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Cardiovascular diseases in India Challenges and way ahead



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Message from President, ASSOCHAM

Today, the average age of a person suffering with heart attack has come down drastically. And this is mainly a result of today's changing lifestyles. In fact the rate of coronary heart disease in the Indian community – particularly in young men – is almost twice as high as their western counterparts.

So what are the reasons or factors which have resulted in an increase in the number of heart patients in India? Has the modern life style proved to be the stimulus for the growth of heart disease among the young population? Improper food habits and lack of physical activity coupled with high level of stress and increase in smoking and alcohol consumption; can we blame these, or shall we blame it on our genes? What makes us more prone to cardiovascular diseases?

The ASSOCHAM team along with Dr. H.K. Chopra & Dr. Navin C. Nanda has come up with a mammoth initiative "INTERNATIONAL HEART PROTECTION SUMMIT" to address the rising menace in the country. I wish them the very best for their endeavor and also I am optimistic that the outcomes of this initiative will

be a part of the recommendations to be sent to the Health Ministry, and the various other stake holders who are working hard to meet the healthcare objectives of the nation. I wish to thank the Planning Commission, Ministry of Health & Family Welfare, Department of Science & Technology CSIR, ICMR, for their support.

I also acknowledge Dr. Om S. Tyagi and his team including Mr. Agnideep, Mr. Sandeep, Mr. Vipul and the Secretariat for their relentless efforts for the Summit. I wish to extend my heartfelt thanks to Deloitte for coming up with the Knowledge Paper in time and with all the facts and figures completing the picture of the prevailing scenario on Heart Disease.



Dilip Modi President, ASSOCHAM



Dilip Modi, President, ASSOCHAM

Acknowledgement from Secretary General, ASSOCHAM



D.S.Rawat Secretary General, ASSOCHAM

It gives me immense pleasure that ASSOCHAM is organizing International Heart Protection Summit (IHPS-2011).

A century earlier very few people used to die of heart diseases. In due course of time, heart diseases have become the number one global killer. The age of technology has made life easier and made people more prone to heart diseases. The combination of a sedentary lifestyle and a rich diet has led to an increase in clogged blood vessels, heart attacks, and strokes.

These diseases are a global health problem with no geographic, gender, or socio-economic boundaries. Despite the tremendous advances in cardiac care made recently, including drugs, devices, and diagnostic innovation; many patients continue to die from heart diseases or live with significant morbidity.

The need of the hour is not only the improvements in existing heart remedies and surgical methods but also to extend preventive strategies such as improved life style, nutritious and healthy food, corporate health protection initiatives, health wellness programmes, promotion

of meditation and Yoga to full effect to combat heart diseases.

I thank Planning Commission, Ministry of Health & Family Welfare, DST, CSIR and ICMR for their support. I also thank our Knowledge Partner Deloitte for its wonderful effort in putting up this report. I also wish to thank all our Sponsors & Media Partners for their overall support. I also acknowledge the hard work put in by Dr. H.K.Chopra and his team as well as Dr. Om S. Tyagi and his team members Sandeep Kochhar, Agnideep Mukherjee, Vipul and Nitesh Sinha for the preparation of this Summit.

I not only wish the Summit a great success but also assume that ASSOCHAM shall continue to organize such programs for larger public benefits with great degree of excellence.

Secretary General, **ASSOCHAM**

Message from President, International Heart Protection Summit



Dr. H.K. Chopra President, IHPS

Dear Colleagues

It is a matter of great pleasure and honour indeed for us to welcome you and invite you all to the International Heart Protection Summit (IHPS-2011) which is being organized by ASSOCHAM on Wednesday, Sept. 28, 2011 at Hotel The Ashok, Chanakya Puri, New Delhi. Over the past decade, there has been a virtual explosion of knowledge in the field of Heart Protection and Preventive Cardiology. The objective of this "International Heart Protection Summit" is to focus on "Heart Illness to Heart Wellness: Consensus Today". Despite sophistication in technology, the prevalence of coronary artery diseases is rising steeply in India. Coronary heart disease has risen from 1 % in 1960, to 11 % in 2003, and 14 % in 2011 in India's urban population."To be an Indian, is itself a risk for premature coronary artery disease" because of genetic predisposition and faulty lifestyle. Coronary artery disease is more extensive, diffuse, multi-vessel, and is more premature in Indians as compared to their counterparts in the western and European world. Timely drastic steps in lifestyle optimization, heart wellness programmes and timely and effective medical and interventional management may help us in curbing the rising menace of coronary artery disease in India

The need for the "International Heart Protection Summit" cannot be over emphasized. Hence,

acknowledging the ever growing threat of heart diseases worldwide, ASSOCHAM for the first time in the world is organizing an "International Heart Protection Summit" (IHPS-2011) to enhance corporate heart wellness (Heart Wellness Programme, cHWP), crystallize guidelines for preventive strategies and create a Heart Attack Eradication Programme all of which are expected to have a global impact. Healthy lifestyle including heart friendly nutrition, exercises, tobacco abstinence, weight management, hypertension, diabetes care and stress management will enhance corporate health. A mingle of scientific perspective and Indian wisdom with emphasis on risk stratification, early detection and timely intervention may help in Heart Protection.

I must compliment our knowledge partner Deloitte for bringing out a knowledge paper on the occasion of IHPS which will indeed embark new dimensions to our thinking and progress. I wish this dedicated endeavour a great success

Dr. H.K. Chopra President, IHPS President, World Heart Academy Sr. Consultant Cardiologist, Moolchand Medcity, New Delhi

Message from Deloitte

In the last couple of decades the disease burden across the world has shifted from communicable diseases to non-communicable diseases (NCDs). Moreover, a majority of people suffering from NCDs reside in the developing countries. These nations, not having completely dealt with the scourge of communicable diseases yet, are now facing the additional burden of NCDs. The already inadequate and stretched healthcare systems in these countries has meant that the mortality from NCDs is also higher, with more than 80% of premature deaths occurring in low and middle-income countries.

Cardiovascular diseases (CVDs) were once thought to be impacting the rich and affluent, but it is now well established that they afflict the poor as well. While changing lifestyles, unhealthy eating habits and declining physical activity are the key reasons for high incidence rates in the rich population, the issues of access and affordability account for higher mortality amongst the urban poor and rural population. These diseases impact not only the well being, but can also hold back the economic growth of the country due to increased healthcare expenditure and diminished productivity. India is projected to lose approximately USD 236 billion between 2005-2015 due to CVDs and diabetes.

To address the issue of rising CVDs, urban India has made considerable progress in delivering high quality diagnostics and interventional cardiac care. Indian hospitals perform heart surgeries with outcomes that are comparable to the best in the world. However, this level of care is available only to the select few - those that can access and afford it. Though Indian hospitals conduct over ninety thousand heart surgeries a year, this is a small fraction of the 2.5 million required.

