Lesson 19: Noninfectious Adult Diseases

A Y N A L E M   A D U G N A

Study Objectives

Noninfectious Adult Diseases

Cardiovascular	Diabetes Mellitus	Dental Health
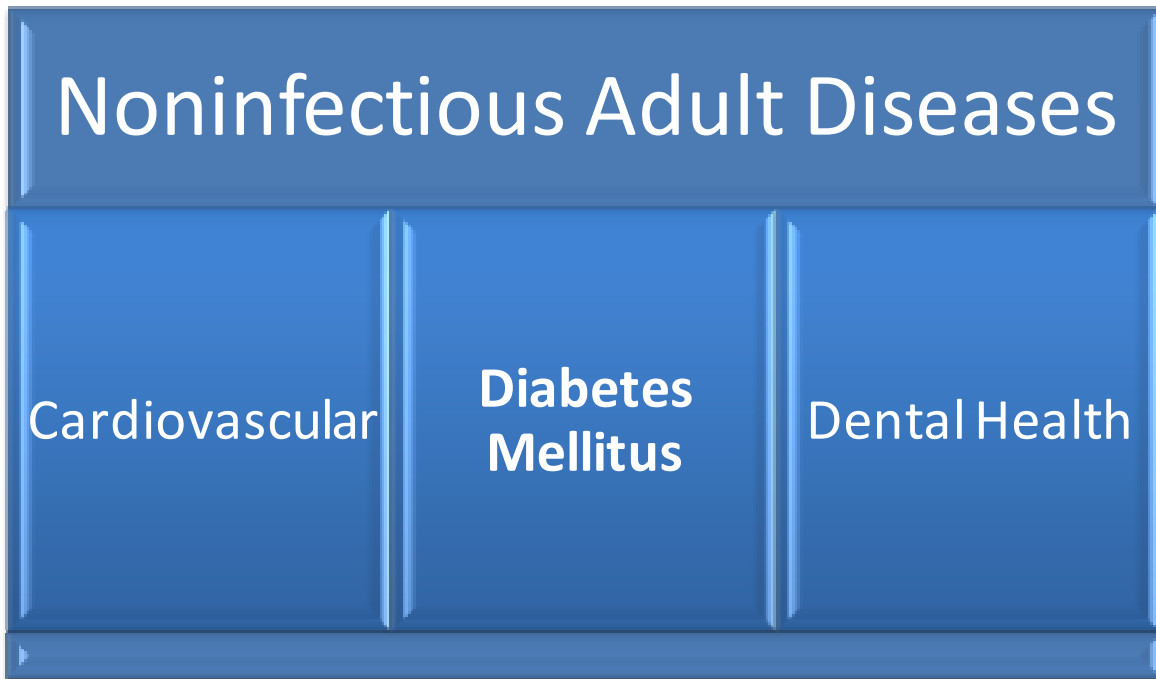
NONINFECTIOUS ADULT DISEASES

Increasing survivorship rates, especially in urban Ethiopia, are leading to a rise in old-age diseases as well as the so called lifestyle illnesses characteristics of Western societies where a sedentary life and unhealthy diet has substituted old infections as the major source of morbidity and mortality.

"Some of the major factors in the increasing incidence of chronic noninfectious diseases in Ethiopia appear to be the adoption of Western lifestyle in urban areas (particularly a more sedentary way of life, increasing cigarette smoking, employment in manufacturing industries, greater stress, and consumption of more refined foods) and increasing life expectancy in cities…" [1]

National-level statistics on non-infectious adult diseases in Ethiopia are scarce. There is no doubt, however, that non-infectious adult diseases are adding to the growing burden of the

myriads of diseases responsible for morbidity and mortality among adults. Among survey results discussed in a recent literature survey by Frances Lester and Kebede Oli [1] include the following:

