Non communicable diseases

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What are non communicable diseases?

Most of us are familiar with the phrase communicable diseases. Diseases such as chickenpox, measles and dengue, caused by infectious agents and transmitted from person to person are some examples of communicable diseases. Theses diseases can spread in a community in epidemic proportions. History tells us how diseases like plague wiped out entire communities.

We are now experiencing a worldwide increase in the incidence (number) of another group of illnesses such as diabetes, high blood pressure, coronary heart diseases and strokes, which are not due to any infectious agent. Yet they pose a significant threat to humanity. These non communicable diseases significantly influence our well being, lifespan, cost of health care, and are a huge burden to the society. World bodies like the WHO, and even developing countries like ours have begun to pay special attention to curb the threat of these non-communicable diseases.

Some examples of NCD

- Diabetes
- Coronary Heart Disease
- Hypertension (high blood pressure)
- Mental illnesses
- Stroke
- Cancers
- Accidents
- Poisoning

Box 1

Under the umbrella of non communicable diseases or NCDs, several diseases are listed (see box 1). The rising trend (figures 1 and 2) of these NCDs is a result of an ageing population and adopting non-traditional lifestyles with industrialization and urbanization. Even some of the cancers are related to lifestyle changes. For example, cigarette smoking directly affects the lung, esophagus (gullet) and the bladder. Diets rich in fiber are known to reduce the risk of cancers of the large bowel.

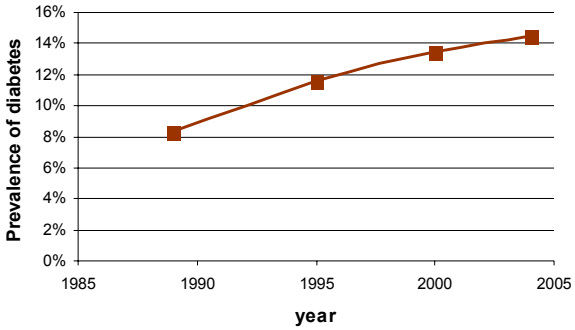

Figure 2 Increase in diabetes from 1989 to 2005 in India. Similar trends are seen in Sri Lanka as well[2].

Some investigators predict that from 2005 to 2010 there will be an increase in hospitalization for illnesses related to diabetes (by 36%), hypertension (by 40%), and coronary heart disease (by 29%) in our country[1].

However, the good news is that there is convincing scientific evidence to indicate that reverting to healthier life styles can prevent many of these NCDs.

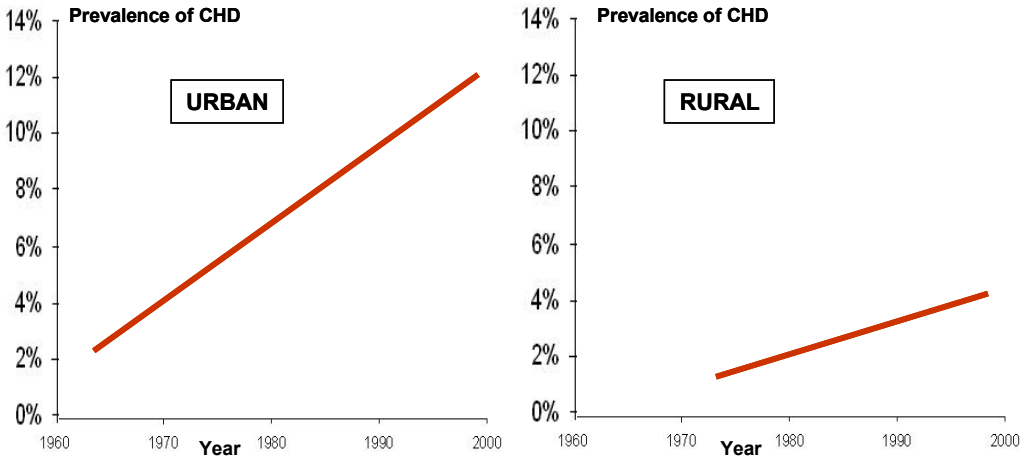

Figure 1 Increasing prevalence of Coronary Heart Disease (CHD) in urban and rural India. Similar trends are seen in Sri Lanka

In this article, I shall discuss a few NCDs, their risk factors and explore the ways of preventing them by adopting life style modifications.