While there is increasing availability and focus on curative care in urban areas, this alone cannot solve the problem of CVDs. There is a need to focus on prevention and early diagnosis.

The solution to this problem does not lie with the healthcare providers alone. There is an urgent need for the Government, urban planners, educational institutions, employers, food and beverage industry, and wellness and fitness players to take up the challenge and work towards behaviour and life style changes through positive and negative reinforcements.

The issue in rural India is relatively more complex and is one of improving awareness, access and affordability. The lack of awareness coupled with the inadequate access to diagnosis leads to a very large number of patients needing tertiary care. The shortage of such high end facilities as well as their inability to pay, leads to high mortality among the rural population.

To tackle this problem there is need for innovation across the cardiac value chain and collaboration amongst the various stakeholder groups including the Government, providers, pharmaceutical companies, medical technology firms and health insurers. There has been some movement in this direction, with the Government launching the National NCD programme which focuses on prevention and awareness, and sporadic examples of innovations in medical and mobile technology that allow early detection and monitoring. There are also examples of models of affordable cardiac care interventions. These however need to be scaled up and supported.

ASSOCHAM's International Heart Protection Summit is an ideal forum to bring together all the potential stakeholders in this arena and discuss the way forward. Deloitte is privileged to collaborate as the knowledge partner for the conference.

Charu Sehgal Senior Director Deloitte Touche Tohmatsu India Private Limited



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Introduction

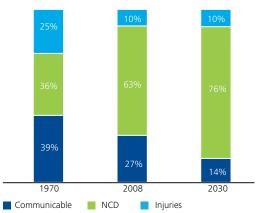
Between 2008 and 2030, the global population is projected to grow by 20%, from 6.7 billion to 8.1 billion people. The crude death rate is expected to remain more or less stable at around 8.4 deaths per thousand. However, a major shift is currently underway in the overall disease burden in the world. In 2008, five out of the top ten causes for mortality worldwide, other than injuries, were non-communicable diseases; this will go up to seven out of ten by the year 2030. By then, about 76% of the deaths in the world will be due to non-communicable diseases (NCDs)¹.

Figure 1: Top 10 causes of mortality

2008	2030
Cardiovascular diseases	Cardiovascular diseases
Cancers	Cancers
Chronic Respiratory	Chronic Respiratory
diseases	diseases
Respiratory infections	Respiratory infections
Perinatal Conditions	Diabetes Mellitus
Diarrhoeal diseases	Digestive diseases
Digestive diseases	Perinatal Conditions
HIV/AIDS	Neuropsychiatric disorders
Tuberculosis	Genitourinary diseases
Neuropsychiatric	HIV/AIDS
conditions	

Non-communicable diseases

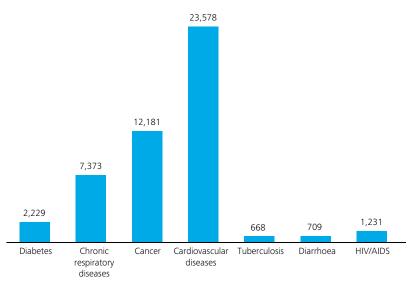
Figure 2: Shifting disease burden – from communicable diseases to NCDs



Source: 1. Global Burden of Diseases 2004. Projected Deaths 2030, Baseline Scenario. World Health Organization, 2008.
2. Global Estimates and Projections of Mortality by cause, 1970-2015. The World Bank, 1992.

Cardiovascular diseases (CVDs), also on the rise, comprise a major portion of non-communicable diseases. In 2010, of all projected worldwide deaths, 23 million are expected to be because of cardiovascular diseases. In fact, CVDs would be the single largest cause of death in the world accounting for more than a third of all deaths².

Figure 3: Mortality from major communicable and non-communicable diseases, 2030



Source: Global Burden of Diseases 2004. Projected Deaths 2030, Baseline Scenario. World Health Organization, 2008. Number of deaths in '000s

Epidemiological transition of NCDs

NCDs, particularly heart diseases, were once associated with the developed and affluent nations while the developing nations were afflicted by infectious and parasitic diseases. However, over the past few decades there has been a change in the landscape of non-communicable diseases across the world.

In the developed nations, determined government policies and action, improved standards of medical care, and advances in medical technology have helped cut the death rates from cardiovascular diseases by more than 50% since the 1970s.

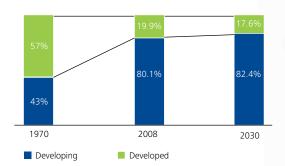
At the same time, an increasing number of people from developing countries suffer from NCDs. By 2030, four-fifths of all NCD related mortality is projected to take place in developing nations.

- 1 Preventing Chronic Disease: A Vital Investment. World Health Organization Global Report. 2005
- 2 Global Burden of Disease. 2004 update (2008). World Health Organization.
- 3 Coronary Heart Diseases in India. Mark D Huffman. Center for Chronic Disease Control.

The global cost of cardiovascular diseases between 2010-2030 is expected to exceed USD 20 trillion, out of which around 45% would be due to productivity loss from disability, premature death, or absenteeism.

For CVDs specifically, in 2005, the age standardized mortality rate for developing nations like India, China, and Brazil was between 300-450 per 100,000, whereas it was around 100-200 per 100,000 for developed countries like USA and Japan³.

Figure 4: Shifting load of NCDs to developing countries



Source: 1. Global Burden of Diseases 2004. Projected Deaths 2030, Baseline Scenario, World Health Organization, 2008 2. Global Estimates and Projections of Mortality by cause, 1970-2015. The World Bank, 1992.

This shift is a major cause of concern for developing countries. These diseases are expensive to treat and manage, and eat a big chunk of the already stretched healthcare budgets. Due to lack of proper medical care at an early stage, complications from the diseases occur at relatively younger ages in developing nations and reduce the productivity of the labour force.



The situation in India

- 4 Economist Intelligence Unit
- 5 Nutrition Transition in India 1947-2007, Ministry of Women and Child Development, Government of India.
- 6 Leeder S, et al. A Race Against Time. The Challenge of Cardiovascular Disease in Developing Countries. Columbia University, 2005.

Indian healthcare overview

The Indian healthcare sector has seen improvements over the past couple of decades, but there is still a long way to go before we meet international standards. The improvements have not been uniform – inequities based on gender, rural vs. urban, and even social status still remain.

While the government assures healthcare to all its citizens, 80% of all out-patient and 60% of all in-patient care is handled by the private sector which accounts for 68% of all hospitals in the country.

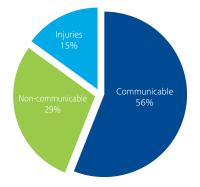
Healthcare financing also remains a key issue. In 2010, 5.0% of the GDP was spent on healthcare⁴, less than any other BRIC nation, out of which the government spend was a meagre 0.9%. Further, 74% of total health spending in India was out-of-pocket (OOP), with only 14% of the population being covered by some form of health insurance.

