

Burden of Chronic Kidney Disease in Type 2 Diabetes using the standard of care in Colombia

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Introduction

In Colombia, Chronic Kidney Disease (CKD) in Type 2 Diabetes (T2D) is the most prevalent microvascular complication within diabetic patients, around 40% of total cases. Furthermore, 55% of patients with Chronic Kidney Disease (CKD) are in stage 5 or End-stage renal disease –ESRD, which is the most expensive stage by necessity of Kidney replacement therapy (KRT). For that reason, this pathology has a economic impact into the country, so it is important to estimate this burden of disease using the standard of care, to evaluate the patients' unmeet needs around the CKD in T2D in the future.

Objective

To estimate the economic burden of Chronic Kidney Disease (CKD) in Type 2 Diabetes (T2D) in Colombia when the standard of care is used.

Results

Direct and indirect costs: standard of care in Colombia

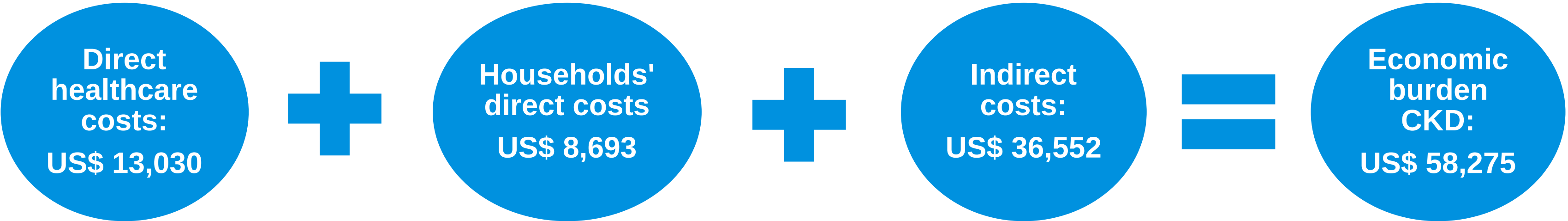
The information shown in the table below estimates the average economic costs of CKD in T2D in dollars x 1 person with Type 2 Diabetes (T2D).

Costs description		Value (USD \$)
Direct Health Costs	Procedures, medicines and supplies	\$ 13,030
Households Direct Costs (Out-of-pocked expenses)	Medical	\$ 2,898
	Non-medical	\$ 5,795
Total direct health costs		\$ 13,030
Total Households Direct Costs		\$ 8,693
Total direct Costs		\$ 21,723
Indirect Costs (loss of productivity)	Monetary value DALY's premature mortality	\$ 24,245
	Monetary value DALYS due to disability	\$ 12,307
Total Indirect Costs		\$ 36,552
Total Global Costs		\$ 58,275

Annual costs per patient were estimated using an exchange rate of \$3,756.67 Colombian pesos per dollar, representative of June 30, 2021