Diabetes

Most of the carbohydrates (starch) we eat are turned into glucose, the main source of energy for our muscles and other tissues. Glucose, once absorbed, is transported in blood. We need the hormone insulin for glucose to be absorbed from blood and utilized by muscles and other tissues. Insulin is produced by the pancreas, a tongue-shape gland situated behind the stomach. If the pancreas does not produce enough insulin or if the body does not respond to insulin secreted by the gland, tissues will not be able to make use of the glucose effectively. As a result, the level of glucose in the blood will rise. This is what happens in diabetes. A normal individual has a blood glucose level between 70 – 110 milligrams per 100 millilitres of blood (4 to 6 millimols per litre) in the fasting state. High levels of glucose in the blood lead to complications.

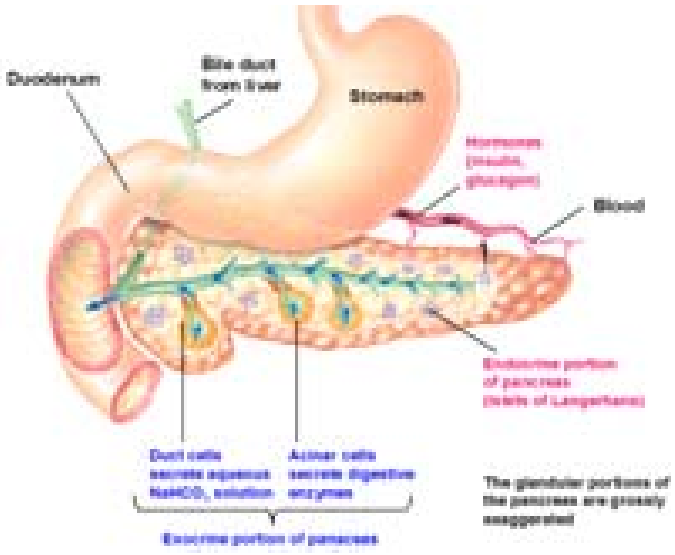

Figure 3 The pancreas

The International Diabetes Federation estimates that more than 245 million people worldwide have diabetes. This is an increase from 30 million in 1985! In South Asian populations (which accounts for almost one fifth of the world population), there had been a marked increase in the prevalence (number of cases per 100,000 population) of diabetes over the last couple of decades. In a Sri Lankan survey conducted by Katulanda and colleagues in 2006, about 17% of urban population and about 10% rural population were found to have diabetes[3].

Diabetes is a major health problem because of its complications. Diabetes is the main cause blindness in adults in developed countries and accounts for the majority of non accidental limb amputations. Diabetics are at higher risk of getting heart attacks, strokes and kidney failure requiring transplantation. It is estimated that over 10% of money spent on health worldwide is spent for treatment of diabetic complications. This places a large burden on the society, particularly in countries like ours, where expenditure for health per person is rather small (17 USD annually per person, 2004 data) compared to developed countries (eg. Switzerland 3,776 USD annually per person, 2004 data).

What is Type 1 and Type 2 diabetes?

In type 1 diabetes the defect is in the pancreas which does not secrete enough insulin. Type I diabetics are often children or young adults. The cause is thought to be due to the body immune system turning itself against the insulin secreting islet cells in the pancreas. There is nothing one can do to prevent this type of diabetes. Treatment is with injections of insulin. Insulin cannot be given by mouth as it is a peptide and gets digested in the stomach.

In type 2 diabetes, the pancreas secretes enough insulin, but the body does not respond to the insulin that is secreted. They are said to be insulin resistant. Type 2 diabetes tends to occur in middle aged, overweight people. About 90% of all people with diabetes have the type 2 variety. Life styles changes aimed at keeping the body weight under control and increasing physical activity help to prevent type 2 diabetes.

People who are overweight, physically inactive and have diabetes among close family members are at risk of developing diabetes. Prevention and early recognition of diabetes in these high risk individuals are important to avoid complications such as kidney failure, nerve damage, heart attacks, strokes and loss of eye sight.