India – transition to NCDs

India has seen a rapid transition in its disease burden (number of cases/lakh) over the past couple of decades. The load of communicable and non-communicable diseases (NCDs) is projected to get reversed in 2020 from its distribution in 1990⁵.

This is largely because, with India's economic growth and urbanization over the past decades, a large section of the population has moved towards unhealthy lifestyles with decreasing physical activity, increasing stress levels, and increasing intake of saturated fats and tobacco. The

Figure 5: Disease Burden Estimates - 1990



Injuries 19% Communicable 24% Non-communicable 57%

Source: Nutrition Transition in India, 1947-2007. Ministry of Women and Child Welfare

average life span has increased due to improvements in medical care; the rapidly ageing population, more prone to NCDs, will also fuel the growth of NCDs over the next few decades. Finally, most NCDs share common risk factors, whose prevalence is high in India and they generally occur as comorbidities.

Cardiovascular diseases are the largest cause of mortality, accounting for around half of all deaths resulting from NCDs. Overall, CVDs accounted for around one-fourth of all deaths in India in 2008. CVDs are expected to be the fastest growing chronic illnesses between 2005 and 2015, growing at 9.2% annually, and accounting for the second largest number of NCD patients after mental illnesses. A more worrying fact is that the incidences of CVDs have gone up significantly for people between the ages 25 and 69 to 24.8%, which means we are losing more productive people to these diseases.

Economic impact of CVDs

The interdependence between health and economic well-being is well established and there is a huge impact of cardiovascular diseases on economic growth and development.

Between 2005 and 2015, India is projected to cumulatively lose USD 236.6 billion because of heart disease, stroke, and diabetes, shaving 1% off the GDP.

In 2000, in the age group of 35 to 64, India lost 9.2 million years of productive life (PYLLs), almost six times the figure for US⁶.

Figure 6: Disease Burden Estimates - 2020

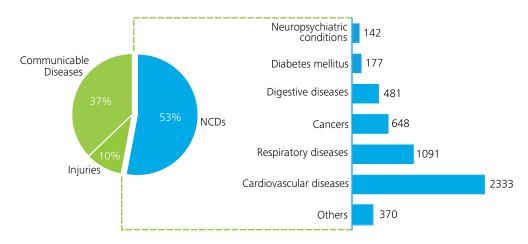


Figure 7: Causes of Death in India, 2008

Source: World Health Organization. Causes of death 2008: data sources and methods. Geneva, World Health Organization, 2010. Note: Number of deaths in '000s

Further, in the absence of any national program for prevention and management of CVDs, it is expected to increase to 17.9 million PYLLs by 2030, more than nine times the corresponding figure for the US. The estimates above do not include the indirect losses, such as losses incurred from not investing the same amount in other areas of human development such as education.

In addition to these losses, the cost of care has also increased. According to IIB (Insurance Information Bureau) data, the average amount claimed from health insurers for circulatory diseases (mostly heart related) increased at an astounding 52.5% annually between 2007-08 and 2009-10. Not only this, the total claimed amount for heart diseases was more than twice the total amount claimed for the next highest disease category, cancers.

The information presented above clearly suggests that NCDs in general and CVDs in particular are a big cause of concern for India. While the Indian government and other stakeholders have realized this and started some corrective action, a lot more focussed and collaborative effort needs to be made to prevent a heart disease epidemic, one a developing India can ill-afford.

Types of cardiovascular diseases

- Coronary Heart Disease (CHD): A disease of the blood vessels supplying the heart muscle that can lead to a heart attack, CHD is the the total CVD prevalence, and more than 85% of all CVD related deaths
- Cerebrovascular Disease (Stroke): A stroke is caused when the supply of oxygen to a part of brain stops. When a stroke is caused due to a clogged artery or a blood clot in the heart or some other part of the body it is called an ischemic stroke. Stroke was the second largest cause of death
- Hypertensive Heart Disease: Hypertensive heart disease refers to coronary artery disease, heart failure, and enlargement of the heart that occur because of high blood pressure. High blood pressure increases the pressure in blood vessels. As the heart pumps against this pressure, it must work harder causing the heart muscle to thicken and the left ventricle to become enlarged. In 2004, of the nearly 0.17 million people
- Congenital Heart Disease: A defect in the structure of the heart and great vessels of a new-born and result from abnormal foetal heart
- Others: There are some more heart diseases with low level of occurrence in India, like Rheumatic heart disease, peripheral heart disease,

Factors for increase in incidence of heart diseases in India

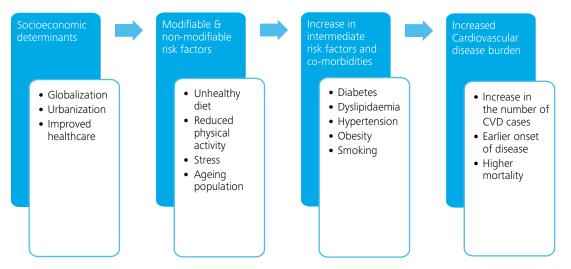
The growth of heart diseases is dependent on a number of interlinked factors such as aging, changing lifestyles and food habits, and other rapidly evolving socioeconomic determinants across developing nations. All these factors together create a domino effect, resulting in increased incidence of cardiovascular diseases.

Socioeconomic determinants like improved access to healthcare, higher income levels and globalization, and urbanization drive increases in CVD risk factors.

that can easily be changed to reduce the risk of the occurrence of the disease, while non-modifiable risk factors like age and genetic makeup can't be controlled. For example, the nutritional shift has moved a number of people to unhealthy eating habits. Between 1983 and 2004, while the per capita consumption of protein went down, the amount of fats intake increased by more than 25%, both in urban and rural areas⁹. This, coupled with reduced physical activity, gives rise to intermediate risk factors such as hypertension and obesity.

- 7 World Development Indicators, World Bank.
- 8 India's Pace of Urbanization Speeds Up, Wall Street Journal, July 2011
- 9 Food and Nutrition in India: Facts and interpretation. Dreze J, et al. Economic & Political Weekly, February 2009.
- 10 Smoking & Heart Disease. Cleveland Clinic.
- 11 Joshi SR, et. al. India -Diabetes Capital of the World: Now Heading Towards Hypertension. Journal of Association of Physicians in India. 2007; 55:323-324
- 12 Xavier D, et.al. Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. The Lancet.2008; 371(9622): 1435-1442.
- 13 World Health Survey, World Health Organization.

Figure 8: Factors for rise of CVDs incidents in India



Improved healthcare in India has increased the average life expectancy from 48.8 years in 1970 to 64.1 years in 2009⁷, resulting in a growing aging population which faces an increased risk of heart diseases.

