

**A COMMUNITY BASED SURVEY OF CATASTROPHIC HEALTH EXPENDITURE IN PATIENTS WITH TYPE II DIABETES MELLITUS IN A DEVELOPING COUNTRY**Saima Nazir, MD<sup>1</sup>, Ashiq Rashid Mir, MD<sup>1</sup> and Arshad Rashid, MS, FNB (MAS)\*<sup>2</sup><sup>1</sup>Senior Resident, Department of Community Medicine, SKIMS Medical College, Bemina, Srinagar, 190018.<sup>2</sup>Lecturer, Department of Surgery, Government Medical College, Srinagar – 190010.**\*Corresponding Author: Dr. Arshad Rashid, MS, FNB (MAS)**

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**ABSTRACT**

**Background:** To manage the epidemic of DM effectively without compromising socio-economic development, it is imperative that program managers understand the magnitude of catastrophic health expenditure (CHE). The present study was carried out to assess its frequency. **Methods:** The present study was carried out in the rural and urban areas of district Tumkur, Karnataka. A total of 360 participants were included in this study. Data was collected using a pre-tested questionnaire, which was administered as a face-to-face interview during house-to-house visits by the second author. **Results:** The mean age of the participants was  $62.68 \pm 8.4$  years in urban areas and  $59.23 \pm 6.2$  years in rural areas ( $P = 0.8634$ ). The mean total direct cost incurred on managing diabetes was  $408.12 \pm 23.37$  INR/month in rural areas and  $516.31 \pm 43.52$  INR/month, while as the total indirect cost was  $145.88 \pm 11.42$  INR/month and  $155.62 \pm 15.15$  INR/month, respectively ( $P < 0.0001$ ). A total of 97 (27%) participants experienced CHE for managing DM. The CHE was seen more frequently with urban participants [54 (30%)] as compared to subjects from rural areas [43 (24%),  $P < 0.0001$ ]. CHE was seen only in those participants who underwent hospitalization. Majority of the people [126 (70%) in rural and 130 (72%) in urban areas,  $P = 0.7659$ ] mobilized cash savings to meet this CHE. **Conclusion:** The present study points to the ever-increasing cost of diabetes care. A significant chunk of people is pushed to the brink of poverty owing to catastrophic health expenditure. There is a glaring deficit of social insurance schemes that needs to be given a boost.

**KEYWORDS:** Diabetes Mellitus; Catastrophic; Expenditure; India.**INTRODUCTION**

Paralleling the rapid development, abrupt transition of lifestyles and social aging, the prevalence of diabetes is rapidly increasing in the world. Despite the United Nations raising the status of non-communicable diseases to that of communicable diseases there is neither support, nor financial protection for DM, which has assumed an epidemic proportion.<sup>[1]</sup> According to the World Health Organization, in 2012, an estimated one-and-a-half million deaths were directly attributed to diabetes mellitus (DM), with more than 80% of these deaths occurring in low and middle-income countries.<sup>[2]</sup> It further projects that diabetes mellitus will be the 7<sup>th</sup> leading cause of death by the year 2030.<sup>[3]</sup> The number of adults aged 20 – 79 years living with diabetes has risen from 108 million in 1980 to 415 million in 2015, and is predicted to reach 642 million by 2040.<sup>[4]</sup> In India in 2015, over one million deaths were attributable to diabetes directly or indirectly and 109 million cases are expected by 2035.<sup>[5]</sup>

DM is a chronic disease that not only drains the body but also drains the pocket of the patient. It not only seriously affects the health of the patients, but also pushes some of

them and their households into poverty, and poses a threat to socio-economic development.<sup>[6]</sup> The healthcare expenditures on diabetes accounted for 11.6% of the total healthcare expenditure in the world in 2010. By 2030, this amount is projected to exceed USD 490 billion.<sup>[2-4]</sup> For obvious reasons, the treatment costs increase with disease duration, presence of complications, and hospitalization. India stands to lose US \$ 0.15 trillion before 2030 due to diabetes.<sup>[5]</sup> Every year more than 150 million individuals in the world face financial catastrophe because of expenditures related to DM.