Preventing diabetes

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Complications of diabetes

Diabetes affects the retina of the eye (retinopathy). Some patients with retinopathy may even require laser therapy to seal off tiny fragile blood vessels in the retina to stop bleeding into the eye. About 10% people who have had diabetes for over 15 years develop severe loss of vision as a result. Diabetes is a leading cause of kidney disease (nephropathy). Routine checking of urine for micro quantities of albumin (microalbuminuria) helps in recognizing early kidney disease. Terminal cases of kidney failure require kidney transplantation. Another complication of diabetes is neuropathy; damage to nerves. Lack of sensation in the feet makes them injure their feet without realizing it. These injuries can lead to ulcers and possibly amputations. This is particularly so if arteries taking blood to the feet are also narrowed because of diabetes. Diabetes is the most common cause of non accidental (that is not as a result of an accident) amputations worldwide. People with diabetes are 15 to 40 times more likely to require lower limb amputation compared to the general population.

If the internal nerves to the male sex organ (penis) get caught up in neuropathy, sexual dysfunction (impotence or erectile dysfunction) could occur. Diabetes is a leading cause of male impotence. Diabetes increases the risk of atherosclerosis, and hence, cardiovascular diseases such as heart attacks and strokes. Risk of heart attacks in people with diabetes is 2-4 times higher than non-diabetics. Heart attacks are a leading cause of death in diabetics.

Blood pressure and high blood pressure (hypertension)

Blood pressure (BP) is the pressure of blood in the arteries. Blood pressure is measured and recorded as two numbers. For example, 150/90 mmHg (150 over 90 millimeters of mercury) means that the pressure in the artery is 150 mmHg when the heart contracts, and 90 mmHg when it relaxes between heart beats. The top number is the systolic blood pressure and the bottom number is the diastolic blood pressure. A blood pressure of 130/80 mmHg could be considered as normal for most people. However, even this may be considered high for a person who has had a heart attack, stroke or a diabetic complication such as nephropathy. Blood pressure varies from moment to moment (for example, BP could rise in excitement when entering the doctor's consultation room!). Therefore, several blood pressure measurements are usually taken before deciding a person as having high blood pressure.

How common is it?

In western populations, nearly one in four adults has high blood pressure. In a recently conducted study in Sri Lanka, Wijewardene and colleagues[4] reported a prevalence of about 20% (one in five adults has hypertension).

In most of the people with hypertension, the cause cannot be found (see box 2). In a minority, however, an underlying cause such as a kidney problem or a hormone problem could be identified.

You are at risk of developing hypertension, if you

- are overweight
- eat a lot of salt
- drink alcohol
- don't eat many fruits and vegetables
- don't do enough exercise, or
- have close family members with hypertension

Box 2

Why bother with blood pressure?

Hypertension is asymptomatic. That is to say that a person will not feel whether the blood pressure is high or not, unless it is measured, as there are no symptoms. Yet, it is an important risk factor for cardiovascular (heart and blood vessels) diseases like heart attacks and strokes, and for kidney diseases. If the blood pressure remains high over a long period of time, it damages the arteries and exerts strain upon the heart. Arteries get stiffer (arteriosclerosis) and the heart muscle gets thicker (hypertrophy of the left ventricle). Generally, the higher the blood pressure, the

greater is the risk for death (mortality). Several large studies have shown conclusively, that the risk of cardiovascular death could be reduced by lowering the blood pressure.

Coronary heart disease (CHD)

The heart is a non-stop pump made of special muscle. A system of blood vessels, called coronary arteries arising from the aorta (pronounced 'ay-o-ta') take oxygen-rich blood to the contracting muscle. If one of the small branches of the coronary arteries get blocked, the blood supply (and therefore, oxygen) to that part of the heart muscle will get cut off. Unless the block is quickly removed, a part of the heart muscle could die. This is known as a myocardial infarction (MI) or a heart attack.

