driven by a combination of factors: rapid urbanization, sedentary lifestyle, unhealthy diet and increasing life expectancy.

The good news is that a large proportion of diabetes cases are preventable. Interventions to promote healthy diet and physical activity have been shown to be effective in preventing or delaying the onset of type 2 diabetes among people at high risk. Maintaining normal body weight, engaging in regular physical activity and eating a healthy diet can reduce the risk of diabetes.

Diabetes is treatable; it can be controlled and managed to prevent complications. Increasing access to diagnosis and affordable treatment, including patient education for self-care, are vital components of the response. Reduction of blood glucose can be achieved through medication and lifestyle changes.
In addition to posing a significant public health challenge, diabetes also causes considerable economic burden on the individual and the family, and increases the cost of care for the health system. Loss of productivity due to morbidity and premature mortality further increases the economic impact.

Low income families bear the highest burden of diabetes. While hospitalization and complications are major components of the costs of diabetes, drug costs constitute an important part of the expenses, often representing more than 50% of total direct costs for households.

The Global Report on Diabetes (April 2016) describes the burden and consequences and advocates for stronger health systems for improved surveillance, enhanced prevention and more effective management of diabetes.

India was one of the first countries to adopt the Global Monitoring Framework for prevention and control of NCDs. The National Action Plan and Monitoring Framework for prevention and control of NCDs identifies ten targets to achieve the goal of 25% reduction in mortality due to NCDs by 2025. The Sustainable Development Goals (SDGs) further strengthen this commitment.

Efforts to prevent and treat diabetes will be important to achieve the global SDG 3 target of reducing premature mortality from NCDs by one-third by 2030.

Diabetes and the other common NCDs share common risk factors. Everyone has a role to play in preventing and reducing these risk factors. Governments, health-care providers, people with diabetes and those who care for them, civil society, food producers, and manufacturers and suppliers of medicines, technology are all important stakeholders.

In this context, the National Multisectoral Action Plan developed by the Ministry of Health & Family Welfare, Government of India is a step in the right direction. It provides a framework to support and strengthen integration of NCD prevention strategies within the plans and programmes of the non-health sector.

WHO works with Member States, civil society and other partners to increase awareness about the burden of diabetes, its health and economic consequences, and to promote effective and affordable interventions for prevention and management of diabetes.

Diabetes and other NCDs represent a challenge to public health and national development. It is therefore imperative that we tackle this challenge now than later. Let us all resolve to ‘beat diabetes’ by scaling up prevention, strengthening care and enhancing surveillance.

\[\text{Signature}\]

\textbf{Henk Bekedam}  
WHO Representative to India
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## Acronyms

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<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>CAM</td>
<td>complementary or alternative medicines</td>
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<tr>
<td>CVD</td>
<td>cardiovascular disease</td>
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<tr>
<td>FSSAI</td>
<td>Food Safety and Standards Authority of India</td>
</tr>
<tr>
<td>HbA1c</td>
<td>glycated haemoglobin</td>
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<tr>
<td>HRH</td>
<td>human resources for health</td>
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<tr>
<td>ICMR–INDIAB</td>
<td>Indian Council of Medical Research–India Diabetes</td>
</tr>
<tr>
<td>ICT</td>
<td>information and communications technology</td>
</tr>
<tr>
<td>IFG</td>
<td>impaired fasting glycaemia</td>
</tr>
<tr>
<td>IGT</td>
<td>Impaired glucose tolerance</td>
</tr>
<tr>
<td>MCTS</td>
<td>maternal and child tracking system</td>
</tr>
<tr>
<td>NCD</td>
<td>noncommunicable diseases</td>
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<tr>
<td>NPCDCS</td>
<td>National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Stroke</td>
</tr>
<tr>
<td>NPHCE</td>
<td>National Programme for Health Care of the Elderly</td>
</tr>
<tr>
<td>OGTT</td>
<td>oral glucose tolerance test</td>
</tr>
<tr>
<td>OHA</td>
<td>oral hypoglycaemic agent</td>
</tr>
<tr>
<td>OOP</td>
<td>out-of-pocket</td>
</tr>
<tr>
<td>PHC</td>
<td>primary health care</td>
</tr>
<tr>
<td>STEPS</td>
<td>STEPwise approach to surveillance</td>
</tr>
<tr>
<td>TB</td>
<td>tuberculosis</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHO PEN</td>
<td>WHO Package of Essential Noncommunicable Diseases Interventions</td>
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1 Introduction

Along with its growing economy, India is witnessing rapid urbanization, increasing life expectancy, sociocultural changes resulting in sedentary lifestyles and changing diets, all of which are contributory factors to increasing the prevalence of diabetes.

Diabetes is a chronic disease, which occurs when the pancreas do not produce enough insulin, or when the body cannot effectively use the insulin it produces. Raised blood sugar, or hyperglycaemia, is a common effect of uncontrolled diabetes that leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

Over time, diabetes can damage the heart, blood vessels, eyes, kidneys and nerves. It can increase the risk of heart disease and stroke, cause neuropathy, retinopathy and nephropathy. Morbidity and mortality from cardiovascular disease (CVD) are two to five times higher in persons with diabetes as compared to people without the disease.\(^1\) The overall risk of dying, among people with diabetes, is at least double that of their peers without diabetes.\(^2\)

**Type 1 diabetes** (previously known as insulin-dependent, juvenile or childhood-onset diabetes) is characterized by deficient insulin production and requires a daily administration of insulin. The cause of type 1 diabetes is not known and it is not preventable with current knowledge. Symptoms include excessive excretion of urine (polyuria), thirst (polydipsia), constant hunger, weight loss, vision changes and fatigue.