- ☑ A study employing the modified autopsy technique in Butajira showed that the category of non-infectious adult illnesses (NIAD) accounted for 24% of morbidity and 14.2% of mortality. These included cardiovascular diseases, malignancies, diabetes mellitus, chronic liver diseases, bronchial asthma, nephritis and nephrosis, and musculo-skeletal diseases.
- ☑ A survey of 2854 bank employees found the prevalence of this category of diseases to be about 13%.
- ☑ A prospective study of patients in the 60+ age category "…found cardiovascular diseases, especially hypertension and its complications in 20% of patients, neurological diseases in 9%, liver diseases in 5%, and malignancies in 6%"…."These surveys indicate the importance in this population of chronic diseases, which can be expected to increase as malnutrition and infectious diseases are controlled and life expectancy increases."
- ☑ Adoption of Western lifestyles – smoking, sedentary life, psychological stress, employment in harmful occupations, consumption of processes foods, etc - is among the contributing factors, but the relative contributions of these individual factors and the trends over time are not known.
- ☑ Various studies have shown prevalence rates ranging from 1% to 10% in patients visiting health facilities for other illnesses such as asthma, dyspepsia, duodenal ulcer, sigmoid volvulus, viral hepatitis, cirrhosis of the liver, iron-deficiency anemia, endemic goiter, renal diseases.

Epidemiology and Global Burden of Major Non-Infectious Adult Diseases

Cardiovascular Diseases

The term **cardiovascular** refers to the circulatory system comprising "…the heart and blood vessels which carries nutrients and oxygen to the tissues of the body and removes carbon dioxide and other wastes from them". They are a class of diseases that include "… arteriosclerosis, coronary artery disease, heart valve disease, arrhythmia, heart failure, hypertension, orthostatic hypotension, shock, endocarditis, diseases of the aorta and its branches, disorders of the peripheral vascular system, and congenital heart disease." [2]

The following definitions are copied from the "medterms.com" website [2]:

Arteriosclerosis: Hardening and thickening of the walls of the arteries. Arteriosclerosis can occur because of fatty deposits on the inner lining of arteries (atherosclerosis), calcification of the wall of the arteries, or thickening of the muscular wall of the arteries from chronically elevated blood pressure (hypertension).

Coronary artery disease: A major cause of illness and death, coronary artery disease (CAD) begins when hard cholesterol substances (plaques) are deposited within a coronary artery.

(The coronary arteries arise from the aorta adjacent to the heart and supply the heart muscle with blood that is rich in oxygen. They are called the coronary arteries because they encircle the heart in the manner of a crown.)

The plaques in the coronary arteries can cause a tiny clot to form which can obstruct the flow of blood to the heart muscle producing symptoms and signs of CAD that may include:

1. Chest pain (angina pectoris) from inadequate blood flow to the heart;
2. Heart attack (acute myocardial infarction), from the sudden total blockage of a coronary artery; or
3. Sudden death, due to a fatal disturbance of the heart rhythm.

Arrhythmia: An abnormal heart rhythm.

In an arrhythmia the heartbeats may be too slow, too rapid, too irregular, or too early. Rapid arrhythmias (greater than 100 beats per minute) are called tachycardias. Slow arrhythmias (slower than 60 beats per minute) are called bradycardias. Irregular heart rhythms are called fibrillations (as in atrial fibrillation and ventricular fibrillation). When a single heartbeat occurs earlier than normal, it is called a premature contraction.

The term arrhythmia comes from the Greek a-, loss + rhythmos, rhythm = loss of rhythm.

Hypertension: High blood pressure, defined as a repeatedly elevated blood pressure exceeding 140 over 90 mmHg -- a systolic pressure above 140 with a diastolic pressure above 90.

Chronic hypertension is a "silent" condition. Stealthy as a cat, it can cause blood vessel changes in the back of the eye (retina), abnormal thickening of the heart muscle, kidney failure, and brain damage.

Heart failure: Inability of the heart to keep up with the demands on it and, specifically, failure of the heart to pump blood with normal efficiency. When this occurs, the heart is unable to provide adequate blood flow to other organs such as the brain, liver and kidneys. Heart failure may be due to failure of the right or left or both ventricles. The signs and symptoms depend upon which side of the heart is failing. They can include shortness of breath (dyspnea), asthma due to the heart (cardiac asthma), pooling of blood (stasis) in the general body (systemic) circulation or in the liver's (portal) circulation, swelling (edema), blueness or duskiness (cyanosis), and enlargement (hypertrophy) of the heart.