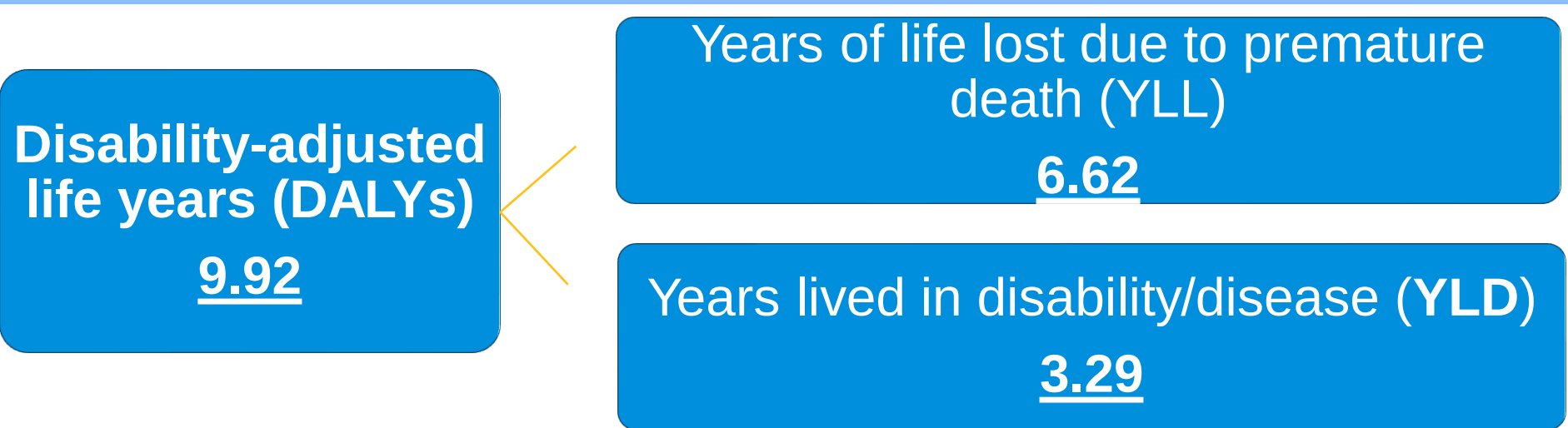
Economic burden of CKD in T2D per patient at 2021 prices.

According to previous information, the economic burden of CKD for a cohort of 1,000 people with T2D is more than \$58 millions dollars, being, then, \$58,275 dollars per patient.



Disability-adjusted life years (DALYs) per patient

To estimate the indirect cost per patient, total Disability-adjusted life years were multiplied to mean labor income per 40-year-old worker in Colombia. Total DALY's per patient are presented in next figure.



Methods

- The cost analysis was carried out from social perspective, considering direct costs (related to the health system and households), and indirect costs, using the indicator Disability Adjusted Life Years (DALY) and a reference of mean labor income per worker. For both was assumed a discount rate by 5.0%.
- Costs were estimated using a macro costing method and these values were used to perform a simulation with the Markov process model in each of the five stages of CKD in T2D (Normoalbuminuria, Microalbuminuria, Macroalbuminuria, End-stage Renal Disease (ESRD), and death, respectively).
- For this model, a cohort of 1,000 40-year-old people with T2D was used, and a time horizon up to life expectancy in Colombia, that is from 40 to 77 years.

