

# Economic impact and inequalities in diabetes in South Africa

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## **Dissertation Summary**

## **Economic impact and inequalities in diabetes in South Africa - Summary**

The overall goal of this dissertation is to evaluate the economic impact and the inequality aspects of diabetes in South Africa. Diabetes is fast becoming a world pandemic, with global estimates indicating an increase in prevalence from 463 million in 2019 to 700 million in 2045. It is expected that the increase in the prevalence of diabetes within low- and middle-income countries (LMICs) will be faster when compared to high income countries. In LMICs diabetes was previously referred to as a disease of the affluent, being more concentrated amongst the rich, but evidence now suggests that it is more frequently being recorded amongst low socio-economic groups. The disease is one of the leading causes of mortality globally. In South Africa was recorded as the second biggest underlying cause of death in 2016. What makes diabetes an even bigger problem in LMICs, such as South Africa, is that it affects mostly the working age populations. This has the potential to affect the livelihood of families, productivity and economic growth. Besides, more than half of the people with diabetes are not diagnosed. Late diagnosis can be fatal and causes complications, which further lead to an increase in diabetes health care costs. Thus, diabetes is a chronic illness that is better managed when diagnosed early. The management of the disease also improves with self-care. However, in many LMICs, patients fail to adhere to recommended self-care practices due to the unavailability of resources.

The aim of this dissertation is to evaluate the economic impact and the inequality aspects of diabetes in South Africa. Given the anticipated increases in the prevalence of diabetes, a study of this nature is important in South Africa for various reasons. South Africa is reported to have one of the highest income inequalities in the world. These inequalities are intertwined with health and could drive the uneven distribution of diabetes and its health outcomes. Furthermore, the anticipated rise in the prevalence of diabetes affects the working age populations and could impact on the economic growth and the livelihood of families. The South African public health care system is already burdened by various challenges, an upsurge in demand for health care services by people with diabetes, will place pressure on already strained public health care resources.

## Chapter 1

In Chapter 1, we provide an introduction to the dissertation. The chapter sheds light into the growing burden of diabetes, its prevalence, economic impact and self-care management practices. The chapter further sheds light onto the concept of health inequalities and in particular health inequalities in South Africa. In order to contextualize the economic impact of diabetes and diabetes management in South Africa, the chapter also provides a description of the country's socio-economic outlook and burden of disease. The challenges associated with the diabetes costs and its management in South African can be better understood in relation to the country's general health care system. Thus, the chapter also provides a description of the health care system in South Africa. The objectives of the dissertation and the subsequent chapters are also defined in Chapter 1.

*Objective 1: To capture the evidence on the cost of diabetes in Africa, review the methods used to calculate costs and identify areas for future research*

Given the chronic nature of diabetes and that diabetes management is characterized by frequent hospital visits, the first objective of this dissertation is to review the evidence on the overall direct and indirect costs of diabetes. The overall focus is on the question "what are the direct and indirect costs associated with diabetes in Africa and what methods have been applied in the calculation of these costs".

*Objective 2: To determine the catastrophic health expenditure and impoverishment amongst people with diabetes in South Africa*

Given the huge income inequalities in South Africa, the second objective is to investigate the incidence, socio-economic inequalities and determinants of catastrophic health expenditure and impoverishment amongst people with diabetes in South Africa. Data were collected at two public hospitals with out-patient diabetes clinics. The analysis provides an opportunity to establish whether the government has been successful in protecting people with diabetes at public facilities from financial hardships.

*Objective 3: To estimate socio-economic inequalities in diabetes and to examine the contribution of lifestyle factors to diabetes inequalities in South Africa.*

Previous research has revealed the existence of inequalities in the prevalence of diabetes in South Africa. Therefore, the third objective investigates the socio-economic inequalities in

diabetes in South Africa. For this we use both data on undiagnosed diabetes and self-reported data on a previous diabetes diagnosis. Given the role of modifiable lifestyle risk factors, the investigation also establishes the contribution of lifestyle factors to the prevalence of diabetes in South Africa.

*Objective 4: To determine the inequalities in diabetes self-care practices and the determinants of diabetes self-care practices in South Africa*

Evidence on the burden of diabetes would be incomplete without considering how individuals cope with managing the chronic illness. Given this, the inequalities and factors associated with diabetes self-care practices amongst people with diabetes are explored. Quantitative data gathered among patients attending two public diabetes health care clinics are used. In order to address the objectives of this study, findings from the quantitative data are complemented by findings from qualitative data on patients' experiences with diabetes health management.