Shock: In medicine, shock is a critical condition brought on by a sudden drop in blood flow through the body. There is failure of the circulatory system to maintain adequate blood flow. This sharply curtails the delivery of oxygen and nutrients to vital organs. It also compromises the kidney and so curtails the removal of wastes from the body. Shock can be due to a number of different mechanisms including not enough blood volume (hypovolemic shock) and not enough output of blood by the heart (cardiogenic shock).

Congenital heart disease: A malformation of the heart or the large blood vessels near the heart. The term "congenital" speaks only to time, not to causation; it means "born with" or "present at birth."

Myocardial infarction: A heart attack. Abbreviated MI.

The term "myocardial infarction" focuses on the myocardium (the heart muscle) and the changes that occur in it due to the sudden deprivation of circulating blood. The main change is necrosis (death) of myocardial tissue.

The word "infarction" comes from the Latin "infarcire" meaning "to plug up or cram." It refers to the clogging of the artery.
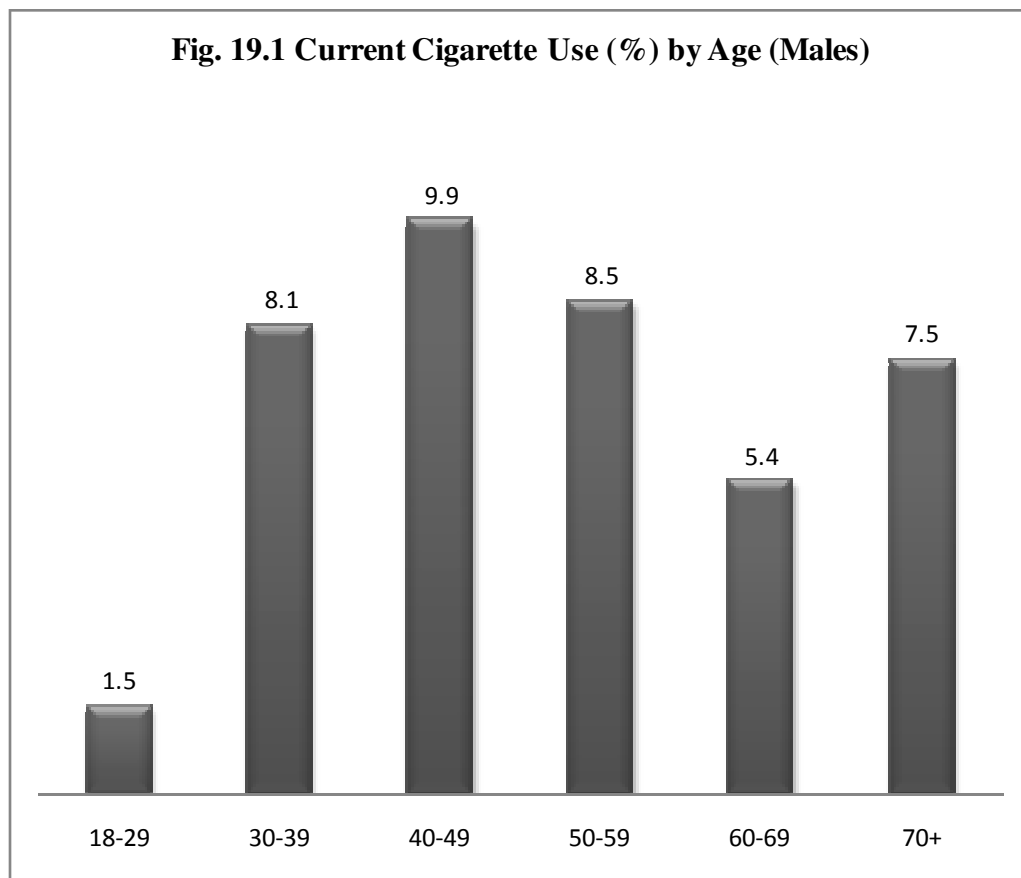
Global Disease Burden (WHO)

According to WHO [3], cardiovascular diseases are

- ☑ The number one cause of death on a global scale
- ☑ An estimated 17.5 million people died from it in the year 2005
- ☑ It represents 30% of all global deaths
- ☑ About 80% of the deaths occurred in low- and middle-income countries
- ☑ If current trends continue 20 million people will die from it annually by 2015