**Type 2 diabetes** (formerly called non insulin-dependent or adult-onset diabetes) results from the body's ineffective use of insulin. It comprises 90% of people with diabetes around the world and is largely the result of excess body weight and physical inactivity. Symptoms may be similar to those of type 1 diabetes, but are

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often less marked. As a result, the disease may remain undetected until several years after onset, by when complications may have already arisen. Until recently, type 2 diabetes was seen only in adults but it is now also occurring in children.

**Gestational diabetes** refers to raised blood glucose values above normal but below those diagnostic of diabetes, occurring during pregnancy. Women with gestational diabetes are at an increased risk of complications during pregnancy and at the time of delivery. They are also at increased risk of type 2 diabetes in future.

**Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG)** are intermediate conditions in the progression from normal blood glucose levels to diabetes. People with IGT or IFG are at high risk of progressing to type 2 diabetes, although this is not inevitable.

The rise in diabetes is generally associated with ageing populations, economic development, increasing urbanization, unhealthy diets, increased sugar consumption, low fruit and vegetable intake and reduced physical activity. Furthermore, Indians have a peculiar genetic composition and Asian Indian phenotype that predisposes them to have a higher propensity to metabolic syndrome, diabetes mellitus and coronary artery disease.

Characteristically, Indians have increased insulin resistance, greater abdominal adiposity (higher waist circumference despite lower body mass index) and higher prevalence of impaired glucose tolerance, contributing to a greater risk of developing disease at a relatively younger age. Furthermore, a large percentage of people in India are inactive, with fewer than 10% engaging in recreational physical activity. The percentage of individuals with no recreational activity increases with age.

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1.1 Prevention and treatment of diabetes

Many unhealthy behaviour patterns that underlie diabetes and other noncommunicable diseases (NCDs) start during childhood and adolescence. They include the main modifiable risk factors – physical inactivity, tobacco use, second-hand smoke exposure, unhealthy diet and the harmful use of alcohol. These are strongly linked to morbidity, mortality and disability in the short and longer term.

Much type 2 diabetes results from modifiable risk factors that can be reduced using a combination of approaches at population and individual levels. These include policy measures that aim to increase access to affordable, healthy foods and beverages, promotion of physical activity and reduction of exposure to tobacco. To help prevent type 2 diabetes and its complications, people should achieve and maintain a healthy body weight, be physically active, eat a healthy diet and avoid using tobacco. It is estimated that up to 80% of the occurrence of type 2 diabetes could be prevented through evidence-based, affordable, cost-effective, population-wide and multisectoral interventions.

Early detection of diabetes and appropriate treatment are necessary to achieve sustained control of blood glucose levels and prevent complications. To reduce avoidable mortality from diabetes and improve outcomes, access to affordable treatment is critical. Adequate access to insulin, oral hypoglycaemic medication and medication to control blood pressure and lipids are essential elements of successful treatment efforts.

The magnitude of the problem is described in Section 2. Management of diabetes is described in Section 3, diagnosis and treatment in Section 4 and health system response to diabetes in India Section 5. Multisectoral coordination and population-based interventions for prevention and control of diabetes and other NCDs are discussed in Sections 6 and 7. Section 8 describes innovative approaches for diabetes prevention and control.
2 Magnitude of the problem

2.1 Global burden of diabetes

The diabetes epidemic is rising rapidly with the most dramatic documented increase being in low- and middle-income countries. Diabetes is undoubtedly one of the largest health emergencies of the twenty-first century with a worldwide prevalence of 422 million (8.5% of adults aged 20–79), which is predicted to reach 642 million by 2040, i.e. one in every ten adults. The largest increases will take place in regions where economies are moving from low- to middle-income levels. About 75% of people with diabetes live in low- and middle-income countries. Furthermore, 318 million people are estimated to have impaired glucose tolerance and 20.9 million live births are affected by some form of hyperglycemia in pregnancy, of which 85.1% are due to gestational diabetes as per the IDF Atlas 2015. Both these conditions are associated with an increased risk of developing type 2 diabetes in later life. Currently, there are more people with diabetes in urban areas (269.7 million) than in rural areas (145.1 million). By 2040, the difference is expected to widen globally, with an estimated 477.9 million people with diabetes living in urban areas and 163.9 million in rural areas.

Half of the cases of diabetes are among people between 40 and 59 years of age. World Health Organization (WHO) estimates that globally, high blood glucose is the third leading risk factor for premature mortality after high blood pressure and tobacco use.