Catastrophic healthcare expenditure (CHE) is defined as, “a very high spending on healthcare in relation to one’s income, beyond which an individual begins to sacrifice consumption of basic needs and uses payment coping mechanisms that could be any interim measures to meet up with payment but in the long run increase the total cost.” The World Health organization proposed that once the out-of-pocket expenditure is more than 40 % of non-subsistence income consumption; it should be considered as CHE.<sup>[7]</sup>

To manage the epidemic of DM effectively without compromising socio-economic development, it is imperative that program managers understand the magnitude of CHE. Survey data provide overall direction by helping to pinpoint the obstacles in society, region specific issues and weaknesses in services that need to be overcome. According to the World Bank, the out-of-pocket (OOP) expenditure in India was one of the highest in the world (around 87%) between 2008-2012 in terms of direct and indirect costs incurred on managing DM, and this was mainly borne by family members of diabetic individuals.<sup>[8]</sup> Hence to address these views, the present study was carried out to assess the magnitude of CHE among patients living with diabetes mellitus in India.

## MATERIALS AND METHODS

This present observational community based, cross-sectional study was carried out in the urban and rural field practice area of Sri Siddhartha Medical College Tumkur. Maralur and Maralur Dinne are urban localities under urban health Training Centre of Sri Siddhartha Medical College, which have a total population of 18,000. The rural field practice area of Sri Siddhartha Medical College consists of 23 villages around the rural health training centre (RHTC) located in Nagvelli and has a total population of 8223. This study targeted all the individuals over the age of 30 years who were permanent residents of the area and were living with type-II DM for at least 1 year. Persons with type I DM and those who didn't consent for the study were excluded. The proportion of income spent in managing DM as reported elsewhere<sup>[8]</sup> in rural India was 27% in rural and 34% in urban areas. The sample was calculated by the formula  $n = Z^2 P(1-P)/e^2$ , where,  $z$  = Level of confidence at 95% (1.96);  $P$  = Proportion of income spent and  $e$  = Margin of error taken (absolute error of 1.5%). Thus the calculated sample size came out to be 162 in rural areas and 168 in urban areas, which after adding 10% non-response was rounded off to 180. Systematic random sampling did the selection of participants.

Data was collected using a pre-tested questionnaire, which was administered as a face-to-face interview during house-to-house visits by the second author. Information was specifically collected regarding the CHE incurred on managing DM. The standard definition of CHE was used in this study.<sup>[7]</sup> The questionnaire was asked in the local language understood to them. If any of the selected individual was not found during the first visit, a second visit was given on the following day. Before the study was formally conducted, this questionnaire was translated into local language and was tested on 30 diabetics of the same area for reliability and consistency as part of a pilot project.

All the procedures performed in this study were in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments. The Institutional Ethical Committee approved this study. All

the subjects were fully informed about the purpose and nature of the study. A written and informed consent was obtained in the language they understood, and assurance regarding confidentiality was given. The study posed no financial burden on the participants. The collected data was analyzed using SPSS version 21 for Mac (IBM Corporation, 2012). Qualitative variables were expressed as proportions in percentages. For quantitative data, mean and standard deviation was calculated. The association between variables was calculated for 95% confidence intervals by using "Chi square test" and "One-way ANOVA". "Unpaired  $t$  - test" was used to compare the means. A  $P$ -value  $< 0.05$  was taken as significant.

## RESULTS

Pertinent to our study objective, 180 diabetics from urban field practice area and 180 diabetics from rural field practice area were included in the study. The mean age of the participants was  $62.68 \pm 8.4$  years in urban areas and  $59.23 \pm 6.2$  years in rural areas ( $P = 0.8634$ ). Out of the 180 study subjects from urban area, [118 (66%)] were in the age group of 60 – 69 years while [93 (52%)] were in the age group of 50 – 59 in rural area. There were more male patients [94 (53%)] as compared to females [85 (47%)] in the rural areas, however females [110 (61%)] outnumbered males in the urban areas ( $P < 0.0001$ ). Sixty-seven (37%) patients were illiterate and only six (3%) patients were having a diploma degree in the rural areas as compared to 60 (33%) illiterate and 30 (16%) with diploma degrees in urban areas ( $P < 0.0001$ ). Majority of the study subjects (75%) from urban area were diabetics for 5 – 8 years, with mean years of duration of diabetes being 7.7 years; while majority of the study subjects from rural area (71%) were diabetic for 1 – 4 years with mean years of duration of diabetes being 4.8 years.