Higher income levels and globalization have induced a nutritional shift resulting in the rise of unhealthy food and decreased intake of fruits and vegetables. India's rapid urbanization, with 31.8% of Indians living in urban areas and the decadal growth rate for urban areas almost three times the rate in rural areas, has led to a number of issues like reduced physical activity, unhygienic and overcrowded living conditions, growing levels of stress, and higher exposure to pollution.

These socioeconomic determinants have fuelled the growth of risk factors – both modifiable and non-modifiable. Modifiable risk factors are those Smoking, another key risk factor, has also increased significantly. Around 14% of Indians smoke daily, and increasingly younger people are taking up smoking. Smoking is a major cause of atherosclerosis, and doubles the chances of mortality from heart diseases¹⁰.

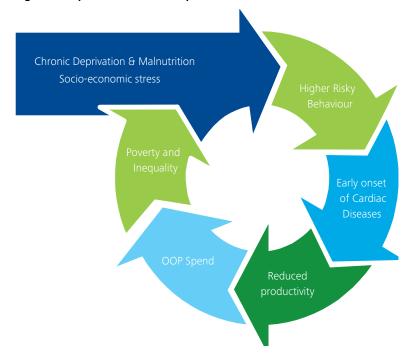
The result is an increasing number of cases with intermediate risk factors and comorbidities – diabetes, hypertension, dyslipidaemia, and obesity. India is not just the diabetes capital of the world with more than 50 million patients, it also has the highest prevalence of metabolic syndrome and obesity - 20 million Indians are obese today with 70 million projected by 2025; 20% of Indians suffer from hypertension¹¹.

These factors together have accelerated the growth of cardiovascular diseases in India as well as the mortality levels from these diseases

Rise of CVDs in the economically underprivileged

The growth of heart diseases impacts not just the urban and economically well-off population, but also the underprivileged. In fact, the Indian rural population and urban poor are facing a "double burden" – with incidences of acute diseases continuing, there has been a rapid growth in incidences of chronic diseases.

Figure 9: Impact of CVDs on the poor



Given the issues of affordability, accessibility, and quality of healthcare, mortality rates from heart diseases are much higher in the economically underprivileged population. According to a study¹², the mortality rate due to Acute Coronary Syndrome (ACS) was 5.5% for the rich, while that for the poor was 8.2%.

The urban poor and the rural people fall into a vicious cycle; already suffering from long term material deprivation, unhealthy living conditions, and high levels of stress, they are more prone to risky behaviour like smoking and drinking. Levels of smoking and drinking are the highest amongst the lowest income quintile in India¹³. This leads to the early onset of cardiac diseases amongst this segment of the population.

They tend to ignore the disease due to poor access to healthcare, high cost of treatment, social stigma, and low awareness. Seeking treatment would also mean missing wages and reduced productivity, and for those in rural settings, often an additional cost of transport to reach the nearest health facility.

When they do choose to go for medical treatment, it involves large out-of-pocket (OOP) payments, and they are further pushed back into poverty. Such expenditure, referred to as "catastrophic expenditure", pushes 39 million Indians into poverty every year.

Heart diseases are no longer a cause of concern for only the rich. If anything, the poor are impacted more by it, and the control of the disease in the poor population should be a high priority.

Between 2011 and 2031, the number of people above 60 years of age is expected to more than double in India.

The cardiac care cycle

Stages in the cardiac care cycle

Heart diseases are considered to be 'silent' diseases whose symptoms are not evident in a patient suffering from them till the disease is in an advanced state.

The cycle of cardiac care starts from the **Prevention** of the occurrence of any such disease. Measures need to be taken to control risk factors which lead to development of heart diseases. Patients suffering from the disease need to undergo an **Intervention**, typically a surgical or medical procedure, to get specialized treatment to prevent any future cardiac incident, or control the damage, if they have already had an incident. This is followed by **Maintenance** of a healthy state and prevention of any further complications.

The entire population can be categorized into Healthy, At Risk, Diseased, or Controlled population, depending on the stage in the cardiac cycle. **Healthy** population should be educated about risk factors

and symptoms, and encouraged to adopt healthier lifestyles including a balanced diet and regular exercise. The **At Risk** population, which has already developed some risk factors, needs to use secondary preventive measures, which include regular screening or early interventions, to control the disease in the early stages and prevent hospitalization. **Diseased** population needs an intervention to control the disease from becoming chronic. **Controlled** population needs to focus more on maintenance and tertiary prevention which include rehabilitation, disease management, balanced diet and lifestyle modification to avoid recurrence of the disease.

Current and emerging trends in cardiac care

The cardiac cycle has multiple stakeholders including the government, healthcare providers, employers, health insurers, medical equipment manufacturers, NGOs, wellness centres and manufacturers of nutraceuticals, supplements and dietary food. All these stakeholders

Prevent development of risk factors

Undergo treatment post development of a disease

Management to prevent recurrence

Population classification as per stages in the cardiac cycle

Figure 10: Cardiac care cycle

Primary prevention Secondary prevention Intervention Maintenance and Promoting healthy lifestyle Undergoing regular screening Undergoing a surgical / tertiary prevention and habits through and examination coupled with medical process followed by Continuing care and lifestyle modification to increased awareness and acute care to prevent future self-management for consciousness, to prevent prevent occurrence of a heart occurrence or minimize prevention of major events/ development of any risk complications deaths in existing patients

Shift towards a healthier population over time

A recent screening drive by the Government in Bengaluru found 14% and 21% people to be suffering from diabetes and high blood pressure respectively. The government has announced the expansion of the program to screen 15-20 crore people across the country this year.

play a vital role in cardiac care in India. Various initiatives are already underway to improve prevention and intervention.

Prevention

Although India has traditionally focused on curative treatments for cardiac care, there has been a recent shift towards preventive measures to address the development of risk factors leading to CVDs. Past projects, focused on prevention in developed countries, have shown great results towards reducing coronary risks. In India, prevention initiatives include the following:

Corporates

Corporates have started considering prevention as an investment in human capital to improve efficiency and productivity. They are engaging in wellness and prevention programmes for employees including awareness camps and yoga and meditation sessions at the work place. Some of them also use Health Risk Assessments, wherein employees are periodically tested and provided health counsellors for regular advice.

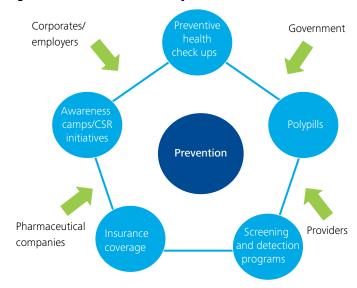
Healthcare providers

Most secondary and tertiary care hospitals provide packages for preventive healthcare. These packages

- Counselling patients on lifestyle modification
- Preventive health check- ups for detection of stroke, hypertension and diabetes
- Guidance on cardiovascular exercises, yoga, meditation, stress management and diet

Hospitals have also launched nation-wide multimedia campaigns to educate people about the risk factors of CVDs, organized walkathons, and public awareness talks by doctors.