*Objective 5: To investigate the self-reported prevalence of and factors associated with diabetes and cardiovascular comorbidity in South Africa*

Diabetes self-care is an essential element to prevent or delay the occurrence of diabetes complications, as indicated by the International Diabetes Federation (IDF). The presence of cardiovascular disease (CVD) in patients with diabetes leads to a reduction in the quality of life and an increase in health care related costs. Hence, after an assessment of self-care management practices amongst people with diabetes, we establish the prevalence of and factors associated with diabetes and CVD comorbidities.

## **Chapter 2**

In this chapter, we provide a systematic review of the literature on the costs of diabetes mellitus in Africa. The chapter also reviews the methods used to estimate costs related to diabetes health care. The literature review is guided by the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines. A desk research was conducted in various databases including Pubmed, Medline, Science direct and Google Scholar. Keywords were carefully selected and checked by an experienced university librarian. The following eligibility criteria were used: peer reviewed English articles published between 2006 and 2016, that include at least one African country, are published in peer review journals and report original research findings on the cost of diabetes.

Twenty-six studies were identified that met the inclusion criteria. The data extracted from the studies revealed that outpatient costs varied by study design, data source, perspective and health care cost categories included in the cost estimation. The studies that reported both drug costs and total costs, showed that drug costs took up a significant portion of total costs. Our review finds that the highest burden of diabetes health care costs is amongst those within the lowest socio-economic groups. Overall, the review reveals that there is a paucity of research on the cost of diabetes in African countries. The chapter concludes that given this gap in research, there is a need for further research aimed at providing evidence on diabetes costs.

### **Chapter 3**

An analysis of the incidence, socio-economic inequalities and determinants of catastrophic health expenditure and impoverishment for diabetes care is provided in Chapter 3. The study uses cross-sectional data collected in 2017 from 396 patients visiting two public hospitals in Tshwane, Gauteng, that operate diabetes clinics. Face-to-face interviews were conducted with the patients using a structured questionnaire. Health care costs and transport costs were classified as catastrophic if they exceeded the 10% threshold of household capacity to pay (WHO method) or if they exceeded a variable threshold of the total household expenditure (Ataguba method). The study uses Erreygers concentration indices to estimate socio-economic inequalities and multivariable regression to identify the determinants of catastrophic health expenditure and impoverishment. Results from the study show that the incidence of catastrophic health expenditure and impoverishment vary with the methods used to estimate catastrophic health expenditure. Inequalities in catastrophic health expenditure favoured those in higher socio-economic groups. The factors associated with catastrophic health expenditure and impoverishment vary with the method used in catastrophic health expenditure estimation. Overall the study reveals that financial protection for people with diabetes in public hospitals is limited. The chapter concludes that financing interventions must target the poor and there is a need for targeted interventions to improve access to health care.

### **Chapter 4**

In Chapter 4, employing data from the 2012 South African National Health and Nutrition Examination Survey (SANHANES-1), concentration indices and the Wagstaff decomposition are

used to estimate inequalities in diabetes and to determine the contribution of lifestyle factors to these inequalities. Previous studies that have estimated socio-economic inequalities in diabetes, made use of self-reported data. The IDF however reports that the majority of the people who are living with diabetes are not aware that they are, thus, our study estimates diabetes inequalities by using both diabetes self-reported data and data on undiagnosed diabetes. Our study shows the presence of pro-rich socio-economic inequalities in diabetes that are exacerbated by differences in dietary, lifestyle and metabolic factors. The decomposition shows that dietary, lifestyle and metabolic factors such as obesity and physical activity contribute to inequalities in diabetes. Although in comparison to other determinants, the contribution of these factors is modest, their contributions are important in the development of policies that address socio-economic inequalities in the prevalence of diabetes.

## **Chapter 5**

Chapter 5 focuses on estimating the inequalities and the determinants of diabetes self-care practices. For this purpose, we use quantitative data collected from two diabetes clinics located at two public hospitals in Tshwane. Face-to-face interviews were conducted with 396 diabetes patients using a structured questionnaire. The study considers diabetes self-care practices of dietary diversity, medication adherence, physical activity, self-monitoring of blood glucose, avoiding smoking and limited alcohol consumption. Concentration indices are used to estimate socio-economic inequalities in self-care practices and regression analysis conducted to determine factors associated with self-care. Our results show that physical activity was the least adhered to self-care practice, followed by dietary diversity, medication adherence, not smoking, self-monitoring of blood glucose and limited alcohol consumption. The presence of complications or additional illnesses may be linked to the high prevalence of non-adherence to physical activity. Adherence to dietary diversity and physical exercise was more concentrated amongst those in higher socio-economic groups whilst not smoking was concentrated amongst those in low socio-economic groups. Our regression analysis shows that even after including the same variables, the association of each variable with each self-care behaviour differs. The findings suggest that efforts to improve self-care must address socio-economic inequalities. Furthermore, the strategies used to address each self-care behaviour should be behaviour-specific given the different determinants.