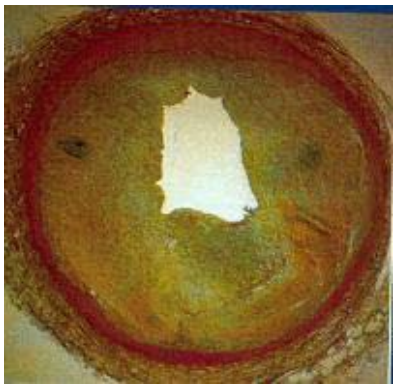

Figure 5 A cut section of an artery narrowed by atheroma

interior becomes irregular. The surface of the plaques cracks and a blood clot forms on the plaque. These plaques are called atheroma and the blood clot is called the thrombus (see box 3). Drugs that dissolve blood clots and reduce the stickiness of platelets (preventing further clots) are used in the treatment of heart attacks.

MEDICAL TERMS

- **Atheroma** - formation of fatty plaques on the inner lining of arteries
- **Atherosclerosis** – the process of formation of atheroma
- **Thrombus** – a blood clot inside an artery or a vein
- **Thrombosis** – formation of a thrombus
- **Myocardial infarction** – death of a part of the heart muscle as a result of its blood supply being cut off
- **Ischaemia** – reduction of blood supply to a tissue, often due to narrowing of the artery (often due to atherosclerosis)
- **Angina** – chest pain that occurs with exertion and relieved with rest, caused by ischaemia
- **Coronary heart disease (CHD)** – heart disease caused by narrowing or blockage of coronary arteries
- **Ischaemic heart disease (IHD)** – heart disease caused by reduction of blood supply to the heart muscle usually due to CHD
- **Cardiovascular disease** – diseases in the blood vessels and the heart; includes coronary vascular disease, cerebro vascular (brain arteries) disease and peripheral vascular (limb arteries) disease

Coronary heart diseases are a major cause of death worldwide. Even in Sri Lanka these are the number one killer[5]. In a community study done in 1994, Mendis and Ekanayake reported that 16 out of 1000 adults in Sri Lanka have definite evidence of ischaemic heart disease[6]. Most myocardial infarctions occur in people over 50 years. As in India we too in Sri Lanka are now seeing younger people (probably have smaller coronary arteries) and more women falling prey to heart attacks. Patients with coronary heart disease present not only as heart attacks but also as sudden death, angina, heart failure or irregularities of the heart rhythm.

Box 3

Atherosclerosis & thrombosis

The commonest cause of myocardial infarction is the blockage of a coronary artery (or one of its branches) by a blood clot. Inner lining of arteries is smooth and blood clots do not form normally. When fatty plaques form on the lining over several years, the

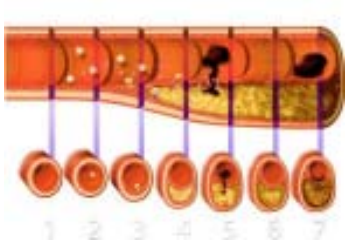

Figure 4 A schematic diagram of atherosclerosis narrowing the artery.

Risk factors for coronary heart diseases

Risk factors for coronary heart disease are almost as same as the risk factors for other cardiovascular disease because the underlying cause atherosclerosis and thrombosis are common to all. Some risk factors are fixed and cannot be modified, whereas prevention is aimed at detecting and modifying other risk factors.

Obesity

Many health problems are more common in obese or overweight people. Out of these, the most important are the increased risk of diabetes and coronary heart disease.

Preventable risk factors

- Cigarette smoking
- Hypertension
- Diabetes
- Obesity
- High cholesterol level in blood
- Lack of exercise
- Unhealthy diet
- Excess alcohol

Fixed risk factors

- Being a male!
- Getting old!
- A family member having a heart attack or a stroke

Box 4

Obesity in children is recognized as a forerunner of diabetes in adult life. Excessive indulgence in junk food, engaging in armchair games (eg. video and computer games) instead of physically active sports, and, parents adopting an attitude where 'being overweight' is considered healthier, are some of the reasons for increasing obesity seen among urban children.

Am I overweight?

The body mass index (BMI) is a good way to find out. It relates the weight to the height. BMI is calculated by dividing the weight (in kilograms) by the square of the height (in metres). For example, if a person weighing 70 kg is 1.75 metres tall, the BMI is 70 / (1.75 x 1.75), which is 22.9. BMI tells you whether your weight is correct for your height (see box 5). A BMI of 25 or more is associated with increased health risks (box 6).