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2.2 Burden of diabetes in India

In India, an estimated 7.8% of the population above 18 years of age has raised blood glucose levels or are on treatment for diabetes.\textsuperscript{6,10} This amounts to an estimated 60 million people with diabetes out of a population of over 1.3 billion. Awareness about their diabetes status varies from state to state and the proportion that is unaware of their diabetes status is very high in rural areas.\textsuperscript{11} Nearly 900 000 annual deaths are directly or indirectly attributed to diabetes.\textsuperscript{6}

Type 1 diabetes is still not very common. However, of the 542 000 children aged up to 14 years with type 1 diabetes in 2015 globally, India had 70 200, the second largest number in the world after the USA. India also ranks highest in the list of top 10 countries with 36.5 million people with impaired glucose tolerance.\textsuperscript{7}

Prevalence of diabetes varies from state to state in India. Partial results available from the Indian Council of Medical Research-India Diabetes (ICMR–INDIAB) Study reveal large inter-state variations in prevalence, ranging from 4.3% in Bihar to 13.6% in Chandigarh.\textsuperscript{11}

The third repeat survey carried out by the National Nutrition Monitoring Bureau among the rural population in 2012 reported a prevalence of 8.2% and 6.8% among adult men and women for diabetes, respectively. The prevalence was reported to be high in the states of Kerala, Tamil Nadu and Gujarat (8.2–16.4%) among both genders. Analysis of secular trends revealed an increase in diabetes prevalence in the rural population at a rate of 2.02 per 1000 population per year.\textsuperscript{12}

2.3 Socioeconomic burden

Diabetes imposes enormous economic burden on individuals and families, national health systems and to society. Health spending on diabetes accounted for 10.8% of total health expenditure worldwide in 2013. Health expenditure includes medical

\textsuperscript{11} Personal communication: Dissemination meeting of the ICMR INDIAB Study, 15 March 2016.
spending on diabetes by health systems, as well as by people living with diabetes and their families. Global health spending to treat diabetes and manage complications totalled at least US$ 548 billion in 2013. By 2035, this number is projected to exceed US$ 627 billion. Health spending due to diabetes is not evenly distributed across age groups. Estimates show that 76% of global health expenditure on diabetes in 2013 was incurred on people between the ages of 50 and 79. There is a large disparity in health spending on diabetes between regions and countries. Only 20% of global health expenditure on diabetes was made in low- and middle-income countries, where 80% of people with diabetes live. On average, the estimated health spending due to diabetes was US$ 5621 per person with diabetes in high-income countries, compared to US$ 356 in low- and middle-income countries.\textsuperscript{13}

The costs associated with diabetes also include productivity loss and disability, which can be a considerable burden to the individual, families and society. When people have long-standing undiagnosed diabetes, the potential benefits of early diagnosis and treatment are lost. The costs related to undiagnosed diabetes are considerable. One study from the USA found that undiagnosed diabetes was responsible for an additional US$ 18 billion in health-care costs in one year.\textsuperscript{13} If effective measures are not put in place, India stands to lose US$ 150 billion before 2030 due to diabetes.\textsuperscript{14}

India has one of the lowest public health expenditures as a proportion of total health expenditure. It is estimated that annually 60 million people are pushed into poverty due to catastrophic out-of-pocket (OOP) expenditure. Lack of quality health services in the public system often forces people to seek care from the private sector, even though the latter may not be affordable. Currently, expenditure on drugs constitutes about 67% of OOP expenditure on health care. In 2013, about 46% of private expenditure on health was paid out of pocket.\textsuperscript{15} As per the data from the National Sample Survey Organization (NSSO), the share of NCDs in OOP expenditure

incurred by households in India increased from 31.6% in 1995–96 to 47.3% in 2004. One-quarter of those hospitalized in India are impoverished due to OOPE.

Healthcare expenditure for people with diabetes is about two to three times higher than for people without diabetes. As the epidemiological burden of diabetes increases, the economic burden on households is expected to rise and the economically disadvantaged will be the most affected. Estimated mean diabetes-related expenditure per person per year with diabetes is US$ 95. The average cost is estimated to vary between US$ 45 and 150 per annum in various studies. The high cost of treatment leads to higher incidence of non-compliance, particularly among the lower socioeconomic groups.

Studies have shown large regional and socioeconomic differences in the prevalence of type 2 diabetes in India. Several studies found that lower income groups generally spent a larger proportion of their income on diabetes care; urban populations spent more in absolute terms and that cost of complications added heavily to overall costs. Within the diabetes population, low-income individuals bear the highest burden of diabetes.

A study on type 2 diabetes in seven states in India during the period 1998 to 2005 found spending to be higher among the urban than the rural population, both in absolute terms and as a proportion of income. This was due to higher expenditure on medical consultations, laboratory tests and drugs, which was attributed to the use of more expensive treatments in urban areas. Such treatments have remained unavailable in rural areas. Also, in lower income groups, spending was higher in the

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urban than in the rural population, possibly because awareness of diabetes care was better among the urban poor. While hospitalization and complications are major components of the costs of diabetes, drug costs constitute an important part of the expenses, often representing more than 50% of total direct costs for households. A study based on a large dataset found that drug costs accounted for 58% of OOP expenditure on diabetes.\(^{22}\)

### 2.4 Diabetes in the elderly

India has 104 million elderly (defined as 60 years of age and above), constituting 8.6% of the total population.\(^{23}\) The number of elderly is expected to reach more than 300 million by 2050, accounting for 20% of the population.\(^{24}\)

The self-reported prevalence of diabetes among people aged over 50 years was 6.9% in 2010, of which 49.2% were on treatment.\(^{25}\) Diabetes in the elderly is associated with a large number of comorbidities. Kidneys and eyes are more likely to be affected. Diabetic elderly often suffer from falls and fractures, neuropathy, cognitive decline, drug-related hypoglycemia, visual impairment, etc. Mortality due to cardiovascular causes increases due to greater risk of arteriosclerosis.\(^{26}\) As the number of older people with diabetes increases, outcomes such as cognitive and physical disability become growing concerns, with implications on quality of life, loss of independence and demands on caregivers.