Figure 11: Preventive measures by various stakeholders



Government

Government has started taking measures towards prevention of heart diseases especially amongst the rural population.

- National Programme for Prevention and Control of Cancer, Diabetes, CVDs and Stroke (NPCDCS) was introduced in July 2010 with an outlay of ₹ 500 crores for interventions on diabetes and cardiovascular diseases and stroke (out of the total outlay of ₹ 1231 crores). The programme aims to achieve behaviour change in the community and improve access to cardiac care through:
 - Massive health education and mass media efforts at country level
 - Opportunistic screening of persons above the age of 30 years
 - Establishment of NCD clinics at CHC and district level

- Development of trained manpower and strengthening of tertiary level health facilities
- Early diagnosis and treatment
- In addition there are initiatives to include preventive healthcare check-ups under CGHS, mass screening camps for early detection amongst slum dwellers, and screening of children for congenital heart disease.

Pharmaceutical companies

The past decade or so has seen a lot of action from pharmaceutical players in the domain of cardiac diseases. There has been rapid growth in the use of drugs that manage early risk factors – for e.g., Angiotensin II Receptor Blockers (ARBs) and statins have helped significantly reduce cardiac disease related mortality. Similarly, the launch of new molecules, such as dabigatran and prasugrel, are expected to reduce mortality and improve the quality of life.

In India, there has been some localized research on drugs better suited for Indian conditions. For example, to reduce the number of pills to be taken by patients, polypills have been introduced. A polypill is a single capsule containing five drugs (a statin, aspirin and three blood pressure drugs), which can significantly cut the risk of heart diseases.

Intervention

Lack of prevention at the appropriate stage at times leads to increased risk factors and development of the cardiac disease. At this stage, the patient needs to go through an intervention which can be a surgical process or a medical procedure to treat the complication. India has made significant progress on treating cardiac ailments in urban cities with state-of-the-art infrastructure, availability of latest medical technology/ equipment with advanced treatments and highly qualified doctors.

The emerging trends on intervention of cardiac diseases are towards providing care in tier II cities through low cost models without compromising the quality of care. Some examples include:

Advances in medical technology

Medical technology related to cardiac diseases has advanced rapidly over the past decade. Developments in diagnostic equipment, stents, and pacemakers, and newer methods of surgery have had a significant impact on cardiac care treatment and outcomes. These technological advancements have enabled physicians to get a better understanding of the disease, for e.g., the use of myocardial perfusion SPECT (MPS) helps in making more informed decisions about the use of coronary angiography and helps in reducing cost by eliminating unnecessary usage¹⁴.

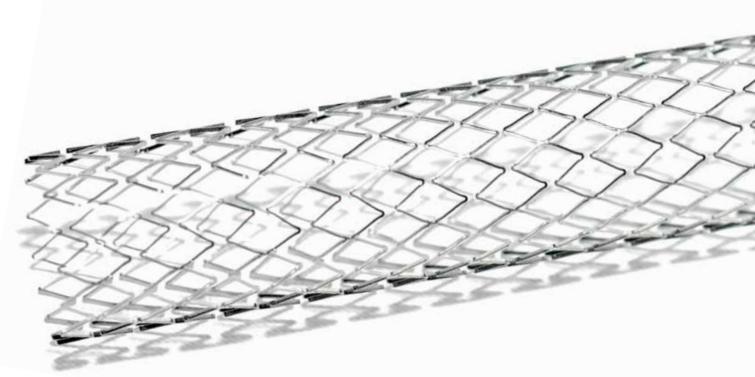
Similarly, CT angiography allows for diagnosis of cardiac artery disease in a non-invasive way without the use of anaesthesia.

Also, there have been rapid advances in the way heart surgeries are carried out. Newer methods like beatingheart surgery and minimally invasive CABGs have increased survival rates, and reduced hospital stay. For example, while earlier the heart used to be stopped to operate the affected area, beating-heart surgery helps doctors carry out the procedure while the heart is kept beating, and reperfusion of the heart is not required once the surgery is completed. This helps in preserving the function of the heart muscles, quicker recovery and mobilization of patients, and reducing the risk of complications. Yet another innovation is awake-heart surgery, where the patient is operated upon under epidural anaesthesia instead of general anaesthesia. This is especially useful for high risk patients where general anaesthesia cannot be administered.

Equipment manufacturers are taking initiatives towards launching low cost, simple and easy to use solutions. For e.g. GE's Mac series, an ultra-portable electrocardiogram (ECG) machine has been conceptualized, designed and manufactured in India according to the requirements

- 14 Nuclear cardiology in India and the developing world: opportunities and challenges. Lele V, et, al. Journal of Nuclear Cardiology. 2009; 16:348-350
- 15 Narayana Hrudayalaya Heart Hospital: Cardiac Care for the Poor. Khanna T, et al. Harvard Business School. 2005.

Set up in 2010, the Billion Hearts Beating Foundation aims to spread awareness about heart diseases and inspire people to shift to healthier lifestyles. It also provides people with information and tools needed for a healthy living and long term change.



of the domestic market. It is priced at one-third that of imported ECG systems of similar quality. To deal with power outages in many parts of India, the machine is battery-operated. Moreover the device is designed to be easily usable by general physicians as well as cardiologists.

Public Private Partnerships

Government is taking initiatives of partnering with private sector hospitals which specialize in tertiary cardiac care. For instance, Government of Uttarakhand has signed an MoU with Fortis Healthcare to set up a cardiac centre in a government hospital in Dehradun which will be the first comprehensive cardiac care facility in the city. Similarly Government of Chattisgarh has signed a MoU with Fortis (Escorts) on cardiac care and surgery and also with various paediatric cardiology centres on correction of congenital cardiac problems in children under Bal Hruday Suraksha Yojna.

Innovation in service delivery

Certain providers have started adopting innovative measures to provide specialized cardiac care at low prices. As an example, Narayana Hrudayalaya group follows a "High Volume Low Cost" care model where the hospital employs economies of scale in purchase of equipment, getting the surgeons to perform higher number of surgeries and tying up with a mass social insurance scheme called Yeshaswini. Further, the hospital specializes in paediatric cardiac surgeries, with 40% of all surgeries performed being paediatric

procedures¹⁵. Parents from all over South Asia visit the hospital for the treatment of their children.

Telemedicine

To increase accessibility of good medical service to poor people, hospitals are introducing telemedicine by setting up coronary care units in rural areas. These units are equipped with basic facilities like beds, medication, ECG machines and technical staff and are linked to the main hospital for expert advice.