BMI	Classed As
Less than 18.5	Underweight
18.5 to 24.9	Ideal
25 to 29.9	Overweight
30 to 39.9	Obese
40 and over	Very obese

Box 5

Health problems in obesity

- diabetes
- hypertension (figure 6)
- coronary heart disease
- breathing problems
- sleep related problems
- stones in the gall bladder
- osteoarthritis of the knees
- back ache
- some types of cancer
- depression
- menstrual irregularities
- complications during pregnancy

Box 6

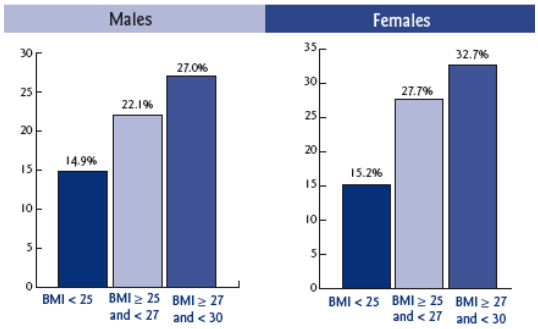

Figure 6 With increasing BMI, more and more people develop hypertension (US data)

Central obesity

Risk to health is greater if extra body fat is mainly around the waist. This can be detected by measuring the waist size. A waist measurement of 90 cm for Asian men and 80 cm for Asian women indicates central obesity which carries a significant health risk even though the BMI could be near normal.

In the United Kingdom, about 2 out of 5 adults are overweight, which is a three fold rise since 1980. Even in Sri Lanka (Figure 7), there is an alarming trend in increasing obesity among children and young adults. This 'obesity epidemic' is a root cause of the 'diabetic epidemic' and the 'heart attack epidemic' we are experiencing.

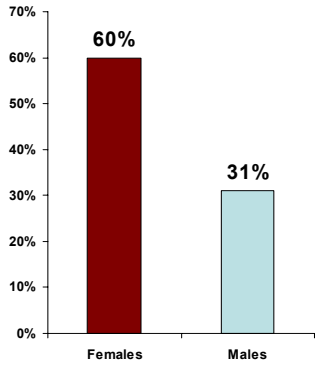

Figure 7 Prevalence of central obesity in a preliminary survey of about 1000 random households in urban Sri Lanka *(Mathews & Katulanda et al)*

Cholesterol

Cholesterol is an essential component of all animal cell membranes. The body needs cholesterol to turn out steroid hormones, sex hormones, vitamin D and bile salts. Cholesterol is not water soluble. Therefore, it is transported in blood as lipoproteins. There are two main types of lipoproteins. Low density lipoproteins (LDL) transport cholesterol into the walls of arteries and promote atheroma formation. High blood levels of total cholesterol and LDL-cholesterol increase the risk of cardiovascular disease. In contrast, high density lipoproteins (HDL) transport cholesterol away from arteries to the liver to be metabolized. Having a high blood level of HDL-cholesterol is protective against cardiovascular disease.

Metabolic syndrome; a new concept?

There is a tendency for several cardiovascular risk factors to be present in the same individual. This clustering of risk factors is known as the metabolic syndrome (MetS). This is not a disease in itself, but, a concept that draws attention to the need to control all risk factors rather than focusing on individual risks. Recent reports from India (32%)[7] and United States (39%) show that almost one in three people has metabolic syndrome. Preliminary data suggest that the situation is Sri Lanka is similar (figure 8)

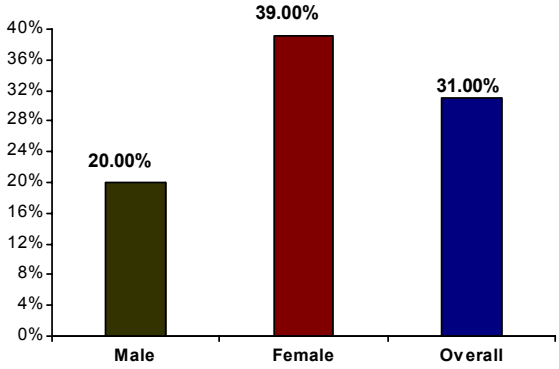

Figure 8 In urban Sri Lanka, almost one third of population has metabolic syndrome. From a survey of about 1000 random households in urban Sri Lanka *(Mathews & Katulanda et al)*

Do I have metabolic syndrome?