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3 Management of diabetes

3.1 Diagnosis of diabetes

Early detection of diabetes can help in good control of blood glucose and prevent complications. This is hence an important aspect of diabetes management. Studies reveal that nearly half the patients with diabetes are not aware of their diabetes status. Thus, opportunistic and high-risk screening for diabetes will facilitate early diagnosis and treatment of diabetes.

Screening tests for type 2 diabetes include risk assessment questionnaires, biochemical tests and combinations of the two. The biochemical tests currently available are blood glucose or urine glucose measurements, blood HbA1c or blood fructosamine measurements. Plasma glucose remains the mainstay for diagnosis of diabetes.

Treatment of diabetes involves lowering blood glucose and the levels of other known risk factors that damage blood vessels. Cessation of tobacco use is also important for avoiding complications. The latest guidelines on diagnosis of diabetes and intermediate hyperglycemia were issued by WHO in 2006 (Table 1).27

Table I: Diagnostic criteria for diagnosis of diabetes and intermediate hyperglycemia

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
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<tbody>
<tr>
<td><strong>Diabetes</strong></td>
<td></td>
</tr>
<tr>
<td>Fasting plasma glucose</td>
<td>≥7mmol/l (126mg/dl)</td>
</tr>
<tr>
<td>Or</td>
<td></td>
</tr>
<tr>
<td>2 hour plasma glucose*</td>
<td>≥11.1mmol/l (200mg/dl)</td>
</tr>
<tr>
<td><strong>Impaired glucose tolerance</strong></td>
<td></td>
</tr>
<tr>
<td>Fasting plasma glucose</td>
<td>&lt;7mmol/l (126mg/dl)</td>
</tr>
<tr>
<td>and</td>
<td></td>
</tr>
<tr>
<td>2 hour plasma glucose*</td>
<td>7.8 mmol/l (140mg/dl) to 11.1mmol/l (200mg/dl)</td>
</tr>
<tr>
<td><strong>Impaired fasting glucose</strong></td>
<td></td>
</tr>
<tr>
<td>Fasting plasma glucose</td>
<td>6.1 to 6.9mmol/l (110 to 125mg/dl)</td>
</tr>
<tr>
<td>and</td>
<td></td>
</tr>
<tr>
<td>2 hour plasma glucose</td>
<td>≤7.8 mmol/l (140mg/dl) if measured</td>
</tr>
</tbody>
</table>

* Venous plasma glucose 2 h after ingestion of 75 g oral glucose load
* If 2 h plasma glucose is not measured, status is uncertain as diabetes or IGT cannot be excluded

**Oral glucose tolerance test**

Diagnosis of diabetes based on elevated 2 h plasma glucose is associated with a worse prognosis for both mortality and retinopathy as compared to diabetes diagnosed on the basis of an elevated fasting glucose alone. Diagnosing such people can only be achieved with an oral glucose tolerance test (OGTT). In addition, IGT can only be diagnosed with an OGTT. This will detect around 30% of individuals that will have prognostic implications.

**Glycated haemoglobin**

Glycated haemoglobin (HbA1c) reflects the average plasma glucose over the previous 2–3 months in a single measure, which can be performed at any time of the day and does not require any special preparation such as fasting. These properties have made it the gold standard for assessing glycaemic control in people with diabetes. However HbA1c testing facility is not widely available in most countries and there are aspects of its measurement that are problematic. Although the precision of HbA1c measurement in reference laboratories is similar to that of plasma glucose, global consistency remains a problem. Furthermore, the HbA1c result is influenced by several factors including anaemia, abnormalities of haemoglobin, pregnancy and uraemia.

WHO recommends that HbA1c can be used as a diagnostic test for diabetes provided that stringent quality assurance tests are in place, assays are standardized to criteria aligned to the international reference values and there are no conditions present which preclude its accurate measurement. An HbA1c of 6.5% is recommended as the cut-off point for diagnosing diabetes. A value of less than 6.5% however does not exclude diabetes diagnosed using glucose tests.²⁸

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3.2 Treatment of diabetes

Type 1 diabetes

Patients with type 1 diabetes require lifelong insulin therapy. The goal of insulin therapy is to provide insulin in as physiologic a manner as possible. Most patients require two or more injections of insulin daily, with doses adjusted on the basis of self-monitoring of blood glucose levels. Optimal diabetic control requires frequent self-monitoring of blood glucose levels, which allows rational adjustments in insulin doses. Hypoglycemia may result from a change in insulin dose, a small or missed meal, or strenuous exercise. Common symptoms of hypoglycemia are light-headedness, dizziness, confusion, shakiness, sweating and headache. Patients should be made aware of these symptoms and educated to respond rapidly with sugar intake. They should be advised to carry candy or sugar cubes.

