Annals of Global Health
VOL. 81, NO. 6, 2015

ISSN 2214-9996
http://dx.doi.org/10.1016/j.aogh.2015.12.011

REVIEW

# Epidemiology of and Risk Factors for Type 2 Diabetes in Egypt

Refaat Hegazi, MD, PhD, Mohamed El-Gamal, MD, MSc, Nagy Abdel-Hady, MD, PhD, Osama Hamdy, MD, PhD

*Columbus, Ohio, Mansoura, Egypt, and Boston, Massachusetts*

**Abstract**

**BACKGROUND** Diabetes is a fast-growing health problem in Egypt with a significant impact on morbidity, mortality, and health care resources. Currently, the prevalence of type 2 diabetes (T2D) in Egypt is around 15.6% of all adults aged 20 to 79.

**OBJECTIVE** To describe the epidemiology, principal causes, associated risk factors, cultural aspects, and challenges that may contribute to the rapid rise in T2D in Egypt.

**METHODS** Review of papers in PubMed and relevant gray literature.

**FINDINGS** The International Diabetes Federation (IDF) has identified Egypt as the ninth leading country in the world for the number of patients with T2D. The prevalence of T2D in Egypt was almost tripled over the last 2 decades. This sharp rise could be attributed to either an increased pattern of the traditional risk factors for T2D such as obesity and physical inactivity and change in eating pattern or other risk factors unique to Egypt. These include increased exposure to environmental risk factors like pesticides and increased prevalence of chronic hepatitis C.

**CONCLUSIONS** Prevention, early identification, and effective intervention are integral components of effective T2D care in Egypt. These strategies may reduce the expanding economic burden associated with T2D care.

**KEY WORDS** diabetes, Egypt, hepatitis C infection, MENA, obesity, pesticide



## INTRODUCTION

Egypt is a North African, Mediterranean, and Middle Eastern country. The majority of its land is a desert except a longitudinal agricultural strip around the Nile River, where for the past 7000 years most Egyptians have lived. Egypt is bordered by the Mediterranean Sea in the north and the Red Sea in the east. In 2015, Egypt's population was estimated at 90 million, and its capital, Cairo, was ranked the 10th largest city in the world with a population of 18.41 million. Egyptian ethnicity is a strong, unified mix of native Egyptians and Arabs who have inhabited Egypt since the seventh century. Ninety percent of Egyptians are Sunni Muslims, and 10% are Christians, with 90% of those Orthodox Christians. The Egyptian gross domestic product (GDP) per capita is around $11,194, with total GDP of $990 billion.

Osama Hamdy is receiving research support from Metagenics Inc and is on the advisory board of Merck Inc, Astra-Zeneca Inc, Boehringer Ingelheim Inc, and Abbott Nutrition. Refaat Hegazi is a full time employee of Abbott Nutrition Research & Development. The material presented in this article is based on the best-known clinical evidence and is not affected by this financial relationship.
From Abbott Nutrition Research & Development, Columbus, OH (RH); Toxicology Department, Faculty of Medicine, Mansoura University (ME); Medical Experimental Research Center, Mansoura University (ME); Department of Internal Medicine, Faculty of Medicine, Mansoura University, Mansoura, Egypt (NA); and Joslin Diabetes Center, Boston, MA (OH). Address correspondence to R.H. (Refaat.Hegazi@abbott.com).

It is worth mentioning that the Egyptian physician "Hesy-Ra" first described diabetes at approximately 3000 BC, but diabetes was further described in detail—as "plentiful urine"—in the Upper Egyptian Ebers Papyrus dating back to 1550 BC (see issue cover). In the modern era, diabetes continues to be a public health problem with a significant burden on the Egyptian economy. Patients with type 2 diabetes (T2D) constitute approximately 90%-95% of all patients with diabetes worldwide and represent a growing epidemic.

In 2013, 382 million adults were diagnosed with diabetes worldwide. This number is expected to grow to 592 million in 2035. People with diabetes are at increased risk of macrovascular and microvascular complications, as well as early mortality. For instance, patients with diabetes are 2 to 4 times more likely to have fatal or nonfatal coronary events or a stroke. Almost 70%-80% of patients with T2D die from 1 of these 2conditions. The American Heart Association considers diabetes as 1 of the 6 major controllable risk factors for cardiovascular disease. Researchers consider having T2D is a risk equivalent to having a prior heart attack. In addition, approximately 40% of patients with diabetes have chronic kidney disease and almost 60%-70% of patients with diabetes have mild to severe forms of nervous system damage. Moreover, diabetes is associated with significant health care costs. Around 11% of total health care expenditures worldwide are spent on diabetes.

## EPIDEMIOLOGY OF DIABETES IN EGYPT

The International Diabetes Federation (IDF) listed Egypt among the world top 10 countries in the number of patients with diabetes. It is expected that the number of patients with diabetes in the Middle East and North Africa (MENA) region to grow by 96% from year 2013 to 2035 or from 34.6 million to 67.9 million. In Egypt, the prevalence of diabetes is around 15.56% among adults between 20 and 79 years of age, with an annual death of 86,478 related to diabetes. In 2013, the IDF estimated that 7.5 million individuals have diabetes and around 2.2 million have prediabetes in Egypt. Furthermore, reports indicate that 43% of patients with diabetes and most patients with prediabetes in Egypt are likely undiagnosed. It is alarming that diabetes prevalence in Egypt has increased rapidly within a relatively short period from approximately 4.4 million in 2007 to 7.5 million in 2013. It is expected this number will jump up to 13.1 million by 2035 (Fig. 1).[1-4]

In addition to being a major public health problem, it is estimated that Middle East region spent around $13.6 billion on diabetes in 2013 (14% of its total health care expenditure), which accounts to only 2.5% of the global spending on the disease. Annual cost analysts estimated that the economic impact of T2D in Egypt was $1.29 billion in 2010. This number excluded cost associated with prediabetes and cost related to loss of productivity. This figure, adjusted for inflation, will be doubled by year 2030. With a fast-growing population, the health authority in Egypt should address this problem and act swiftly without further delay to avoid major spending on health care in the coming years.

The Egyptian ministry of health (MOH) is currently the major provider of primary, preventive, and curative care in Egypt, with around 5000 health facilities and more than 80,000 hospital beds spread nationwide. There are no formal referral systems in the MOH delivery system, and most patients with diabetes are either treated in the private health care sector through out-of-pocket fee for service, in the limited number of academic hospitals, or in the scarce dedicated diabetes centers in Cairo and some other major cities. According to the IDF, the current spending on diabetes in Egypt is among the lowest in the MENA at $116 per patient per year. This is far lower than the spending in developed countries, which usually ranges from $2000 to $7000 per patient per year and even lower than the general spending in the MENA region, which ranges from $160 to $3000 per patient per year. Currently, diabetes is a leading cause of vision loss in Egypt. It is estimated that 42% of patients with diabetes in Egypt have diabetic retinopathy, 5% are legally blind, and 22% had peripheral neuropathy. Diabetes is also the major cause of end-stage renal disease and leg amputation in Egypt.

## RISK FACTORS FOR TYPE 2 DIABETES IN EGYPT

**Obesity and Physical Inactivity.** Obesity, especially visceral adiposity, and physical inactivity are major risk factors for diabetes in Egypt. The Egypt Demographic Survey (2008), which assessed the nutritional status of the population aged 15 to 59 years old, found that approximately 50% of Egyptian men and 65%-80% of Egyptian women are overweight or obese.[5] A 2010 World Health Organization (WHO) report indicated that 30.3%