



A Study on Cardiovascular Disease and Treatment Cost in India: an Economic Perspective

KEYWORDS

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ABSTRACT Cardiovascular diseases are the largest cause of mortality, accounting for around half of all deaths resulting from non communicable diseases (NCDs). CVD is also one of the leading causes of deaths in India. Globally, the number of deaths due to cardiovascular diseases increased by 41 per cent between 1990 and 2013, climbing from 12.3 million deaths to 17.3 million deaths. Over the same period, death rates within specific age groups dropped by 39 per cent, according to an analysis of data from 188 countries by World Health Organisation. The workplace offers a singularly advantageous arena for the detection of unrecognized, asymptomatic CVDs, for the circumvention of workplace factors that might accelerate or aggravate them and for the identification of factors that increase the risk of CVDs and the mounting of programmes to eliminate or control them. In the World Heart Day (September 29) it is estimated that by 2020 cardiovascular disease will be the cause of over 40 per cent deaths in India as compared to 24 per cent in 1990. Globally, it causes 17.3 million deaths annually. In India, the budget allocation is only three per cent of the GDP where as in the U.S., it is 15 per cent. Cuba and Costa Rica have got a better healthcare system than the U.S. Cardiovascular disease threatens to cripple India's workforce and stunt India's growth if timely and appropriate public health measures are not instituted. The growth of heart diseases impacts not just the urban and economically well-off population, but also the underprivileged.

Introduction

The state of health of individuals has major impacts on their households. Poor or ill health exposes individuals and families to financial risk via income loss due to absence from work or job loss and out-of-pocket spending on health, especially for those lacking insurance or a social security safety net. Households with sick members are also more likely to default on loans, adversely affecting not only their own credit standing but also the health of the leading financial institutions. Many studies have documented that households in India spend a disproportionate share of their consumption on health, with the contribution from government being almost negligible. Public spending on health is very low, stagnant at about one per cent of GDP, putting India among the bottom 20 per cent of countries and far below what is needed to provide basic healthcare to the population. Two of the major risk factors for heart disease are diabetes and high blood pressure. India is the current diabetes capital of the world. Approximately 32 million Indian have diabetes in 2030. In India young population with medium age under 40 years, going to doubled its heart attack rate by 2020.

Cardiovascular Disease

Cardiovascular disease (CVD) is a general term that describes a disease of the heart or blood vessels. Blood flow to the heart, brain or body can be reduced as the result of a blood clot (thrombosis), or by a build-up of fatty deposits inside an artery that cause the artery to harden and narrow (atherosclerosis). Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina) or stroke. Cardiovascular diseases are a group of disorders for the heart or blood vessels, and include mainly hypertensive heart disease, ischaemic heart disease, rheumatic heart disease and cerebrovascular disease or strokes.

Cardiovascular Disease in Global

CVDs are the number one cause of death globally: more people die annually from CVDs than from any other cause.

Cardiovascular diseases is the leading cause of premature death in the world, include heart attacks, strokes, and other circulatory diseases. At the same time, efforts to prevent and treat cardiovascular diseases appear to be working as the rise in deaths is slower than the overall growth of the population.

Table 1
Treatment Cost of Various Diseases in Various Countries

Procedure	USA (\$)	UK (\$)	India (\$)
Open Heart Surgery (CABG)	90,000	55,000	7,500
Total Knee Replacement	48,000	52,000	6,300
Hip Resurfacing	55,000	48,000	7,000
LA Hysterectomy	22,000	24,000	4,000
Lap Cholecystectomy	18,000	20,000	3,000
Spinal Decompression Fusion	60,000	65,000	5,500
Obesity Surgery (Gastric Bypass)	65,000	70,000	9,500

Source: All India Institute of Medical Sciences (AIIMS), New Delhi, India, 2011.

Globally, the number of deaths due to cardiovascular diseases increased by 41 per cent between 1990 and 2013, climbing from 12.3 million deaths to 17.3 million deaths. Over the same period, death rates within specific age groups dropped by 39 per cent, according to an analysis of data from 188 countries by World Health Organisation.

Cardiovascular Disease in India

Asian Indians have a national history of heart disease, which is also shared by other South Asian countries like Pakistan and Bangladesh and appears to be mediated by elevated levels of lipoprotein. Among all CVD deaths, 5per cent among whites 15 per cent among blacks and 50 per cent among Asian Indians occur in those younger than 50 years of age. Heart attack is about 10 times more

common among Indians younger than 40-45 years than Americans, with 30 per cent of death occurring in people <40 years of age. The WHO Region for South-East Asia has set a target for reducing premature mortality from cardiovascular disease and other non communicable diseases (NCDs) by 25 per cent by 2025 and has developed a regional action plan to achieve this target.