A test of blood donated by volunteers in Northwestern Ethiopia in the late 1990s focused on "….total blood cholesterol (TC), lipoprotein cholesterol (LDL-C & HDL-C) and triglyceride (TG) [to] determine the prevalence of hypercholesterolaemia and other coronary heart disease risk factors." Not surprisingly for a poor country "the prevalence of hypercholesterolemia and other coronary heart disease risk factors are low in both urban and rural donors in northwest Ethiopia." [4]

Another risk factor looked at as a possible contributor to heart disease in Ethiopia was cigarette smoking. The results show that while tobacco represents a significant health risk for the individual smoker, the relatively low prevalence rates [5] makes it less of a threat on a national level than in other countries (Fig. 19.1). Kibrebeal and Getachew [6] have argued that the threat level is being kept in check somewhat by economic factors, and not so much by education or legislation, as is the case in numerous other countries.

"There is very little tobacco control activity in Ethiopia. Although there is a policy statement that prohibits smoking in public places particularly schools and health care facilities, this has not been through regulation. Like most of the major airlines in the world, smoking is prohibited in Ethiopian Airlines too. There is also a legislation that bans cigarette advertising and sponsorship in the country. Cigarette taxes and duties include excise tax 150%, sales tax 12%, and import duty %." [6]

Fig. 19.1 Current Cigarette Use (%) by Age (Males)

Age	Value
18-29	1.5
30-39	8.1
40-49	9.9
50-59	8.5
60-69	5.4
70+	7.5

Source: (5)

Two universally acknowledged risk factors now gaining importance as a public health concern for the relatively well-to-do urbanites whose numbers are small but growing, are diet and lifestyle choices which are leading to weight gains above what is normal for an individual's height, and obesity, with the attendant implications for heart-health. The study on donated blood mentioned above [4] also looked at the physical measurements – weight and height – of individual donors. The picture that emerged (Fig. 19.2) is reassuring, in that at least among this population the combined use of a weight and height index also known as body mass index (BMI) for most of the study subjects fall in the "normal" category.

Fig 19.2 BMI (Females) by age group
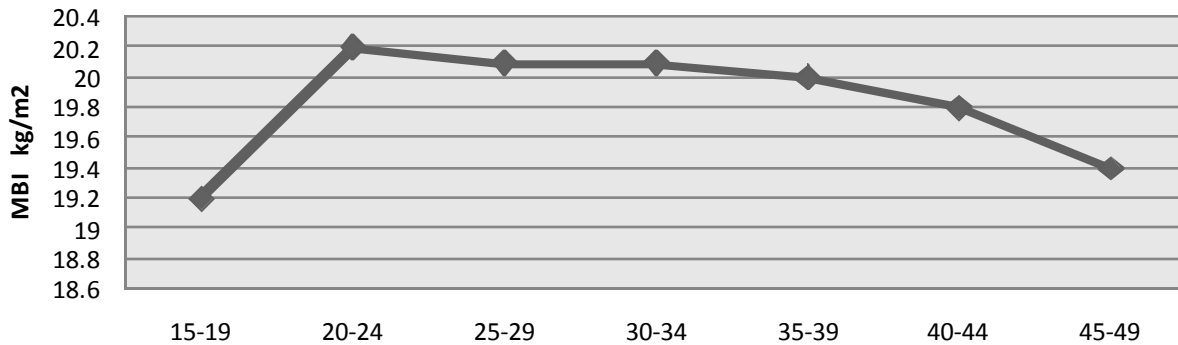
Source: [4]

Category	BMI range - kg/m^2
Severely underweight	less than 16.5
Underweight	from 16.5 to 18.5
Normal	from 18.5 to 25
Overweight	from 25 to 30
Obese	from 30 to 35
Clinically Obese	from 35 to 40
Morbidly Obese	above 40

Source: [7]

The 2005 Demographic and Health Survey also gathered nutritional data and body measurements to establish the nutritional status of women by age and socio-economic backgrounds. The mean BMI for the various groups was about 20 and roughly two-thirds of the women in the study group fell in the "normal" category. Classification in the "overweight" and "obese" (BMI ≥25) categories only applied to urban women, those with secondary education or above, and those in

the top wealth quartile with respective proportions of 14.2%, 14.1% and 10.9%. Only 2.2% of rural women were in the "overweight" or obese categories. [8]