## **Chapter 6**

In order to capture the experiences of diabetes self-care management practices amongst people with diabetes, we complemented the findings from the previous chapter with a qualitative study. The key objective is to explore the challenges people with diabetes face in diabetes self-care and the factors that enable or inhibit them from adhering to recommended diabetes self-care practices. Using an interview guide with open ended questions, 28 purposively sampled patients visiting two public diabetes clinics and one private diabetes clinic were interviewed. Transcribed interviews were entered into Atlas.ti and data analysis was conducted using content analysis and guided by the Theory of Triadic Influence. The results from the analysis are presented for the intra-personal, inter-personal and environmental streams. The results reveal enablers and inhibitors of diabetes emanating from all three streams of influence. Intra-personal factors such as diabetes knowledge and depression were identified as enabler and inhibitor of diabetes self-care respectively. Inter-personal factors such as supportive interactions with family and non-supportive interactions with family were identified as enabler and inhibitor of diabetes self-care respectively. Environmental factors such as the use of technology devices and financial difficulty were identified as enabler and inhibitor of diabetes self-care respectively. The study demonstrates the importance of multi-level approaches to promoting diabetes self-care.

## **Chapter 7**

People with diabetes are at an increased risk of developing CVD when compared to people without diabetes. However, no study has investigated CVDs in people with diabetes in South Africa. Therefore, using data from the 2012 SANHANES-1, Chapter 7 examines the self-reported prevalence of and factors associated with diabetes and diabetes CVD comorbidity in South Africa. Our findings show that indeed the majority of people with diabetes in our study, self-reported having at least one additional CVD. The results from the regression analysis suggested that after applying a common set of variables, the statistical significance of the effect of each determinant on diabetes or diabetes CVD comorbidity was different. Even when variables were associated with both diabetes and diabetes CVD comorbidity, the magnitude of the effect differed. We find for example that older age was associated with both the presence of diabetes and the presence of diabetes CVD comorbidity. The magnitude of the coefficients was slightly larger for diabetes CVD when compared to diabetes only. This indicates a slightly higher likelihood of association.



Other differences are for example that being Indian was associated with having diabetes but not associated with diabetes CVD comorbidity, high income was associated with diabetes CVD comorbidity but not with diabetes. These findings give insight into the factors associated with having diabetes only and having diabetes and CVD comorbidity. The results can aid decision making for improved diabetes outcomes.

## **Chapter 8**

Finally, Chapter 8 summarises and discusses the main findings from the studies conducted in the dissertation. As discussed in the chapter, in South Africa, differences in socio-economic inequalities exist in terms of diabetes prevalence, diabetes health care costs and diabetes self-care practices. It is reported that high income inequalities are intertwined with high health inequalities. South Africa is reported to have one of the highest income inequalities in the world and we see this translated into inequalities in various aspects of diabetes. By using concentration indices, we find that the direction of inequality varies for diabetes prevalence, diabetes health care costs and each diabetes self-care practice. Efforts to address these inequalities should focus on addressing income inequalities within the country. Our findings on the inequalities in the economic impact of diabetes call for targeted policies that protect people with diabetes within low socio-economic groups from catastrophic health expenditure.

We also show that financial difficulty amongst people with diabetes in South Africa is both an outcome of self-care and a barrier to some diabetes self-care practices. Our literature review in Chapter 2 shows that the economic burden of diabetes is huge. This is consistent with findings from Chapter 3, which show that the fees for using health care may lead to financial difficulty for some patients as reflected in the estimates of catastrophic health expenditure and impoverishment. Chapter 6 also goes on to show that individuals with diabetes may fail to adhere to self-care practices such as healthy diet due to financial difficulties. The findings from our study call for the elimination of user fees for people with diabetes accessing public hospitals and for the consideration of the financial challenges that patients face during the tailoring of individualised patient care.

Evidence in South Africa suggests that the factors that influence health care behaviour, are varied and originate from multiple levels. Given that the determinants of self-care and the magnitude of their effect is not consistent across the self-care behaviour, interventions that aim to improve diabetes self-care practice should take into consideration the health behaviour to be addressed and the context in which the behaviour occurs. Given that multi-level factors influence the occurrence of diabetes self-care, programmes that promote self-care need to be comprehensive and target all levels of influence. Due to the multifaceted and multivariable nature of diabetes and its link to other diseases, we recommend a holistic approach to diabetes management that also takes into consideration the various social aspects linked to diabetes.