

**ORIGINAL ARTICLE**

## **COST OF TYPE 2 DIABETES MELLITUS IN SELECTED DEVELOPING COUNTRIES**

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### **ABSTRACT**

*Increasing prevalence of chronic diseases is a major contributor for rapid rise in healthcare cost in developing countries since the last decade. It was estimated that around 54% of deaths in developing countries are due to chronic non-communicable diseases which is predicted to rise by 65% by 2030. Diabetes mellitus is among the most prevalent chronic diseases suffered by more than 180 million people worldwide. By 2030 it is estimated that around 400 million people in the world will be afflicted with diabetes. Annual deaths attributable to diabetes are probably as high as 3 million with more than 80% occur in developing countries. India, China and Indonesia are three countries in the Asian region with most number of people with diabetes. The total number of cases in these three countries is expected to increase more than double from 61 million in 2000 to 163 million in 2030. China and India will suffer cumulative GDP loss of 13.8% and 16.7% respectively, over the next ten year period. Assessing economic burden of diabetes is a challenging task for researchers because identification of direct and indirect cost of the disease is often complex since patients with diabetes also suffers from other complications and co-morbidities. In conclusion, the heavy economic burden of diabetes pose major challenges to health policy makers in developing countries to assess the current approach in managing this chronic disease. Serious efforts should be made on focusing and up-scaling activities on health promotion and prevention of diabetes so that to provide a more cost-effective solution to this condition with huge and increasing economic loss.*

**Key words:** Cost, diabetes mellitus, developing countries

### **INTRODUCTION**

Diabetes Mellitus is one of the commonest chronic non-communicable diseases globally. The global prevalence of diabetes is estimated to increase from 4% in 1995 to 5.4% by the year 2025<sup>1</sup>. It is epidemic in many developing, newly industrialized countries and almost 1 million people die because of diabetes each year, two-thirds of these in developing countries<sup>2</sup>.

Type 2 diabetes constitutes 85% to 95% of the diabetic population in developed countries and even higher in developing countries (King H 1998). In 2003, 194 million people 20 to 79 years of age had diabetes mellitus, almost a quarters of them living in developing countries<sup>2</sup>. There is rapidly increasing trend in the prevalence of diabetes in Asian countries for example, Singapore showed an

increase prevalence from 1.99% in 1975 to 9.0% in 1998.

It was estimated that around 54% of deaths in developing countries are due to chronic non-communicable diseases which is predicted to rise by 65% by 2030. Annual deaths attributable to diabetes are probably as high as 3 million with more than 80% occur in developing countries.

Diabetes mellitus is a costly disease, both for the patient and the health care provider due to its chronicity and multi-organ involvement which resulted in frequent visit and admission to health facilities. High prevalence and higher rate of complications engender substantial negative implication on the economies.

**Costs of diabetes in selected developing countries**

Increasing prevalence of chronic diseases is a major contributor for rapid rise in healthcare cost in developing countries since the last decade. Worldwide estimates suggest that the annual direct medical cost for diabetes in total is at least US\$129 billion and may be as high as US\$241 billion, or 2.5% to 15.0% of global annual healthcare budget. It was also estimated that there will be almost 50% increased in direct healthcare costs associated with diabetes from US\$286 billion in 2003 to US\$396 billion in 2025.

There have been a lot of data on economic burden of diabetes from developed countries. Guideline on economic evaluation was produced to facilitate the researchers to conduct the accurate cost estimation method so that the estimated cost to be comparable across the countries. On the contrary, there was limited data in developing country and there was no standardize guideline to be observed in conducting cost estimation which imposed a difficulty in comparing the data.

India is the world most populated country with diabetes individuals, where WHO estimated the number will increase to 78 million by 2030 (one sixth of world's diabetic patients). Results from national survey of 5516 diabetes individuals (both type 1 and type 2) in India showed that mean estimated annual direct costs of diabetes were Rs.4724 (USD101.95) per individual including drug treatment, monitoring and check-ups, and Rs.2343 (USD50.63) for hospitalization, indirect costs were Rs.12,756 (USD275.31) including measures of productivity and income loss through illness in earning and non-earning family members and total costs were Rs.19914(USD429.74). Main burden of diabetes costs is met by patients which amounting as much as 25% of the annual family income and India will suffer cumulative Gross Domestic Product loss of 16.7% over 10 year period<sup>3</sup>.

A prevalence-based 'Cost-of-Illness' study for diabetes care was conducted in six different out-patient clinics of Karachi, Pakistan from July to September 2006 found that the overall mean economic cost borne by each person with diabetes and/or his/her family came to Rs. 2,070(USD24.23) for each visit. After adjusting this cost to monthly and yearly basis, it amounts to Rs. 1,035(USD12.13) and Rs.12, 420(USD144.94) respectively. The mean (SD) direct cost in persons having no co-morbidity was Rs. 1,226 (1,328)

[USD14.32 (15.503)] and those having one or more co-morbidities was 1,779 (1,600) [USD20.74 (18.678)]. It was found that the poorest segment of the society is spending as much as 18% of total family income. Considering prevalence of diabetes in Pakistan, Rs 71 billion (USD828,023,099.26) spent for outpatient care for that fiscal year which was 80% greater than the total national health budget<sup>4</sup>.