Heart disease afflicts a small but growing proportion of Ethiopian adults, but it is not exclusively found among adults. According to a news report earlier this decade, "at least 50,000 Ethiopian children are born with congenital heart disease annually [meaning], an estimated 6.8 per 1,000 live births are reported to be affected by congenital heart disease in Ethiopia. [9]

Maru M. surveyed trends in coronary heart diseases in Ethiopia over the three decades from the 1960's to late 80's focusing on serum cholesterol, cigarette smoking, hypertension, as well as atherosclerosis and myocardial infractions in autopsy studies.

"From Ethiopian reviews of admission records of 5013 patients from the black lion hospital and the teaching hospital Gondar between 1963 and 1967 showed only four patients with myocardial infarction. .....In 1984 Gebre-Selassie analyzed the autopsy records of 256 patients from the Black Lion hospital performed during the previous six years and found 4(1.6%) patients with myocardial infraction."…"In the present series some degree of coronary atherosclerosis was found in 26 (21%) of the patients. Moderate to serious lesions were found in 10 (8.1%) cases. Myocardial infraction was found in 8 (6.5%) of the 124 patients. Compared with the previous reports, the findings in this series indicate a significant increase in the incidence of myocardial infraction in Ethiopia during the last two decades. A rate of 6.5% of myocardial infraction in a series with a mean age of 37, is highly indicative that myocardial infraction is under diagnosed. …The mean serum cholesterol level in Ethiopia has been reported to be within the range of 142±36mg/dl to 208±40mg/dl in different social classes. From the few available reports, the prevalence of hypertension ranged from 1.8% in rural communities to 12.8% in hospital outpatients. Both hypertension and serum cholesterol were found to increase with age, urbanization, and social class. Cigarette smoking by Ethiopians is on the increase. The overall prevalence is still unknown. The effect of these predisposing factors will be more evident with improvement in the standard of living and with increasing life expectancy of the population.' [10]

Pauletto et. al [11] focused on blood pressure in their study of risk factors for Ethiopian heart patients. The result is shown in Fig. 19.3.

Fig. 19.2 Mean Systolic Blood Pressure by Broad Age Groups and Sex
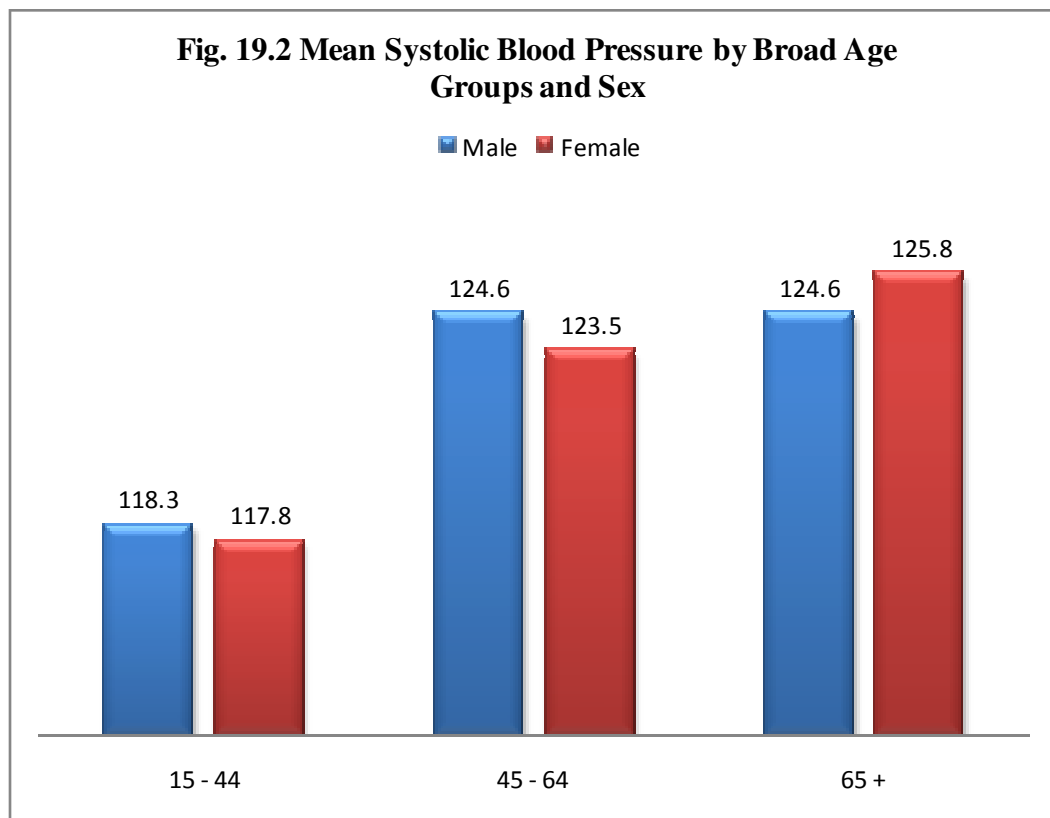
Source [11]