Maintenance

After intervention, in the next stage of the cardiac cycle, the patient needs to focus on the maintenance of a healthy state and tracing back to using preventive measures to avoid recurrence of the disease. Follow up check-ups, counselling and diagnostics for continuous monitoring play a key role in maintenance.

Not many initiatives have been taken in this space in India; however some hospitals are working on creating patient databases to follow up with them on a regular basis. Maintenance initiatives are also being coupled with preventive measures of lifestyle modification, balanced diet, regular exercise and wellness.

Assisted living facilities, rehabilitation centres, home nurses and disease management programs are few means to maintenance which are in a nascent stage and still need to be conceptualized and institutionalized in the Indian context.

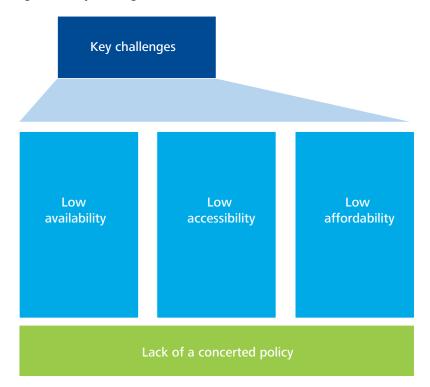
Key challenges

The key challenges being faced in cardiac care in India are lower availability, accessibility, and affordability of effective and efficient treatment, coupled with lack of a focused policy towards NCDs including CVDs.

Low availability

Low availability exists in terms of economical and efficient service delivery infrastructure. There is limited availability of affordable preventive and curative cardiac care across the country.

Figure 12: Key challenges - Cardiac care in India



- 16 India's health budget goes up by 20%. Deccan Herald, 28 Feb 2011.
- 17 School of Health Sciences, IGNOU.
- 18. Chronic Diseases and Injuries in India. Patel V, et. al., The Lancet. 2011; 377: 413-428

India faces a challenge of shortage of trained healthcare personnel at all levels, and especially in the rural areas. There is only about one doctor for every 1700 people in India and it faces a more than 60% shortfall of specialists at the CHC level. India produces less than 30,000 doctors every year and there is a shortfall of about 600,000 doctors and 1,000,000 nurses to reach the WHO recommended standard of 1 doctor every 1000 people¹⁶.

The situation is even grimmer when it comes to cardiology; India trains only about 150 cardiologists every year¹⁷, and the number is not enough given the disease burden. There is a shortage of adequately trained specialists, nurses and technicians for cardiology to cater to the masses for preventive health check-ups, interventions and disease management.

Low accessibility

Inequitable access to healthcare delivery has been a key issue with the Indian healthcare system. Public healthcare infrastructure for cardiology is inefficient and inadequate too. Around 60% of the hospitals in India are located in the urban areas and cater to only 30% of the population. Only 13% of the rural population has access to a primary healthcare facility and less than 10% to a hospital.

It is a well-accepted fact that early detection and prevention of non-communicable diseases can be managed most effectively at a primary health setting and would decrease the load on the already over utilized tertiary health infrastructure. The Indian primary and secondary healthcare system is under prepared to handle cardiac diseases and has focused predominantly on infectious diseases, child and maternal health and small injuries. This leads to increased patient flow and patient load on tertiary care hospitals.

Low affordability

Affordability of quality care is a key concern for most of the population, both for preventive check-ups and treatment. Big hospitals in Tier I cities are typically driven by use of advanced medical technology, thus raising the cost of treatment. The issue of affordability is further magnified by the low penetration of health insurance in India

Even in case of the small percentage of people under insurance cover, the coverage is limited to the treatment of CVDs once the disease is in the intervention stage. There is no coverage for preventive or diagnostic or in fact any outpatient care. This is a huge barrier towards lowering the burden of CVDs through preventive measures.

This is compounded by negligible coverage of rural population under health insurance schemes and plans. The low health insurance coverage and large OOP payments mean that the poor often have to make a choice between getting treatment or a financial disaster. Healthcare expenditure on chronic diseases can account for up to 70% of the average monthly salary of people in the low income group, and around 45% in the highest income group. Around 28% of all diseases in the rural areas go untreated due to financial constraints18.

Since most of the population can't afford preventive health check-ups available at tertiary care hospitals, it aggravates the already rising risk factors in the affected population leading to serious ailments in the future.

Lack of a concerted policy targeted towards CVDs

In India, the growing incidence of CVDs is not yet seen as a public health challenge which has resulted in the absence of a strong policy targeting them. Though the Government has recently started taking initiatives by introducing programmes focusing on screening and detection of the rural population for symptoms of CVDs, these initiatives need to be scaled up to reach out to the population all over the country. A focussed policy targeting CVDs will attract the attention of various stakeholders and lead to concentrated efforts to reduce the mortality and morbidity arising due to them.

Only 13% of the rural population has access to a primary healthcare facility and less than 10% to a hospital.



Need of the hour Collaboration and innovation

India has the intellectual and financial capability to overcome challenges being faced in delivering efficient and cost effective cardiac service. In order to address the challenges of low accessibility, affordability and awareness and to meet the healthcare needs of the population, Indian stakeholders need to **collaborate** and innovate.

As discussed, the challenges faced by India are unique and diverse and tackling the entire problem of cardiac diseases in such a challenging environment by a single stakeholder using existing solutions, is not feasible.

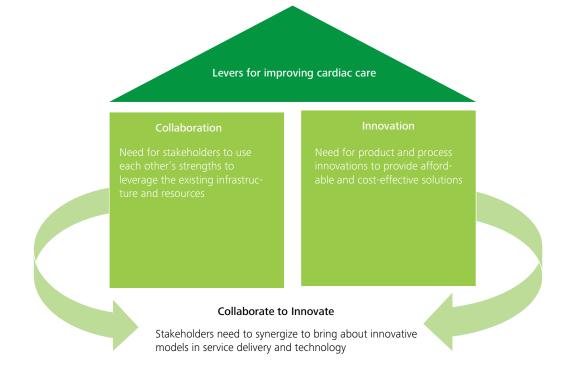
While there are independent examples of success in tackling the various challenges, these exist on a smaller scale and isolated places. These success stories need to be studied further and adapted for mass implementation; requiring **collaborative effort** between multiple stakeholders. Also, there is a need for **localized innovations**, which are suited for implementation in various situations in India and benefit a larger cross-section of the population. Lastly, there is a strong case for **collaborative innovation** to tackle larger issues such as quality and affordability.

