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Original Article

Burden of diabetes mellitus attributable to demographic levels in Qatar: An emerging public health problem

Abdulbari Bener [a,b,*], Eun-Jung Kim [c], Fatih Mutlu [d], Afnan Eliyan [a], Hamsa Delghan [d], Enas Nofal [d], Luma Shalabi [d], Nada Wadi [d]

[a] Department of Medical Statistics & Epidemiology, Hamad Medical Corporation, Department of Public Health, Weill Cornell Medical College, PO Box 3050, Qatar
[b] Department of Evidence for Population Health Unit, School of Epidemiology and Health Sciences, The University of Manchester, Manchester, UK
[c] Department of Public Health, Korea University, Seoul, Republic of Korea
[d] Department of Mechanical & Industrial Engineering, Faculty of Engineering, Qatar University, Qatar

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ABSTRACT

Background: Diabetes is one of the main contributors to ill health and premature mortality worldwide and its prevalence has been rising during the last decades.
Aim: The aim of the present study was to quantify the burden of disease in terms of deaths and loss of healthy life years (DALYs) attributed to diabetes by its demographic levels in the State of Qatar.
Materials and methods: The methods were largely based on the established Global Burden of Disease methodology and use the burden of disease in terms of disability adjusted life years (DALYs) and the years lost due to disability (YLD) as the outcome measure. We calculated years lost due to disability (YLD) and years life lost (YLL) attributable to diabetes. The study was conducted during the period from June 2013 to January 2014.
Results: The study findings revealed that disability adjusted life years (DALYs) has been increasing across the years and reached to 4.35 in 2011 from 2.58 in 2007. DALYs for men was remarkably higher than women during the period (2007–2011). Diabetes mellitus was the 6th leading cause of disease burden in Qatar (3.8%). The YLD showed a sharp increase in men (2.52 in 2011 from 1.34 in 2007) and women (1.05 in 2011 from 0.33 in 2007) during the year 2011. YLL portion of women enlarged considerably in 2011 (0.10) compared to 2010 (0.04). YLL for men and women was fluctuating across the years with a decrease in 2011 (18%) from 2007 (35%). Men and women in the age group 30–44 years had the highest peak across the years.
Conclusion: The study findings revealed that diabetes disease burden was considerably high in Qatar, particularly in the working age group. DALYs has been increasing across the years.

1. Introduction

Diabetes is recognized as a major global public health problem and one of the main chronic syndromes currently affecting population regardless of socio-economic status and geographic location. Diabetes, a disease with significant morbidity and premature mortality, is affecting increasing numbers of people worldwide. Diabetes was estimated to be the 5th leading cause of death globally with heart disease, stroke, and renal failure largely accounting for the additional deaths [1]. Also, it was estimated that the diabetes has been projected to increase to 366 million in 2030 from 171 million people in 2000 [2].

Because diabetes is a chronic disease that often leads to various complications and the increase in diabetes prevalence will likely place considerable burden on the health care system. According to WHO [3], 15 years after the onset of the disease, Diabetes will develop blindness, severe visual impairment, retinopathy, nephropathy, neuropathy and cardiovascular disease. It was reported that diabetes and its complications will emerge as one of the major threats to future public health resources throughout the world at a huge economic and social cost, particularly in a developing country

* Corresponding author at: Department of Medical Statistics and Epidemiology, Hamad Medical Corporation & Department of Public Health, Weill Cornell Medical College, PO Box 3050, Doha, Qatar. Tel.: +974 4439 3765; fax: +974 4439 3769.
E-mail addresses: abb2007@qatar-med.cornell.edu, abener99@yahoo.com (A. Bener).

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[4]. A substantial increase will occur in developing countries due to ageing of the population as well as urbanization associated with increasing trends towards unhealthy diets, obesity, and sedentary lifestyles.

The World Health Organization, World Bank and the Harvard School of Public Health developed a new metric called disability adjusted life year (DALYs) for measuring the burden of disease [5]. The present study used this metric to estimate the burden of disease attributable to diabetes in Qatar which has been widely used to assess disease burden and health trends. The DALYs is based on years of life lost from premature death and years of life lived in less than full health. It was estimated by the World Health Organization that non-communicable diseases account for 58.5% of all deaths and 45.9% of the global burden of disease, as expressed by disability adjusted life years (DALYs) [6].

State of Qatar is a country which is undergoing rapid epidemiological transition. Previous study on measuring the national burden of diseases in Qatar indicated that non-communicable diseases were already responsible for major proportion of the total disease burden. Population ageing and changes in distribution of risk factors have accelerated the share of non-communicable disease out of total disease burden in many developing countries. In the previous Burden of Disease study [7], diabetes was identified as one of the leading cause of disease burden in Qatar. Also, the State of Qatar has been reported to have higher incidence of non-communicable diseases especially diabetes mellitus. Previous studies of Bener et al. documented a high prevalence of diabetes in the adult Qatari population [8–10]. To understand the magnitude of this problem, the authors conducted the present study to estimate the burden of diseases due to diabetes by sex and age group using the disability adjusted life year (DALYs) methodology.