If you have following criteria, you are considered to have metabolic syndrome and a higher risk of getting cardiovascular diseases!

• **Central obesity** (Waist circumference; male > 90 cm and female > 80cm	
Plus any TWO of the following	
• Raised blood triglycerides	≥1.7mmol/l (150mg/dl)
• Reduced HDL-cholesterol (good cholesterol)	<1.03 mmol/l (40mg/dl) males <1.29 mmol/l (50mg/dl) females
• Raised blood pressure	Systolic ≥130mmHg or diastolic ≥ 85mmHg or previously diagnosed hypertension
• Raised blood glucose	Blood glucose ≥5.6 mmol/l (100mg/dl) or previously diagnosed diabetes

Box 7

Preventing NCDs through healthy-living

Health is not merely a state of living without an illness! 'Health' encompasses physical, mental, social and spiritual wellbeing. Healthy-living focuses not only on healthy eating and physical activity, but also on aspects ranging from dental health, safety at work place, reproductive health and sexual health to mind-body interaction.

Large clinical trials involving hundreds of thousands of individuals, conducted across several countries have shown the value of quitting smoking, eating a healthy diet, controlling body weight and increasing physical activity in preventing cardiovascular disease. Measures aimed at reducing the risk factors are directed either at high risk individuals or on the population at large.

Preventing cardiovascular disease

The most important population goals for the prevention of CVD are as follows:

- **Tobacco smoking**: reduction of smoking by the community through education, legislation and taxation

- **Saturated fats and trans fats**: less than 10% of energy should come from saturated fats and less than 2% of energy from trans fats. High intakes of saturated fats (eg. animal fat, milk products) and trans fats (eg. in processed food like potato chips) raise cholesterol levels and significantly increase risk of CVD. High blood cholesterol levels in the population make the risk of smoking and high blood pressure for CVD even worse. Mono and polyunsaturated fats (eg. corn, olive oil) should replace these wherever possible. Daily cholesterol (main sources – meat, meat products, egg yolk, milk products) consumption should be kept below 300 mg.

- **Fruit and vegetables**: more than 400g/day is recommended. Fruit and vegetables contain a vast array of beneficial compounds which, acting together, appear to be responsible for their protective effect.

- **Salt**: should not exceed more than 6g/day. Reducing salt intakes lowers blood pressure and risk of CVD in people with normal blood pressure as well as in people with hypertension.

- **Body Mass Index**: to maintain a BMI of 23. Obesity and overweight increase the risk of CVD and type 2 diabetes.

- **Physical Activity**: at least 30 minutes a day of moderate physical exercise, 5 days a week. What is recommended is aerobic activity such as brisk walking, jogging, swimming and cyling.

In summary, non communicable diseases such as diabetes and cardiovascular disease are on the rise worldwide. Even in our country, these have become a major killer. Whereas developed countries are troubled only by NCDs, we in developing countries have to battle with both communicable (eg. dengue) and non communicable diseases; a double burden of diseases. Most of the NCDs can be prevented by adopting healthier life styles and well designed population strategies.

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Phoenix to explore Mars

NASA in the United States has planned to launch a space shuttle named as "Phoenix" to Mars for exploring the life on Mars.

It is planned to launch the Space Shuttle on 04 August 2007 expecting landing on the red planet on 25 May 2008, after a long journey of 422 million miles.

Phoenix will be landed to the northern hemisphere of Mars and it is assumed by the scientists that the evidence of life can only be obtained in this area of the red planet.

'Phoenix' will use its robot arms to dig snow and soil and it will stay on the red planet for a period of three months testing the samples. 'Phoenix' will investigate the environment of the red planet for maintain life on Mars.

After the successful voyage to the moon with human beings, the next dream of the man is to land on Mars. Scientists say that more studies have to be done to achieve this goal.

Before sending human beings to the red planet, the leader of 'Phoenix' Research Group, Peter Smith says that it is necessary to investigate the life is ever existed on Mars and there is a suitable environment for living beings on the red planet. Photos obtained by Phoenix will be used to continue research on Mars.

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