One of the other important steps in managing type 1 diabetes is diet control. Dietary treatment is based upon nutritional assessment and treatment goals. Dietary recommendations should take into account the patient’s eating habits and lifestyle. Diet management includes education about how to adjust the timing, size, frequency, and composition of meals so as to avoid hypoglycaemia or postprandial hyperglycaemia. Exercise is another important aspect of diabetes management. Patients should be encouraged to exercise regularly. It is essential to educate patients on the effects of exercise on blood glucose level. If patients participate in rigorous exercise for more than 30 minutes, they may develop hypoglycaemia unless they either decrease the preceding insulin injection by 10–20%, or have an extra snack. Patients must also make sure to maintain their hydration status during exercise.

Treatment of type 2 diabetes

Introduction of oral hypoglycaemic agents (OHA) will often be necessary in patients on diet treatment only, and the dosage further increased to improve glycaemic control. Metformin can be used as a first-line oral hypoglycaemic agent in patients with type 2 diabetes who are not controlled by diet only and who do not have renal insufficiency, liver disease or hypoxia. A sulfonylurea is prescribed to patients who have contraindications to metformin, or in whom metformin does not improve
glycaemic control. Glibenclamide is a second generation sulfonylurea and the only sulfonylurea on the WHO Essential Medicine List.

Lowering of plasma glucose towards normal values relieves symptoms of hyperglycaemia and has a beneficial effect on macrovascular and microvascular complications. The majority of persons with type 2 diabetes are overweight or obese, which further increases their risk of macrovascular and microvascular complications through worsening of hyperglycaemia, hyperlipidaemia and hypertension.

All overweight patients should be advised to reduce weight by reducing their food intake and giving preference to low glycaemic-index foods as the source of carbohydrates in their diet. All patients should be advised to practice regular daily physical activity appropriate to their physical capabilities, e.g. walking.29

3.3 Treatment of diabetes in the elderly

Management of diabetes in the elderly carries certain unique challenges. As diabetes in the elderly population is often associated with comorbidities, polypharmacy is a major concern amongst this age group. Apart from these, elderly persons with diabetes may consume complementary or alternative medicines (CAM) without informing the physician. This may increase the risk of hypoglycemia.30 While prescribing medicines, the formulation and dosage should be prescribed with caution. The metabolism of certain drugs in the body gets altered due to ageing; the metabolites may be harmful substances causing more harm than good.

Dwindling immunity due to diabetes and growing age leads to ulcers and infections in different parts of the body, which persists, affecting the quality of life. Palliative care provides relief to such patients to a great extent. Dementia and other cognitive symptoms can appear as a consequence of this metabolic disease process. Support from the psychiatrist and psychologist should form an integral part of the treatment regimen. Sensitization and capacity building of caregivers at home determine the outcome of the treatment to a great extent. Patient and family members’ awareness and education are essential to the management of diabetes in the elderly. Self-monitoring of blood glucose will help reduce the risks of serious hypoglycemia, irrespective of the fact that the patient is on oral drugs or insulin.\(^{31}\)

4 Health system response to diabetes in India

4.1 Health-care system

India has been at the forefront of the fight against NCDs with a national programme for NCDs in place for the past few years. There is increasing recognition of the need to tackle the diabetes epidemic. This has been reflected in the new draft National Health Policy, which intends to “reduce premature mortality from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases by 25% by 2025”.

The Government of India initiated the National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) in the year 2009–10. By the end of 2015, this programme covered more than 350 districts of the country. NPCDCS envisages a primary-care approach for tackling NCDs and outlines the required manpower at different levels. NCD cells with additional manpower have been recommended at national, state and district level. NCD clinics also have been recommended to deal with patients attending community health centres (CHCs) and district hospitals. In the Twelfth Five-Year Plan, it has been envisaged that NCD clinics would be set up in each CHC in the country. The NPCDCS aims at integration of NCD interventions in the National Health Mission framework for optimization of scarce resources.

Private hospitals are the predominant source of treatment for chronic conditions, with government hospitals accounting for only about a quarter of the treated cases for diabetes and hypertension. Forty-one percent of the elderly with acute morbidity sought treatment from public facilities, 40% from private facilities and the rest from other types of facilities.32

Efficient use of limited health-care resources, sustainable health financing mechanisms, access to basic diagnostics and essential medicines and organized

medical information and referral systems are imperative for provision of equitable care for people with and at risk of diabetes as well as other NCDs. They require long-term care that is proactive, patient centred, community based and sustainable. Such care can be delivered equitably only through health systems based on primary health care (PHC). The WHO Package of Essential Noncommunicable Diseases Interventions (WHO PEN) supports implementation of very cost-effective interventions through an integrated approach.

WHO PEN is an innovative and action-oriented response, which prioritizes a set of cost-effective interventions that can be delivered to an acceptable quality of care, even in resource-poor settings. It will reinforce health system strengthening by contributing to the building blocks of the health system. Cost effectiveness of the selected interventions will help to make limited resources go further, and the user-friendly nature of the tools that are being developed will empower primary care physicians as well as allied health workers to contribute to NCD care. WHO PEN is the minimum standard for NCDs to strengthen national capacity to integrate and scale up care of heart disease, stroke, cardiovascular risk, diabetes, cancer, asthma and chronic obstructive pulmonary disease in primary health care in low-resource settings.

**Quality of care**

The quality of care in diabetes has not sufficiently been studied and documented in India. However, the lack of continuum of care for diabetic patients indicates that there are treatment gaps, poor glycaemic control and non-adherence to medications by patients. The cost of care including prescription and medication (especially when three quarters of all patients visit private providers) poses a major problem for households.