Collaboration

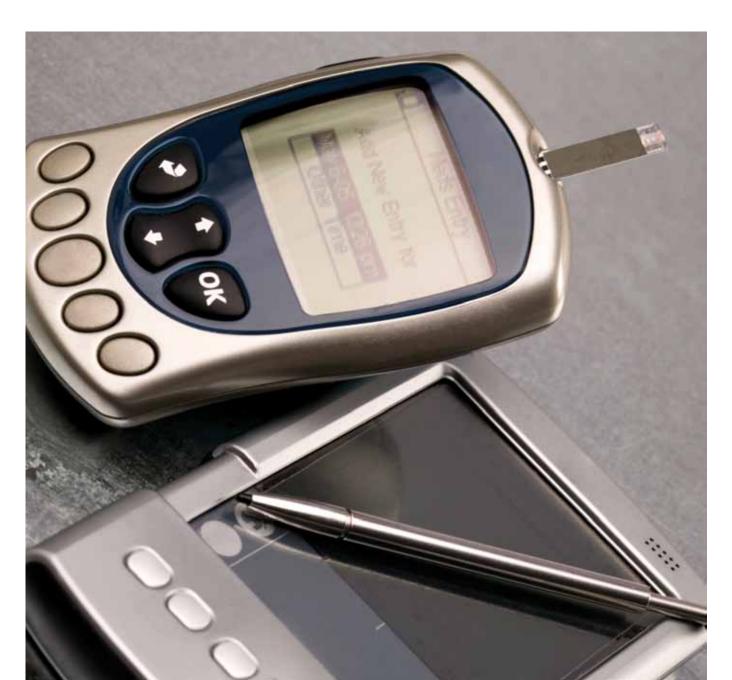
As discussed in previous sections, various initiatives are being taken by different stakeholders in the areas of prevention and intervention. However these stakeholders need to come together to develop and implement cost effective and scalable models of delivering cardiac care. Effective collaboration across the value chain is essential for new technology/ drug introduction, lowering costs, increasing awareness and acceptance of preventive measures, strengthening healthcare financing and making healthcare accessible to the rural and the urban poor population.

For example, providers, medical technology companies and the Government need to collaborate to increase public private partnership (PPP) initiatives in diagnostics and delivery in the cardiac space. This will benefit them through the high patient volume at these Government hospitals and achieving economies of scale. For example, GE Healthcare is setting up diagnostic centres at few government hospitals in Andhra Pradesh and Madhya Pradesh. Similarly PPPs need to strengthen between private and Ggovernment hospitals.

Figure 13: Key levers – collaboration and innovation



Over a 10 year period, 20% of CVD related deaths in the 40-79 age group can be averted by the use of a regimen of aspirin, statin and blood pressure-lowering agents. This regimen costs less than USD 3 per person per year in low and middle income countries.





In the cardiology industry, product innovation is underway with the introduction of new equipment and drugs. What is needed is the localization of innovation, keeping in mind the Indian ground realities.

> Coverage of health insurance schemes can be increased based on models such as the Yeshaswini scheme in Karnataka, where the Government bears a part of the insurance cost. This can be done through greater interaction between the Government and insurance agencies, and including cardiology procedures under the coverage of the schemes.

Another area of collaboration is between payers, employers, and wellness players. While some insurers and employers already provide for regular pre-emptive health checks, few do anything to improve it. This can be changed by including the wellness service providers in the process. They can help formulate health and wellness programs to improve the overall health of the employees. This would help employers reduce health insurance premium burden and absenteeism thereby increasing productivity. Further, it would reduce illness claims for payers, and generate business for wellness players.

Figure 14: Progress from product to process and business model innovation

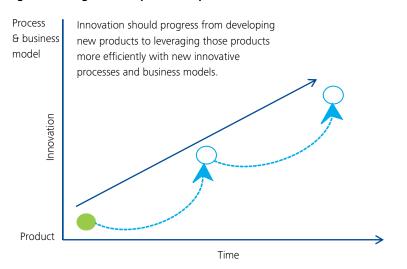
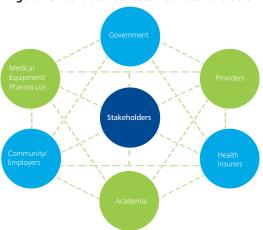


Figure 13: Collaboration between stakeholders



Innovation

Innovation is required not only at the product level but also at process and business model levels to provide cost effective and accessible solutions to the entire population. Product innovation pertains to new technology, new pharmaceuticals or new techniques of treatment/intervention. Process and Business model innovation refers to efficient, re-engineered processes and business models to implement and leverage the product innovations for greater impact.

In the cardiology industry, product innovation is underway with the introduction of new equipment and drugs. What is needed is the localization of innovation, keeping in mind the Indian ground realities.

For example, the GE MAC I can be run on battery power given that the rural areas face a lot of power cuts. Another area ripe for innovation is the use of mobile technology given the penetration of mobile devices in India. Doctors can recommend patients to register for customized medicine alert service provided by pharmaceutical companies and telecom service

Figure 15: Examples of product, process and business model innovation

Product Innovation

Medical Technology

GE's Mac series: MAC 400 - an ultraportable ECG machine, Cheaper than its foreign counterparts, battery operated to deal with power outages and lightweight.

MAC I – smaller than a laptop, cheaper and reduces the cost of delivering an ECG bill to only Rs 9

Pharmaceuticals

Polypills- single capsule containing five drugs to significantly cut the risk of heart disease among healthy people

Health Insurance

ICICI Lombard, Apollo Munich, Max and other insurers are coming up with plans that cover OPD and preventive check ups Government schemes like Yeshaswini covering rural population

Process and business model innovation

Narayana Hrudayalaya business model

High volume low cost model to provide affordable healthcare to masses

Fixed salary for cardiologists instead of paying per surgery

Telemedicine

Maestro Mediline, a medical equipment manufacturer has used the process of telemedicine where doctors can check their patient's ECG on mobile heandsets



Product Innovations are actively taking place in the Indian cardiology industry and should be encouraged. Share of efforts should also focus on process and business model innovations eventually

providers, which will help increase compliance. Such innovations foster the use of products across different conditions.

However, the diffusion of innovation still remains an issue in the Indian scenario. The innovation does not percolate down and remains limited to urban affluent areas. Eventually, process innovation will have to leapfrog product and business model innovation and provide affordable healthcare to not only the urban population but also to the urban poor and rural population. These innovations will help cut down the cost of innovative technologies and make them affordable for a larger cross-section of people.

Collaborate to innovate

More often than not, stakeholders come up with innovation on their own without much collaboration with the other players across the value chain. This works in scenarios where most of the cogs in the wheel are functioning properly. However, for India, where there is large room for improvement at almost all stages, such a process can lead to inefficiency and unwanted delay. The multiple stakeholders in the healthcare value chain need to collaborate and identify innovations that would span across their domains and add value for everyone,

as the output from each stage would serve as inputs for the next stage.

As an example, a medical technology player might come up with a very advanced Point-of-Care (PoC) diagnostic device but without a specialist to interpret the results at a primary healthcare setting, the innovation might not reach its full potential. However, coupled with information and communication technology (ICT) innovation that provides for real time transmission of data and improved telemedicine technology, results from the PoC device can be analysed by a specialist located at a government facility in a larger city, and evidence based medicine dispensed. It would also help in maintaining the patient records using this facility, and make it available remotely. Further, the government and medical device manufacturer would need to look at innovative PPP models so that that these devices are made available across rural and urban areas.