2. Methodology

The burden of disease attributable to diabetes study was conducted during the period June 2013 to January 2014. Ethical approval was obtained from the Hamad Medical Corporation Institutional Review Board for conducting this research in Qatar. The study applied the methodology developed by Murray and Lopez [5] to compute DALYs which extends the concept of potential years of life lost due to premature death to include equivalent years of healthy life lost due to health problems or disability. Disability adjusted life years (DALYs) was calculated by the sum of the estimated years of life lost (YLLs) and years lived with disability (YLDs) due to diabetes [5,7].

The data essential for the mortality (YLL) component of disability-adjusted life years (DALYs) are the number of deaths by age, sex and average age at death within respective age groups. The International Classification of Diseases and Health Related Problems 10th Revision was used and we included the E10–E14 codes related to diabetes mellitus. Mortality data for the year 2013 according to ICD 10, by age group were collected from the vital statistics database. Also, life expectancy table for the year 2007 was used. For the disability data and for the majority of conditions, the number of incident cases was available directly from disease registries, routine databases and epidemiological research surveys. We have used the inpatient discharge abstract of the hospitals and some of the community surveys for the incidence of diabetes. Where sufficient data were not available to run the model, the incidence estimates developed in other studies were used. The complete details of each minor and major category of ICD have been mentioned with its frequency, length of stay and number of deaths. Life table was used to cross check the stock of the demographic estimates that may be required at different stages of burden of disease estimation. The total fertility rate has decreased to 2.1 in 2011 from 3 in 2003. The population structure of Qatar is different from other countries. In terms of age structure in 2012, 15% of the population was below age 15 years, 83% in the age group 15–59 years and 2.2% above age 60 years.

DALYs estimation: DALYs is a summary measure that represents health status. The effect of fatal case (of disease or injuries) is captured by years of life lost, while YLD captures the future health consequences in terms of diseases or injuries of incident cases that were not fatal. DALYs were obtained from the addition of two components:

DALYs = Years of life lost (YLL) + Years of life lived with disability (YLD)

Years of life lost (YLL) were calculated by multiplying age-specific mortality rates by age-specific standard expected YLL and population numbers. For most conditions YLD were estimated by multiplying age-specific incidence rates by average duration of each incident case (or more precisely, of the associated disability until death or recovery) and average disability weight.

3. Results

Table 1 shows the disability adjusted life years (DALYs), total years of life with disability (YLD) and Years of life lost (YLL) according to gender during the period (2007–2011). DALYs was 2.58 in 2007 and it was increasing across the years and reached to 4.35 in 2011 which is nearly two fold. DALYs for men was considerably higher than women across the years (2.13 vs 0.45 in 2007; 2.33 vs 0.39 in 2008; 2.38 vs 0.71 in 2009; 2.53 vs 0.71 in 2010; and 3.20 vs 1.15 in 2011). Total years of life with disability (YLD) for men increased remarkably from 1.34 in 2007 to 2.52 in 2011.

Table 2 shows the leading diseases of burden of diseases (% of total DALYs) in Qatar. Diabetes mellitus was the 6th leading cause of disease burden in Qatar (3.8%).

Fig. 1A and B shows the burden of diabetes by age and gender during the period (2007–2011). The burden of diabetes was peak in both men and women in the age group 30–44 years across the years. Men in the age group 30–44 years had the highest peak in the year 2010 (20.42) and 2011 (19.03) compared to previous years. Women in the age group 30–44 years had a sharp increase (8.76) in 2011 than in previous years. The diabetes disease burden was highest in the age group 15–59 years.

Fig. 2A shows the distribution ratio of DALYs during the period 2007–2011. The proportion of YLD for diabetes was nearly three fourth of the total burden of disease and it increased from 71% in 2008 to 82% in 2011. The proportion of YLL decreased from 35% in 2007 to 18% in 2011.

Fig. 2B compares YLD and YLL for diabetes during the period 2007–2011. YLD has been increasing gradually until 2010, but

Table 1
Disability adjusted life years (DALYs), total years of life with disability (YLD), years of life lost (YLL) for diabetes according to gender during the period (2007–2011).

Year	Gender	DALYs per 100,000 persons	DALYs per 100,000 persons	YLD per 100,000 persons	YLL per 100,000 persons
2007	M	2.58	2.13	1.34	0.79
	F		0.45	0.33	0.12
2008	M	2.72	2.33	1.59	0.74
	F		0.39	0.35	0.04
2009	M	3.09	2.38	1.79	0.59
	F		0.71	0.61	0.10
2010	M	3.25	2.53	1.73	0.81
	F		0.71	0.67	0.04
2011	M	4.35	3.20	2.52	0.69
	F		1.15	1.05	0.10