The mean cost on consultation for DM was higher among urban study subjects at 148.33 rupees per month while it was 67.27 rupees per month for rural area study subjects ( $P < 0.0001$ ). The mean total direct cost incurred on managing diabetes was  $408.12 \pm 23.37$  INR/month in rural areas and  $516.31 \pm 43.52$  INR/month, while as the total indirect cost was  $145.88 \pm 11.42$  INR/month and  $155.62 \pm 15.15$  INR/month, respectively. This difference was statistically significant [ $P < 0.001$ ]. In urban subjects, majority of spending of direct cost of diabetes was on medication (64%). Rural study subjects spend higher percentage on consultation (24%) as compared to 19% by urban study population.

Sixty-three (35%) of the urban subjects required hospital admissions over the study period for managing DM as compared to 53 (29%) rural subjects ( $P = 0.5671$ ). A total of 97 (27%) participants experienced CHE for managing DM. The CHE was seen more frequently with urban participants [54 (30%)] as compared to subjects from rural areas [43 (24%),  $P < 0.0001$ ]. CHE was seen only in those participants who underwent hospitalization.

Majority of the people [126 (70%) in rural and 130 (72%) in urban areas,  $P = 0.7659$ ] mobilized cash savings to meet this CHE. Twenty-three (13%) of the urban were forced to sell assets as compared to 25 (14%) rural subjects ( $P = 0.5671$ ). Thirteen (7%) of our subjects in rural areas and 11 (6%) in urban areas were forced to borrow money in order to cope up with CHE. None of our patients had access to any health insurance scheme.

## DISCUSSION

Patients with DM need to receive quality treatment, which comes at a cost and when serious complications and acute hyperglycemic symptoms occur, the cost of treatment drastically shoots up. Generally speaking, it is an OOP payment.<sup>[6-8]</sup> Some patients are forced to borrow money or sell assets to pay for the treatment and allied costs. This places many of the patients and their households at a precarious financial risk. CHE and impoverishment due to DM impact disproportionately those who are socially and economically vulnerable.<sup>[9]</sup> Substantial financial hardships create barriers to health services utilization for patients living with DM, leading to more serious health problems.<sup>[10]</sup>

In the present study, CHE was experienced by 27 % of study subjects. Urban study subjects had experienced more CHE (30%) than rural study subjects (24%). A study from north India showed that 37.5% experienced CHE at 40% threshold.<sup>[8]</sup> A study by Mudur et al noted 40% CHE<sup>[11]</sup>, which is higher than this study. High cost of private hospitals in India could be one of the reasons for this difference, however most of our patients preferred treatment in government hospitals. CHE was seen only in subjects requiring hospitalization, that usually occurs in the setting of diabetes complications, and can be minimized by proper screening and counseling of the patients. None of our patients had any access to health insurance schemes, and were forced to pay OOP. Thus, there is a need to strengthen the basic health care facilities free health care schemes like Ayushman Bharat need to be encouraged.

Utilizing cash savings as a coping-up strategy for CHE was seen in majority of our respondents, which has also been reported elsewhere.<sup>[8-12]</sup> But, this carries an important caveat as using money saved for other basic necessities like food and shelter could further jeopardize the health of the patients. This further pushes them into poverty because total expenditure is inflated and necessary consumption is temporarily sacrificed to pay for CHE. Borrowing was preferred to selling out assets in our study. Borrowing and trading out assets may push respondents deeper into poverty especially if borrowed from money lenders as interest on the money will further increase the cost burden while disposal of assets may provide immediate cushion but in the long run, impoverishes the owners.

The strengths of this study were that the subjects were selected using random sampling technique, which helped to avoid selection bias. Our study has some potential limitations. It has not escaped our mind that the hospitalization could have been due to other reasons and wrongly attributed to DM, owing to recall bias. However, we made every effort to cross check the hospitalization history with the available hospital records. Our study may also be criticized on the plea that these results cannot be extrapolated to the national or global scenario, as the sample was not a nationally representative one.

## CONCLUSIONS

The present study points to the ever-increasing cost of diabetes care. A significant chunk of people is pushed to the brink of poverty owing to CHE. There is a glaring deficit of social insurance schemes that needs to be given a boost.

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