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The Economic Burden of Heart Diseases in Mexico

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Abstract

Heart disease (HD) is currently the leading cause of death in the Latin American region and expected to remain so for the next few decades. HD imposes health care system and other costs to society through morbidity, premature mortality, carer costs and loss of productivity. The economic burden of heart disease in the Latin American region has not been previously quantified.

Objective: The study aim was to assess the economic burden of heart failure (HF), myocardial infarction (MI), atrial fibrillation (AF), and hypertension (HTN) in Mexico, and the cost effectiveness of telemedicine (TM) and structured telephone support (STS) for the treatment of HF.

Methods: The cost of four heart conditions in Mexico was estimated using a prevalence approach for HF, AF and HTN, and an incidence approach for MI. This was done by estimating the number of people with HD in a base period (2015) and the costs associated with the condition in that period. The cost estimates included health system expenditures as well as other financial costs including productivity losses (absenteeism, lower workforce participation, premature mortality) and informal care costs. We also estimated transfer costs in order to better understand how costs were borne by government, individuals and society. Estimates were also made of the value of the loss of healthy life, measured in disability adjusted life years (DALYs) using global burden of disease disability weights. To estimate the number of cases of HD in the population, by age and gender, epidemiological data on prevalence or incidence rates were applied to population data. Data inputs were informed by a targeted literature review that provided Mexico specific disease estimates and a data scan and amalgamation of Organisation for Economic Co-operation and Development, World Health Organization and regional estimates. Estimates were triangulated using semi-structured interviews with clinicians, insurers and health administrators.

Results: Accounting for co-morbidities, these HDs were found to affect approximately 20.5 million people in 2015 in Mexico (25.6% of the adult population). This leads to significant wellbeing loss, estimated at 1.6 million DALYs, and economic burden, estimated at 96.4 billion pesos in 2015. TM and STS were found to be cost effective treatment options for the management of patients with HF.

Conclusion: HD imposes a significant burden to the health system and society. Prevention and appropriate management of HD would result in significant benefits both in improved wellbeing and economic savings. TM and STS are cost effective mechanisms for achieving improvements in the management of heart failure.

Introduction

- In Mexico, coronary heart disease (which includes MI and other atherosclerotic conditions) mortality rates have increased more than 90% between 1970 and 2000[1,2]
- Heart conditions impose physical, social, financial, and health related quality of life limitations on individuals affected. These conditions result in an economic burden and impact on society due to expenditures on health care treatment, productivity losses from employment impacts, costs of providing formal and informal care, and lost wellbeing[3,4]
- Common risk factors for heart disease are: tobacco intake; high cholesterol; obesity; high blood pressure; diabetes; alcohol intake; dietary factors; physical inactivity and depression.[5-9]

Objective

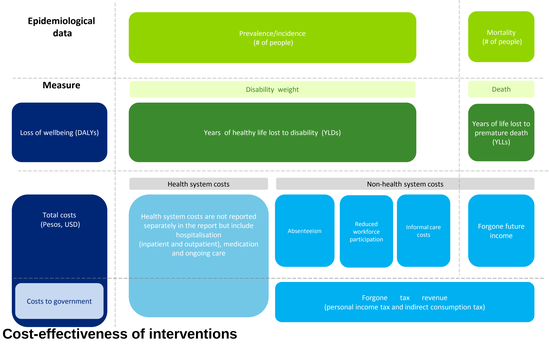
- The economic burden of heart disease in the Latin American region has not been previously quantified. This study assessed the economic burden of the four main heart conditions: HTN; HF; MI; and AF in Mexico. In addition, the cost-effectiveness of TM and STS for the management of HF was assessed.

Methods

Burden of heart diseases

- The burden of heart disease in Mexico, which is a function of the number of people with the disease and associated costs in a base period (2015), was estimated using standard methodology which applies a prevalence approach for HF, AF and HTN, and an incidence approach for MI.

Figure 1.1 High level methodology



Cost-effectiveness of interventions

- The network meta-analysis and economic evaluation of home TM and STS programs after discharge in patients with HF, conducted by the National Institute for Health Research in 2013[9] was used as the basis for a cost effectiveness analysis from the perspective of the Instituto Mexicano del Seguro Social (IMSS).

Data sources

- The analysis was informed by a targeted literature review, data scan and modelling, with inputs and methods validated through a consultation process in Mexico that included nine clinicians and other stakeholders from the Instituto Nacional de Cardiología, Centro Médico Siglo XXI, the IMSS, and Asociación Nacional de Cardiólogos de México.