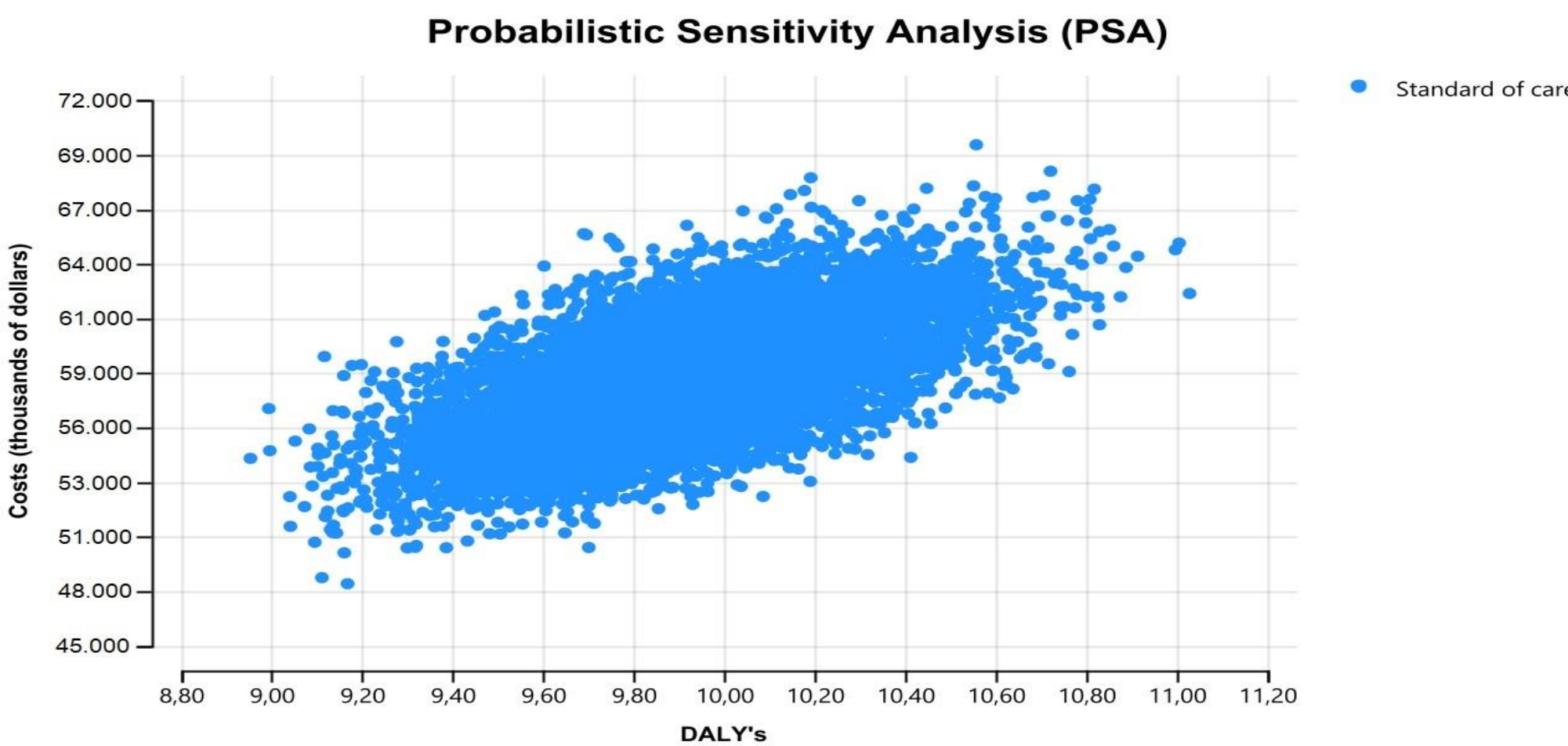
Markov Model - Transition Probabilities Matrix

	Normo	Micro	Macro	ESRD	Death
Normo	1-0.056- p(age)	0.056	0	0	p(age)
Micro		1-0.094- p(age)	0.094	0	p(age)
Macro		0	1-0.056-p(age)	0.056	p(age)
ESRD		0	0	0.87	0.13
Death		0	0	0	1

Adapted from Adarkwah, 2010

Probabilistic Sensitivity Analysis (PSA) for CKD with standard of care in Colombia

Next figure shows the dispersion of results after a Monte Carlo simulation for a cohort of 1,000 people with T2D in 10,000 different iterations. This cohort was 40 years-old and started the simulation in normoalbuminuria stage, then, they followed the transition established by the Markov model. The results represent the central tendency or expected value of DALY's and costs with the standard of care in Colombia. The results regarding to costs are expressed in dollars. The costs fluctuate between \$45.000 and \$72.000 thousands of dollars.



Sensitivity scenarios for CKD in T2D with standard of care in Colombia

Besides the Monte Carlo simulation, were carried out 18 sensitivity scenarios were variables such as discount rate, medical costs and average income were increased or decreased to see how these changes impacted the costs within the cohort. Changing the values in the variables mentioned before, the lowest estimated cost with the standard of care was \$29,176 thousands of dollars and the highest \$102,356 thousands of dollars for 1.000 people with T2D

Conclusions:

Considering the average income per worker in Colombia, the CKD in T2D represents high costs for society, mainly related to the health system and households. 22% of economic burden is due to direct health costs, 15% to households' direct costs and 63% to indirect costs (loss of productivity due to disability or premature mortality). These results are relevant because in Colombia it is estimated that T2D has a prevalence of 1.42 million of people and an incidence 168 thousand of people, from which 2.2% of new cases are people from 40 to 44 years old and 65.7% people from 50 to 74 years old.

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