**Co-morbidities and complications**

A series of studies, specially emanating from southern India, have reported that complications are common in 10–20% of diabetic patients, and that diabetic retinopathy is one of the commonest complications (WHO India, unpublished review; 2013).
Complications are at times the reasons that prompt patients to visit health facilities, where they are identified with diabetes for the first time. Diabetes and hypertension are often reported as the common comorbidities in India and elsewhere. Studies have also indicated that amongst tuberculosis (TB) patients, diabetes is one of the commonest comorbidities. There have been increasing efforts in screening of comorbidities and complications in diabetic patients in Indian states.

**Care for the elderly**

In order to provide quality health care services for the elderly, the National Programme for Health Care of the Elderly (NPHCE) and NPCDCS are being implemented across the country. This was needed because the OOP expenditure on health care of the elderly is quite high. At present, health insurance coverage for the elderly population is very low. Studies have indicated that despite welfare programmes, economic, health and social security among the elderly has not improved commensurately,\(^{33}\) and that a large proportion of the elderly are dependent on their families for support.\(^{34}\)

**4.2 Human resource capacity**

Human resources for health (HRH) is one of the most critical elements for health system preparedness and response to diabetes prevention and control. Although the HRH situation in India has improved since the World Health Report 2006 which identified India as one of the 57 countries with a critical shortage of health workers, it still needs to make transformational changes on all fronts of HRH if it wants to make serious progress towards achieving UHC, including prevention and control of NCDs like diabetes. While 70% of India’s population lives in rural areas, only about 40% of health workers are working in rural areas.\(^{35}\) The health system needs a paradigm shift to tackle NCDs. Workforce capacity building is an important activity to achieve this. Training of and retraining of the health workforce is necessary to build capacity

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on programme and disease management. Task shifting or task sharing is another innovative approach with the potential to rapidly scale up access to quality NCD care at the primary health level in India.

4.3 Drugs, equipment and supplies

Health is a state subject in India. More than 50% of India’s population is covered under free drug distribution schemes introduced by various state governments. Under the NPCDCS, there is provision for free drugs and diagnostics for NCDs, which includes drugs to treat diabetes. State governments are given the responsibility of ensuring regular drug supply based on an indicative list of essential medicines for management of NCDs, including diabetes. However, the challenge still remains as most of the patients seek services from the private sector and OOP expenditure is high. The private sector has been empanelled by a few state governments under state health insurance schemes to protect people from catastrophic expenditure due to chronic diseases.

4.4 Patient empowerment for self-care

Management of diabetes not only includes controlling blood sugar but also involves empowering the patient for self-care and prevention or early detection of complications. Some other complementary interventions along with drugs that can help achieve better blood sugar control include:

- lifestyle interventions for preventing type 2 diabetes;
- influenza vaccination for patients with diabetes;
- preconception care among women of reproductive age including patient education and intensive glucose management;
- detection of diabetic retinopathy by dilated eye examination followed by appropriate laser photocoagulation therapy to prevent blindness;
- effective angiotensin-converting enzyme inhibitor drug therapy to prevent progression of renal disease;
- care of acute stroke and rehabilitation in stroke units;
- interventions for foot care—educational programmes, access to appropriate footwear, multidisciplinary clinics.
5 Multisectoral coordination for diabetes prevention and control

Type 2 diabetes shares common behavioural risk factors with the other NCDs, namely cardiovascular diseases, cancers and chronic respiratory diseases. Prevention and control of NCDs will essentially require addressing these risk factors.

Effective approaches to reducing the NCD burden include a mixture of population-wide and individual interventions. Such cost-effective interventions are already available and include methods for early detection of NCDs and their diagnoses using inexpensive technologies, non-pharmacological and pharmacological approaches for modification of NCD risk factors and affordable medications for prevention and treatment of heart attacks and strokes, diabetes, cancer and asthma.

These low technology interventions, if effectively delivered, can reap future savings in terms of reduced medical costs, improved quality of life and productivity. Most of the actions related to these interventions extend beyond the boundaries of the health sector. Multisectoral coordination is based on the “whole-of-government” approach and needs cooperation from relevant government ministries to address risk mitigation and inequity in treatment related to prevention and control of diabetes.

Following the endorsement of the global NCD voluntary targets and indicators for NCD prevention and control by World Health Assembly in 2013, India was the first country globally to define its national monitoring framework with country-specific targets and indicators and to commit to 10 targets and 21 indicators to be achieved by 2025. The National Multisectoral Action Plan for Prevention and Control of NCDs (2015–22) provides the implementation framework for achievement of these targets. It provides a framework to support and strengthen integration of NCD prevention strategies within the plans and programmes of non-health stakeholders. Within the health sector, it will build synergies within the existing programmes. It identifies four strategic areas for achieving the national targets for NCD, which include development of an integrated and multisectoral coordination mechanism, health promotion through effective policies and programmes, health system strengthening
and putting surveillance, monitoring and evaluation and research systems in place for strategic use of data to inform programme implementation. The National NCD Monitoring Framework is given in Fig. 1.