The following definitions are copied from an Internet source (americanheart.org) [12].

What is blood pressure?

Blood pressure is the pressure of the blood against the walls of the arteries.

Blood pressure results from two forces. One is created by the heart as it pumps blood into the arteries and through the circulatory system. The other is the force of the arteries as they resist the blood flow.

What do blood pressure numbers indicate?

- The higher (systolic) number represents the pressure while the heart contracts to pump blood to the body.
- The lower (diastolic) number represents the pressure when the heart relaxes between beats.

The systolic pressure is always stated first. For example: 118/76 (118 over 76); systolic = 118, diastolic = 76.

Blood pressure below 120 over 80 mmHg (millimeters of mercury) is considered optimal for adults. A systolic pressure of 120 to 139 mmHg or a diastolic pressure of 80 to 89 mmHg is considered "prehypertension" and needs to be watched carefully. A blood pressure reading of 140 over 90 or higher is considered elevated (high).

Diabetes Mellitus

What is diabetes?

"Diabetes mellitus is a group of metabolic diseases characterized by high blood sugar (glucose) levels, which result from defects in insulin secretion, or action, or both. Diabetes mellitus, commonly referred to as diabetes (as it will be in this article) was first identified as a disease associated with "sweet urine," and excessive muscle loss in the ancient world. Elevated levels of blood glucose (hyperglycemia) lead to spillage of glucose into the urine, hence the term sweet urine. Normally, blood glucose levels are tightly controlled by insulin, a hormone produced by the pancreas. Insulin lowers the blood glucose level. When the blood glucose elevates (for example, after eating food), insulin is released from the pancreas to normalize the glucose level. In patients with diabetes, the absence or insufficient production of insulin causes hyperglycemia. Diabetes is a chronic medical condition, meaning that although it can be controlled, it lasts a lifetime." [2]

Diabetes is a serious illness because it can, over time lead to blindness, kidney failure, and nerve damage. "These types of damage are the result of damage to small vessels, referred to as microvascular disease. Diabetes is also an important factor in accelerating the hardening and narrowing of the arteries (atherosclerosis), leading to strokes, coronary heart disease, and other large blood vessel diseases. This is referred to as macrovascular disease." [2]

Global Disease Burden (WHO) [3]

- ☑ Diabetes causes about 5% of all deaths globally each year.
- ☑ 80% of people with diabetes live in low and middle income countries.
- ☑ Most people with diabetes in low and middle income countries are middle-aged (45-64), not elderly (65+).
- ☑ Diabetes deaths are likely to increase by more than 50% in the next 10 years without urgent action.