Finally, not only does collaborative innovation increase the value for all players, it also reduces the cost for the end user and improves outcomes. In the above example, the overall cost of treatment for the patient is reduced as he would not need to travel to a city to meet a doctor or miss wages. Further, earlier action would also improve the outcomes of clinical intervention.

Figure 16: Models for collaboration



PPP models for affordable and accessible diagnostic facilities across the country



Integration for relevant, reliable and practically tested research



Encourage preventive measures for reducing the disease incidence

Collaborative clusters

One way of solving a complex problem is by breaking it down into smaller puzzles, solving them and then putting it all together. In this fashion since problems are tackled simultaneously, the overall time taken is reduced considerably. This is where the idea of collaborative clusters comes into picture.

For example, to improve the diagnostic ability, medical technology companies, ICT players, healthcare providers, and the Government could form a cluster. The medical technology companies can provide low cost innovative diagnostic machines located in rural areas. The machines would be connected to specialized healthcare providers in the larger cities using the help of enhanced communication and telemedicine capabilities provided by ICT players. Meanwhile the Government can provide the funding for the setting up of the diagnostic equipment in the rural areas, and contracting of the service providers in the cities through some sort of a PPP model.

Another possible cluster can be between the Government, academia, and the pharmaceutical industry to conduct India specific trials and upgrading of the teaching manuals to include the latest content.

The Tianjin Project, China

The way forward

Government, Industry and Community all need to step up to make coordinated and concerted efforts towards improving service delivery, financing and infrastructure to provide affordable and accessible healthcare to combat the growing burden of CVDs in the country.

Government

Policy Action

- The Government needs to recognize CVD as a public concern and make prevention a thrust area in the XIIth five year plan.
- According to an analysis, less than 3% of all global health assistance in 2007 in low and middle income countries was dedicated to NCDs¹⁹. Given the scale of the disease in India, an increase in resources allocated is needed, specifically for cardiovascular diseases and prevention of its risk factors.

Financing

- Given that a number of people are unable to afford adequate care, Government must ensure access through public health insurance and risk sharing, based on successful social health insurance experience.
- Centralized purchasing of medicine, medical supplies, and healthcare services can help reduce costs and set standard treatment guidelines.
- It has been established that prevention of CVDs is much cheaper than treatment. The Government should subsidize wellness by providing tax exemption for preventive health expenditure, such as fitness centre expenses and lifestyle improvement counselling.

Tactical

- Strengthen primary and secondary healthcare system by retraining medical staff to focus towards surveillance, prevention and counselling.
- Improve intermediate cardiac care by upgrading hospitals to handle acute cardiac incidents, by providing proper equipment like crash carts and defibrillators.
- Train community health workers, such as ASHAs, to raise awareness and to flag high risk people to the local health centre for timely intervention.
- Use ICT for improved health information systems for surveillance and monitoring of individuals. It will prevent people from falling off treatment and will also provide much needed information for development of evidence based methodologies.



19 Where Have All the Donors Gone? Scarce Donor Funding for Non-Communicable Diseases. Nugent R et al. Center For Global Development. November 2010.



Less than 3% of all global health assistance in 2007 in low and middle income countries was dedicated to NCDs despite the rising disease burden.

· Use urban planning tools for promoting healthy behaviour like providing for parks and community gymnasiums, priority for pedestrians, and separate lanes and parking for cycling. Better public transport facilities and reduction in noise levels near residential areas help in decreasing stress levels.

Food & Agriculture Laws

- Regulate salt, sugar, and fat content in processed food in collaboration with the food industry. For example, salt intake levels were brought down by 10% in UK in four years without having any impact on the sales of companies.
- Regulate advertising of unhealthy food, especially those targeted towards children.
- Mandate the proper labelling of food to show its nutritional content and warn about excess levels of salt, sugar or fats.
- Stricter implementation of anti-smoking laws

Pharmaceutical and Medical Technology

- Make India specific clinical trials and sub-group data analysis mandatory, given the differences in genetic makeup across Indian population.
- Encourage localized price effective innovations like the low cost ECG machine and the polypill.

Healthcare Providers

Reorient healthcare professionals including nurses and paramedics, towards prevention, patient education, and self-management of CVDs.

 Formulate standard guidelines for screening and treatment of CVDs on lines of the American Heart Association guidelines, and enforce compliance.

Insurance Agencies

 Incentivize wellness programs through innovative products that have reduced insurance premiums for those who maintain certain health standards, and cover out-patient treatment and annual health check-ups.

Employers

- Raise awareness by holding health camps, riskscreening camps and other activities at work places.
- Create healthy work environments that promote physical activity and healthy eating and reduce stress levels.

Community

Academia

- Strengthen, improve and increase the medical education and training infrastructure to bridge the shortage of skilled manpower providing cardiac care across all levels.
- Update teaching methods and syllabus to reflect the paradigm shift to prevention rather than intervention in light of increase of lifestyle diseases.
- Continuing medical education (CMEs) must be made mandatory so that healthcare professionals keep themselves updated with the latest developments in the management of CVDs.
- Study innovative business models for more expensive devices and treatments, and adapt such experiments for implementation on a larger scale.
- Promote India specific research at premier research driven institutes.

Community

 Create multi-sectoral and integrated programs involving the community and its leaders, the media, Government, physicians and other stakeholders to improve overall health of the people and reduce risks of heart diseases.

North Karelia Project, Finland

The project began in 1972 when Finland had the one of the highest mortality rates from lifestyle related diseases among the developed world. It was implemented in North Karelia which was a less developed region with social setting similar to many developing countries. A low cost lifestyle modification and community based program was incorporated into the existing health system of the country through training of doctors, nurses, social workers

Various activities were taken up including awareness programs at workplace for smoking cessation and weight reduction, social marketing in form of advertisements and TV series, cholesterol-lowering campaigns in villages, stricter anti-smoking laws and working with food manufactures to come out with low fat products. Over 25 years (1972-1997) CVD mortality reduced by 68%, CHD mortality decreased by 73% and the cases of lung cancer were down by 71%. Most of this decline was attributed to population level changes.

- Raise awareness of the diseases and emphasize on prevention of the diseases.
- Execute social marketing campaigns involving influential people, passionate advocates and public figures to promote physical activity, reduce smoking and healthy eating.

Schools and Colleges

- Educate about the benefits of healthy food habits and regulate the presence of junk food in canteens.
- **Promote physical activity** and teach students about the disease in physical education courses.
- Train students to identify cardiac incidents and emergency procedures like cardio-pulmonary resuscitation.

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