Currently, heart attack and strokes account for approximately 12 million deaths worldwide each year with a disproportionately greater burden in India. The 1.21 billion (according to census 2011) people (17 per cent of the world's population) of this low-income country are experiencing cardiovascular disease (CVD) morbidity and mortality at an accelerated rate. The population is also growing at a rate of 1.4 per cent annually. More than three million Indians die from CVD every year and are expected to surpass four million by 2020. Estimates from the World Health Organization (WHO) show that by 2030, CVD will be the main cause of death throughout India, accounting for more than 35 per cent of all deaths.

Table 2
Comprehensive Cost of Heart Surgery in India

Treatment	Cost in USD
Coronary Angiography	\$ 700-\$ 800
Complete Cardiac Evaluation with Patient stay	\$ 1200 -\$ 2800
Coronary Angioplasty(with one stent)	\$ 6400 -\$ 7300
Coronary Angioplasty(with two stents)	\$ 10000 -\$ 10500
Heart Bypass Surgery (CABG)	\$ 6400 -\$ 7300
Heart Bypass Surgery with valve replacement (one valve)	\$ 10500 -\$ 11500
Aortic valve/ Mitral Valve Replacement (one valve)	\$ 9500 -\$ 10500
Aortic valve/ Mitral Valve Replacement (two valves)	\$ 11000 -\$ 12000

Source: All India Institute of Medical Sciences (AIIMS), New Delhi, India, 2011.

Cardiovascular diseases have been gaining importance in India recently because of increased incidence of the disease. It is the first among top five causes of deaths in Indian population (rural vs. urban, economically backward vs. developed states, men vs. women and at all stages vs. middle age).

Cardiovascular Disease among Industrial Workers

CVDs loom large in the workplace, not so much because the cardiovascular system is particularly vulnerable to environmental and job hazards, but because they are so common in the population of working age. The workplace offers a singularly advantageous arena for the detection of unrecognized, asymptomatic CVDs, for the circumvention of workplace factors that might accelerate or aggravate them and for the identification of factors that increase the risk of CVDs and the mounting of programmes to eliminate or control them. When CVDs do occur, prompt attention to control of job-related circumstances that may prolong or increase

their severity can minimize the extent and duration of disability, while early, professionally supervised rehabilitation efforts will facilitate the restoration of working capacity and reduce the risk of recurrences. The World Bank estimates DALYs (disability adjusted life years) lost due to heart diseases of 18.2 million in 2010 in India and is projected to be more than double in the next 20 years. Cardiovascular diseases (CVDs) is the most common causes of illness and death in the working population, particularly in industrialized countries and it is also increasing in developing countries (Wielgosz 1993). In the industrialized countries, 15 to 20 per cent of all working people will suffer from a cardiovascular disorder sometime during their working lives and the frequency climbs sharply with age. Among those between 45 to 64 years of age, more than a third of the deaths among men and more than a quarter of deaths among women are caused by this group of diseases.

Table 1 Productive Life-years Lost Due to Early Cardiovascular Deaths Years of Life Lost due to CVD in Populations- Aged 35-64 Years (in million)

Countries	PPYLL in 2000	PPYLL in 2030
India	9.2	17.9
China	6.7	10.5
Russia	3.3	3.2
USA	1.6	2
South Africa	0.3	0.4
Portugal	0.04	0.05

Source: Indian Cardiology, 2007

In recent years, CVDs have become the most frequent cause of death among post-menopausal women. Women with CVD fare worse than men, experiencing a higher proportion of CVD deaths than men. This is particularly true of women in low and middle income countries where those who develop CVD are more likely to die from it than comparable women in industrialized nations.

The cardiovascular disease (CVD) burden of India is expected to double in the next two decades, making it the single largest cause of death and the second largest cause of disability by the year 2020. This will be characterized by an enormous burden of CVD among urban communities. Further, the prevalence of CVD in rural and semi-urban areas is expected to increase substantially. While the exact aetiology of this predisposition to CVD in Indians is still debated, from a public health point of view it is clear that the rapid transition in diet and lifestyles with urbanization has contributed to increasing levels of potentially reversible CVD risk factors. Data from several cross-sectional studies confirm the high prevalence of risk factors such as smoking, type 2 diabetes, high blood pressure, dyslipidaemia and obesity in urban Indians. Despite this high burden, there is poor awareness among Indians, in addition to low detection and control rates. The reasons for this include low literacy, lack of access to healthcare and competing priorities such as infectious and nutritional diseases.