Once considered rare, diabetes is now emerging as one of the major concerns among public health officials dealing with health care among adult Ethiopians. There is no national-level data on the illness but a few available local studies have shed some light on prevalence among hospital patients. "Analyses of medical admissions from Addis Ababa and a number of provincial hospitals have shown prevalence ranging from 0.5 to 8.4%..." with the majority in type 2 category [13]

"In the past patients who were diagnosed with type 2 diabetes were nearly all seen for the first time as the symptomatic stage of the disease probably indicative of the limited accessibility of healthcare facilities as well as a narrow perception of health care in the community as being confined to the management of overly symptomatic diseases. However, more recently the number of patients diagnosed with type 2 diabetes at the asymptomatic stage or on presentation with non-specific symptoms has been increasing. This is related to a number of factors, including an increasing number of individuals undergoing medical

evaluation for employment and insurance purposes, as well as an enhanced health awareness (particularly growing concern about the risk of chronic non-communicable diseases) among the emerging middle class segment of the population" [13]

A recent literature review and data analysis by Jemal Abdulkadir and Ahmed Reja gave the following additional facts:

☑ A study of nearly 3000 bank employees in Addis Ababa in the 1970s showed a low prevalence rate with peak rates in the 40-59 age groups. The female rate was only a third of the male rate owing to the general younger age structure of female employees compared to males many of whom were older and in senior management positions

☑ Cases of malnutrition-related diabetes mellitus (MRDM) have also been found in studies from Gonder (where it was the most dominant type), Tigray, and Addis Ababa. "Patients with this type of diabetes are most often poor farmers, mostly adolescent and young adult males, undernourished or cachectic (wasting) when first seen, and presenting with the classical symptoms of diabetes of several months or even a few years duration".

☑ Another category, found among expecting Ethiopian mothers "…because of obesity, older age, or a history of delivery of heavy babies…" is gestational diabetes mellitus (GDM).

☑ "Good glycemic control is unattainable for the majority of patients because of unfavorable socio-economic conditions and the generally low educational level of the people". Thus, the risk of complications from chronic diabetes with duration of 10 years or more is a lot higher than in the developed countries.

Dental Health

A recent literature survey by Wondwossen et.al [13] yielded very limited and fragmented facts about the oral health of Ethiopians, and about past studies in oral health in Ethiopia. No national studies on the subject exist, and the limited information available does not give a national picture of dental health problems or whether or not regional differences exist in risk factors to dental health. The following are excerpts from an article by Wondwossen et.al:

☑ "In African countries, oral health has always had a low priority because most resources provided for health activities have been directed towards controlling communicable and other life threatening diseases. Moreover, in the past it was always assumed that all Africans had good teeth. Therefore, the need for oral health services for Africans was considered not to be a priority."

☑ Dental caries is common in Ethiopia among people of all ages with rates as high as 51% (Arsi, 1974), 47% (a community in rural Northwest Ethiopia, 1985), and 46 % (poor children in Addis Ababa aged 4-6 years, 1991)

☑ There was a very limited use of sugar (the main catalyst for dental caries) in Ethiopia prior to the commencement of sugar production in 1958, but its consumption as a food ingredient and a sweetener has since increased significantly in both urban and rural areas.

☑ Periodontal diseases are also a major contributor to the national dental health concern with advanced cases diagnosed among a significant proportion of 40+ old individuals. In a study of out-patient dental ailments seen at study Menelik II Hospital "…the most prevalent disease was periodontitis (33.4%) followed by trauma (16.2) out of 3,428 patients seen during the period of 1993-1995"

☑ In a 1993 oral health assessment of all children supported by the Christian Children's fund (CCF), 62% of children under CCF care in Addis Ababa and 69% in Shashemene were found to be needing treatment.

☑ "Apart from a few "Westernized Ethiopians who use toothbrushes, those who clean their teeth at all use the "*mefakia*", a chewing stick made from a twig of *grawa (Vernonia amygdalina)* and other local plants"

☑ There is a serious problem of fluorosis in the Rift Valley areas of Ethiopia due to long-term exposure to high levels of naturally occurring fluoride in the water, especially in the early formative years (the first six to seven years of life). Some studies have shown a mouth prevalence – "having at least one tooth affected" – of 72 to 96 percent in Wonji-Shoa Sugar Estate.

☑ Unequal sizes of the upper and lower jaws lead to "overcrowding of the teeth" and, although not a significant source of pain, this condition is known to cause functional difficulties among affected individuals.

☑ The harmful and unnecessary tooth extraction practiced (removal of deciduous teeth) in Ethiopia for traditional reasons has not abated, and have added to the growing challenge of meeting the dental health needs of the population.

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