Fig. 1: National NCD Monitoring Framework

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Framework element</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Outcome</td>
</tr>
<tr>
<td>1.</td>
<td>Premature mortality from NCDs</td>
<td>Relative reduction in overall mortality from cardiovascular disease, cancer, diabetes, or chronic respiratory disease</td>
</tr>
<tr>
<td>2.</td>
<td>Alcohol use</td>
<td>Relative reduction in alcohol use</td>
</tr>
<tr>
<td>3.</td>
<td>Obesity and diabetes</td>
<td>Halt the rise in obesity and diabetes prevalence</td>
</tr>
<tr>
<td>4.</td>
<td>Physical inactivity</td>
<td>Relative reduction in prevalence of insufficient physical activity</td>
</tr>
<tr>
<td>5.</td>
<td>Raised blood pressure</td>
<td>Relative reduction in prevalence of raised blood pressure</td>
</tr>
<tr>
<td>6.</td>
<td>Salt/sodium intake</td>
<td>Relative reduction in mean population intake of salt, with aim of achieving recommended level of less than 5gms per day</td>
</tr>
<tr>
<td>7.</td>
<td>Tobacco use</td>
<td>Relative reduction in prevalence of current tobacco use</td>
</tr>
<tr>
<td>8.</td>
<td>Household indoor air pollution</td>
<td>Relative reduction in household use of solid fuels as a primary source of energy for cooking</td>
</tr>
<tr>
<td>9.</td>
<td>Drug therapy to prevent heart attacks and strokes</td>
<td>Eligible people receiving drug therapy and counselling (including glycomic control) to prevent heart attacks and strokes</td>
</tr>
<tr>
<td>10.</td>
<td>Essential NCD medicines and basic technologies to treat major NCDs</td>
<td>Availability and affordability of quality, safe and efficacious essential NCD medicines including generics, and basic technologies in both public and private facilities</td>
</tr>
</tbody>
</table>
6 Population-based policies and interventions

Population-wide policies and initiatives such as marketing restrictions on unhealthy foods and non-alcoholic beverages to children, nutrition labelling, food taxes and subsidies, physical activity policies and social marketing campaigns are typically designed to alter the food and physical activity environments to make healthier choices the easier choices for individuals within the population. The creation of environments that support healthy diets and physical activity is an essential component of population-wide diabetes prevention strategies. All the risk reduction strategies require multi-stakeholder engagement and actions.

Creating supportive environments typically requires policy changes, particularly in the areas of food marketing and labelling, fiscal policy, urban planning, transport and agriculture. Moreover, there is evidence to suggest that multiple intervention strategies have the potential to achieve larger health gains than individual interventions, and often with greater cost-effectiveness.\(^{36}\)

Lifestyle interventions focusing on weight management and increasing physical activity should be promoted in all children at high risk of developing type 2 diabetes. The types of policy instruments generally used as part of this component of comprehensive diabetes prevention strategy are laws, regulations, taxes, subsidies and social marketing campaigns that affect the population as a whole. These policies typically affect both adults and children.

6.1 Marketing of unhealthy foods and non-alcoholic beverages to children

The marketing of food and non-alcoholic beverages, especially television advertisements targeted towards children is very potent and highly influential in determining children’s food knowledge, preferences, purchase requests and consumption patterns.\(^{37}\) Television advertising is associated with increased

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consumption of snacks and drinks high in sugar, as well as excess calorie intake.\textsuperscript{38} WHO has identified that the reduction in marketing of foods and non-alcoholic beverages high in salt, fats and sugar to children is likely to be a cost-effective action to reduce NCDs, including diabetes.\textsuperscript{39}

In India, the Ministry of Women and Child Development and the Food Safety and Standards Authority of India (FSSAI), under the aegis of Ministry of Health and Family Welfare have taken some important measures to promote healthy snacks in schools. In 2015, FSSAI had passed a gazette notification restricting the maximum amount of trans fatty acids to 5% of weight in margarine, fat spreads, hydrogenated vegetable oils, etc. This has now become the Food Safety and Standards Regulation, 2015. These policy measures are a driving force for implementation of interventions promoting healthy diet among children in India for prevention of obesity and diabetes.

\textbf{6.2 Nutrition labelling}

The provision of nutrition information in a standardised format on foods sold has been shown to encourage more healthy diets among people who read the labels.\textsuperscript{40} In India, FSSAI provides regulations for processed foods to display nutrition information on the product packaging, including levels of energy, protein, total fat, saturated fat, carbohydrate, sugars and sodium. This provides an opportunity for introducing such interpretative labelling for prevention of diabetes and other NCDs.

\textbf{6.3 Food taxes and subsidies}

There is strong evidence that price has a major effect on consumption choices and that increasing the price of unhealthy foods can be used to limit their consumption and thus improve population health.\textsuperscript{41–42} Additionally, monetary incentives may be used to encourage the purchase of healthier food including fruits and vegetables.


\textsuperscript{39} Scaling up action against noncommunicable diseases: how much will it cost? Geneva: World Health Organization; 2011.


6.4 Fruit and vegetable initiatives

Fruits and vegetables are an essential part of the human diet. The 2002 Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases recommends that the population consume at least 400 gms of fruits and vegetables per person per day (approximately equivalent to five servings). Multipronged strategies such as use of multiple media channels for creating awareness, monetary incentives, creating a healthier food environment in schools and workplaces and demonstration workshops are some of the initiatives to promote fruit and vegetable consumption.