Selection of activities and industrial branches that may be associated with cardiovascular hazards

Hazardous material	Occupational branch affected/use
Carbon disulphide (CS ₂)	Rayon and synthetic fibre fabrication, rubber, matches, explosives and cellulose industries. Used as solvent in manufacture of pharmaceuticals, cosmetics and insecticides
Organic nitro-compounds	Explosives and munitions manufacture, pharmaceuticals industry
Carbon monoxide (CO)	Employees in large industrial combustion facilities (blast furnaces, coke ovens) Manufacture and utilization of gas mixtures containing CO (producer gas facilities) Repair of gas pipelines Casting workers, firefighters, auto mechanics (in badly ventilated spaces) Exposures to accidents (gases from explosions, fires in tunnel building or underground work)
Lead	Smelting of lead ore and secondary raw materials containing lead. Metal industry (production of various alloys), cutting and welding metals containing lead or materials coated with coverings containing lead. Battery factories Ceramics and porcelain industries (production of leaded glazes). Production of leaded glass Paint industry, application and removal of leaded paints
Hydrocarbons, halogenated	Solvents (paints, lacquer). Adhesives (shoe, rubber industries). Cleaning and degreasing agents. Basic materials for chemical syntheses
hydrocarbons	Refrigerants. Medicine (narcotics). Methyl chloride exposure in activities using solvents

Treatment Process

In India, 1,20,000 cardiac surgeries were held in 2010. As many as 45 million coronary artery disease cases have been diagnosed in India in 2010 alone and the figure is expected to go up to 60 million by 2015, besides a large number of rheumatic and congenital heart disease cases. In India, the budget allocation is only three per cent of the GDP where as in the U.S., it is 15 per cent. Cuba and Costa Rica have got a better healthcare system than the U.S.

Surgical Intervention

Due to improved healthcare and technology, heart disease can be well treated with heart surgeries. Here are some commonly used surgical treatments.

Angioplasty: It is the most common surgery performed to open up blocked arteries in patients with coronary heart disease with the help of a small device called stent. Here are indications, procedure, risks of angioplasty.

Bypass surgery: In this surgery, a healthy blood vessel is used to form a bypass or another route for the heart to pump blood to the other body parts to make up for a blockage in a coronary (heart artery). This new blood vessel is called a graft and the proper name for the procedure is 'coronary artery bypass graft surgery'

Pacemaker implantation: A pacemaker may be implanted in patients with congestive heart failure or cardiomyopathy. Pacemaker is a tiny device that transmits electric signals to the heart muscle helping it to maintain a heart rate and rhythm.

Heart transplant: Heart transplant is rarely performed because acquiring a healthy heart is difficult and matching the recipient is even more difficult.

Coronary Artery Bypass Graft (CABG): Also known as Coronary Artery Bypass surgery and heart bypass or bypass surgery is a surgical process which is undertaken for

relieving angina and reduction of risk of death from coronary artery disease.

Heart Valve Replacement: Heart valve replacement has to be done when the valve of the heart does not work properly and they might not open at all or close and in that case a surgery might be required. There are various types of valves available today and the kind which one should opt for depends on a number of considerations such as age, valve condition, gender etc.

Cardiology Robotic Surgery: In Robotic Cardiac Surgery, robotic assist the heart surgeon in performing surgery through tiny incisions. The surgeon has to sit in an operating room where he controls the instruments while looking at 3D images from the camera which is inside the patient. Various procedures can be performed in this case such as mitral valve replacement or repair, correction of HOCM etc. Use of Robotic Surgery in Cardiology has benefits as it involves less pain, scarring and risk that are otherwise involved. The surgeon can perform surgery through tiny openings in the chest, cracking the breastbone and spreading the ribs.

Treatment Cost in India

The cost of treatment of non-communicable diseases (NCDs) such as hypertension, diabetes and heart diseases are crippling for the poor and the middle class despite public health facilities' claims of offering free or subsidized treatment and medicines. The treatment could consume 16-60 per cent of a poor family's monthly income depending on whether the treatment is for hypertension or for the most expensive of the three NCDs, heart disease. This raises questions about how effective public health facilities are in reaching those who need them the most and in reducing out-of-pocket expenditure on treatment. By 2030 the total global cost of CVD is set to rise from approximately US\$ 863 billion in 2010 to a staggering US\$ 1,044 billion. There is no justification in the clamour for a reduced cost of treatment from various quarters at a time when the actual cost of treatment is on the rise with the nurses and paramedical staff demanding salary hike, besides the expensive technological support the hospitals have to depend upon.