A retrospective prevalence-based cost of illness study from provider perspective in Thailand on 186 type 1 and type 2 diabetes receiving care at 30-bedded public hospital reported that the average direct medical cost treating diabetes per year was 6331 Thai baht (USD205.95). Breakdown of costs by services are outpatient services 1528.2 baht (USD49.42) (24%) and inpatient services 1020.65 baht (USD33) (16%). Predicted costs of various complications of type 2 diabetes were ; no complication 4036.97 baht(USD130.54), diabetic foot 7602.63 baht(USD245.84), gangrene 13416.62 baht(USD433.95) and stroke 10417.57 baht(USD336.97)<sup>5</sup>.

A cross sectional study in Sudan to measure economic burden of diabetes on patients and families enrolled 822 Type 2 diabetes attending a public diabetes centre and private diabetes clinics reported that the direct median cost was USD175 per year<sup>6</sup>.

In Taiwan, a study on impact of diabetes on economic costs in dialysis patient involving three medical centers including one government university hospital, one private university hospital and one private community hospital using reimbursement of health insurance disclosed that the annualized medical cost for care of dialysis per patient -year was USD26988 for diabetic, USD22311 for outpatient and USD4677 for hospitalization. Comparing to non diabetic ESRD, diabetic ESRD engendered 11.8% (3.5 times) more expense per patient-year<sup>7</sup>.

A study from family medicine units of The Institute Mexican of Society Security in Monterrey using Per Capita Budget Model in 1996 estimates that the average annual cost per diabetic patient was \$708 USD, the total annual cost of diabetics was 2,618,000 USD,15.46% of health spending and 0.79% of GDP<sup>8</sup>.

**Table 1. Cost of type 2 diabetes of selected countries in developing countries**

Pakistan Liaquat A Khowaja 2007	Mean direct cost per visit no co-morbidity was USD14.31 (15.503) one or more co-morbidities was USD20.7(18.978)
Thailand Riewpaiboon A 2007	Average direct medical cost per year USD205.95 : both type 1 and 2
Sudan Elrayah-Eliadarous, 2007	Direct median cost per year- USD175
Taiwan Wu-Chang Yang 2001	Medical cost per patient-year Annual-USD26988 Outpatient -USD22311 Inpatient -USD4677
Mexico Villareal-Rios 2000	Total annual cost USD2,618,000

There have been studies done at isolated localities in Malaysia measuring economic burden of this disease. Nabila et al in 2003 measure direct cost of outpatient type 2 diabetes care at one health clinic in Selangor where secondary data was gathered from the clinic to determine the provider's cost and a survey of 253 patient visiting the clinic on patient's cost was conducted in one week duration. They found that the direct cost per diabetic per year was RM185.97 (USD59.92) for provider and another RM55.23 (USD17.76) borne by Patients<sup>9</sup>. Another study by Rohana assessing the cost of diabetes outpatient care in one district in Kelantan found that means provider cost per

diabetic patient per year for health clinic with specialist was RM1127 (RM906.088)[USD363.13 (291.95)] and RM802.15 (RM626.266) [USD258.46 (201.79)] for health clinic without specialist<sup>10</sup>. For inpatient care, Amrizal (2002) who measure the provider cost of type 2 diabetics care admitted to medical wards found that RM2,161 (RM1,322)[USD696.31(425.97)] per patient per admission<sup>1</sup>. Zawiah (2007) on the other hand looked into inpatient direct provider cost of diabetic foot, found that RM12, 934.61 (RM7, 362.49)[USD4,167.74(2,372.32)] was spent per patient per admission<sup>12</sup>. Both studies were done at same teaching hospital in Kelantan.

**Table 2. Cost of type 2 diabetes in Malaysia**

<b>OUTPATIENT</b>	
Nabila et al, 2002	Direct outpatient cost of diabetes/annum USD77.71
Rohana et al, 2007	Mean provider cost per diabetic patient per year for health clinic with Family Medicine Specialist was USD361.6(290.18) and USD257.42(200.984) for health clinic without Family Medicine Specialist
<b>INPATIENT</b>	
Amrizal, 2002	Provider cost of type 2 diabetics care admitted to medical wards was USD693.51(424.262) per patient per admission
Zawiah et al,2007	Direct provider cost of diabetic foot in orthopaedic wards was USD4,151.03(2,362.80) patient per admission

## CONCLUSION

The expensive cost of treating type 2 diabetes and the rising prevalence will impose a heavy economic burden, and major challenges to health policy makers in developing countries in managing this chronic disease. Serious efforts should be made to focus and upscale activities on health promotion and prevention of diabetes which could provide a more cost-effective solution to this condition with huge and increasing economic loss.

Unstandardised methods used in assessing and reporting economic burden and poor quality documentation of secondary data in most developing countries are among obstacles face in the evaluation of diabetes mellitus and other chronic diseases which contribute to the lack of data in developing countries. Comparison among countries also made difficult by the different terminologies and approaches. The availability and accuracy of data in cost of illness study is important to assess the current approach in managing this chronic disease.

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