6.5 Promotion of physical activity

WHO recommends that children and adolescents between 5 and 17 years of age accumulate at least 60 mins of moderate to vigorous intensity physical activity every day. This guidance can be used as a starting point to implement and guide national physical.

6.6 Social marketing for awareness generation

Social marketing campaigns using paid and non-paid forms of media across multiple channels are considered cost effective for improving diets and promoting physical activity.

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7 Surveillance and monitoring

Surveillance and monitoring are integral components of planning and implementation of any public health intervention. They enable understanding of whether the intended results are being achieved as planned. Availability of information on time trends and on key outcome and impact indicators will help to benchmark the burden of diabetes at national and state levels, allow comparable assessments across states and with time, provide the evidence for advocacy and policy development, as well as help to reinforce political commitment.

Regular population-based assessment of risk factors for type 2 diabetes is a key element for the prevention and control of diabetes. India adopted the WHO STEPwise approach to Surveillance (STEPS) which is a simple, standardized method for collecting, analysing and disseminating data on NCD risk factors. India uses the STEPS tools to generate reliable information for monitoring the effects of the implementation of various strategies and interventions under the National Multisectoral Action Plan for Prevention and Control of NCDs. The STEPS approach encourages collection of small amounts of useful information on a regular and continuing basis to track within-country trends, as well as for making comparisons with other countries.

WHO Director-General will use 10 progress indicators to report, by the end of 2017, to the United Nations General Assembly on the progress achieved in the implementation of the four time-bound commitments included in the 2014 UN Outcome Document on NCDs. One of the indicators is availability of a STEPS survey or a comprehensive health assessment every 5 years. India has conducted a sub-national STEPS survey in six centres in 2004 and another involving seven states in 2007. A national level STEPS survey is now underway by ICMR.47

8 Innovative approaches for scaling up prevention and care

8.1 mHealth for diabetes prevention and care: mDiabetes

The wide reach of mobile networks and deep penetration of mobile phones in the Indian population presents a significant opportunity for promoting access to health information and services. mHealth provides an excellent opportunity to scale up prevention and management of diabetes, hypertension and other NCDs.

Information and communications technologies (ICT), notably those using mobile devices, potentially provide a useful tool in enhancing prevention and management strategies for diabetes. SMS is the single most widespread service offered by mobiles and may provide a simple, fast and efficient adjunct to the prevention and management of diabetes. The use of this simple facility allows one to reach a wider audience among the pool of mobile subscribers.

In India, mobile phones are being extensively used in different forms by health programmes, notably in maternal and child health, tuberculosis and tobacco cessation. For instance, more than 25 million pregnant women have been registered in the Maternal Child Tracking System (MCTS) in which SMSs are sent to beneficiaries and to front line workers to alert them regarding services.

Given the challenges in diabetes detection and management in India, it is imperative to increase the reach of services and health literacy among the population and also enhance the capacity of health-care providers to provide quality care and counselling for diabetes. Going by the demonstrated potential, mDiabetes (mHealth for Diabetes) can be used to help address these challenges.

mDiabetes is expected to lead to rapid uptake and self-registration for service by the target population, improved awareness, early diagnosis, health-care seeking behaviour for diabetes, better adherence to drug or dietary control, self-care and prevention of complications among patients with diabetes.
8.2 Diabetes prevention in the workplace

Workers represent half the world’s population and are the major contributors to the economic and social development of nations. Their health is determined not only by workplace hazards but also by social and individual factors and access to health services. The working environment and the nature of work itself are both important influences on health. In recent decades, significant changes have taken place in the world of work that are closely linked to the organization and management of work. These have resulted in emerging risks and new challenges in the field of occupational health and safety. Psychosocial risks at the workplace have been identified as significant emerging risks. Linked to psychosocial risks, issues such as work-related stress and workplace violence are widely recognized as major challenges to occupational health and safety. Work can affect physical health through influence on many behaviour patterns like smoking, unhealthy diet and lack of physical activity.

Work-related programmes can help reduce smoking behaviour, control weight (in the short term), improve one’s attitude towards nutrition, lower blood cholesterol and increase physical activity. A WHO review of interventions to improve diet and exercise found that multicomponent workplace interventions that provide healthy food and beverages at the workplace, provide place for fitness, encourage use of stairs, involve the family and provide individual behaviour change strategies were effective. Promising practices for success in health promotion include integrating health promotion programmes into the organization’s operations, while simultaneously addressing individual, environmental, policy and cultural factors affecting health and productivity, tailoring programmes to address specific needs and attaining high levels of participation.

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9 Conclusion

Increasing urbanization, rising age and lifestyle changes all contribute to an increasing prevalence of diabetes in India. Diabetes and its complications bring about substantial economic loss to people with the disease and their families, as well as to health systems and national economies directly or indirectly. Diabetes and other NCDs are serious threats to public health and national development. The political basis for concerted action to address diabetes has been set at the 2011 UN Political Declaration on NCDs, and the 2013 WHO Global Action Plan on NCD.

These have been subsequently woven into the 2015 UN Sustainable Development Goals for 2030. Simple lifestyle measures at a personal level and policy support for creating an enabling environment for health promotion and reduction of risk factors, along with a strengthened health system that provides affordable and quality health care will all be essential for halting this silent epidemic. We can indeed beat diabetes through scaling up prevention, strengthening care and enhancing surveillance.