The economic impact was estimated to be \$9 billion in national income from premature deaths due to heart disease, stroke, and diabetes in 2005 alone, with cumulative projected estimates of \$ 237 billion by 2015. India spends less than 1per cent for health care compared to 17 per cent in the US. Since the government spends only 17-18 per cent of this, the out-of-pocket health expenses incurred by households is as high as 80 per cent or more. Many diabetic patients spend 25 per cent of the household income for diabetes care alone. Heart disease is a silent disease with 75per cent of the patients being unaware of the presence of the disease. Therefore, only 25 per cent would receive any kind of treatment (statins, aspirin, beta blockers, hospitalization, thrombolytic therapy, angioplasty, stent, and bypass).

The direct economic burden of heart disease in India could be 200 billion rupees (\$ 4.5 billion). This would increase to 800 billion rupees (\$ 18 billion) if 100 per cent of the CAD patients were aware and received necessary treatment. Indirect costs would make the numbers even higher. The economic burden of CVD varies among states with Kerala amounting to as much as 20 per cent of its state domestic product. The WHO

(World Health Organization) has estimated that a two per cent annual reduction in national-level chronic disease death rates in India would result in an economic gain of USD 15 billion for the country over the next 10 years. India has no parallels in healthcare when it comes to cost effective treatments in comparison with other countries.

Concluding Observation

Cardiovascular disease now the leading cause of death strikes Indians early and kills many in their productive mid-life years. In India, the projected death rates from cardiovascular disease are much higher than the death rate caused by communicable diseases like HIV/AIDS, TB, and malaria. It is more likely to affect middle-aged adults than the elderly; it also affects both genders equally. Heart-attack victims are just the first wave of a swelling population of Indians with heart problems. By 2025, India is predicted to have the highest incidence of diabetes & heart diseases in the world and cardiovascular disease will be leading cause of death & disability in India. Cardiovascular disease threatens to cripple India's workforce and stunt India's growth if timely and appropriate public health measures are not instituted. The growth of heart diseases impacts not just the urban and economically well-off population, but also the underprivileged. Given the issues of affordability, accessibility, and quality of healthcare, mortality rates from heart diseases are much higher in the economically underprivileged population.

Poor people 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 payments, and they are further pushed back into poverty. It is clear that cardiovascular disease is really an economic burden and makes the rich as poor and the poor as poorer. Furthermore, cardiovascular diseases incur huge welfare losses, both at the individual and national level; through cost of illness, reduction in consumption and impoverishment and loss of national production. Thus, chronic diseases have considerable impact on the national economy level which merits policy attention.

Reference

1. American Heart Association (2015) "Women and Cardiovascular Disease" Statistical Factsheet.
2. International Heart Protection Summit, September (2011) Cardiovascular diseases in India: Challenges and way ahead. India: ASSOCHAM.
3. Shah P.B. et al (2008) "The Relationship Between Tobacco Advertisements and Smoking Status of Youth in India" Asian Pacific Journal of Cancer.
4. Strazzullo. P et al (2009) Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies, British Medical Journal 339: P.4567.
5. World Health Organization (2007) "Prevention of cardiovascular disease: Guidelines for assessment and management of cardiovascular risk" Geneva.
6. World Health Organization (2010) "Global Status Report on Non-Communicable diseases" Geneva.
7. World Health Organization (2011) "Non-communicable Diseases Country Profiles" Geneva.
8. World Health Organization (2014) "Non-communicable Diseases Country Profiles" Geneva.
9. World Health Organization (2003) "Diet, nutrition and the prevention of chronic diseases" Report of a joint WHO/FAO expert consultation"

- Geneva.
10. World Health Organization (2007) "Prevention of cardiovascular disease: Pocket Guidelines for Assessment and Management of Cardiovascular Risk" Geneva.
11. World Health Organization (2010) "Global Estimate of the Burden of Disease from Second-Hand Smoke", Geneva.
12. Cardiovascular Disease in Terms World Heart Federation (2012).
13. World Health Organization (2015), Regional Office of South-East Asia "Cardiovascular Diseases fact sheet" Department of Non communicable Diseases and Environmental Health, September.
14. Xavier. D et al. (2008) "Treatment and outcomes of acute coronary syndromes in India" (CREATE): a prospective analysis of registry data. Lancet 371: 1435-1442.