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Results

Prevalence of four heart conditions

- HTN has the highest prevalence of the four conditions, followed by HF.

Table 1: Prevalence of four heart conditions, Mexico 2015

Condition	Number of people	Percentage of the adult population
HF	1,599,223	2.0
MI	204,382	0.3
AF	650,577	0.8
HTN	19,833,533	24.8
Total conditions	22,287,715	27.8
Total persons with any condition (i.e. accounting for comorbidities)	20,461,603	25.6

Source: Deloitte Access Economics analysis. *Percentage reflects the evidence from studies among populations aged 20 years and over.

Financial costs on society

- MI imposes the greatest financial cost (39.0 billion pesos/2.5 billion USD), followed by HF (27.0 billion pesos/1.7 billion USD), HTN (22.7 billion pesos/1.5 billion USD) and, finally, AF (8.4 billion pesos/532 million USD).
- Health system costs were borne by government, private insurers and individuals, while productivity losses were borne by individuals, governments (in the form of taxation revenue forgone), and family/friends (who reduced work to provide care, in many cases).

Table 2: Financial cost of heart conditions in Mexico, 2015 (millions of pesos)

Category	HF	MI	AF	HTN	Total (unadjusted)	Total (adjusted for comorbidities)^
Health system costs	7,556	22,903	8,111	5,385	43,955	43,955
	28%	59%	97%	24%	45%	46%
Productivity losses	19,457	16,145	246	17,316	53,164	52,441
	72%	41%	3%	76%	55%	54%
Income forgone by individuals	*8,259*	*11,874*	*143*	*7,731*	*28,008*	*27,611*
	31%	*30%*	*2%*	*34%*	*29%*	*29%*
Income forgone by businesses	*848*	*1,050*	*73*	*7,983*	*9,954*	*9,725*
	3%	*3%*	*1%*	*35%*	*10%*	*10%*
Opportunity cost of informal care by family/friends	*7,155*	*631*	-	-	*7,786*	*7,774*
	26%	*2%*	-	-	*8%*	*8%*
Tax revenue forgone by government	*3,194*	*2,591*	*30*	*1,602*	*7,416*	*7,332*
	12%	*7%*	*0%*	*7%*	*8%*	*8%*
Total cost	27,013	39,048	8,357	22,701	97,119	96,395

^Comorbidities totals do not sum to the total of the individual conditions as one person can have more than one condition and the interaction between conditions causes the total estimate of the four conditions together to vary.

Wellbeing loss of selected heart conditions

- The heart conditions included impose a substantial wellbeing loss of 1.63 million DALYs, after adjusting for comorbidities.

Table 3: Loss of wellbeing of selected heart conditions in Mexico, 2015

Condition	YLDs	YLLs	DALYs
HF	152,479 (17%)	59,595 (8%)	212,074 (13%)
MI	1,250 (0%)	668,519 (90%)	669,769 (40%)
AF	145,570 (16%)	11,852 (2%)	157,422 (10%)
HTN	614,840 (67%)	-	614,840 (37%)
Total (unadjusted)	914,138	739,966	1,654,104
Total (adjusted for comorbidities)^	902,081	723,306	1,625,387

^Comorbidities totals do not sum to the total of the individual conditions as one person can have more than one condition and the interaction between conditions causes the total estimate of the four conditions together to vary

Impact of heart failure and cost effectiveness of interventions

- 1.6 million Mexicans had HF and the average age of an individual with HF was 62
- HF had the second largest total financial cost and cost per case of the four conditions
- HF health system costs were 7.6 billion pesos (481 million USD) which is 28% of HF financial costs
- HF imposed the greatest care giver burden among the four conditions studied
- Income losses for those with HF cost a further 8.3 billion pesos (526 million USD)
- Government taxation forgone as a result of HF productivity losses cost 3.2 billion pesos (203 million USD)
- Assuming a willingness to pay threshold of 137,727 – 413,181 pesos per quality adjusted life year, which is approximately 1 to 3 times the GDP per capita of Mexico, the cost effectiveness analysis suggests that TM and STS are both cost effective treatment options for the management of patients with HF.

Conclusion

- Heart conditions impose substantial loss of wellbeing and financial costs in Mexico and should be a public health priority.
- Myocardial infarction imposed the greatest financial cost, followed by heart failure, hypertension and atrial fibrillation.
- Prevention or better management of heart conditions would result in significant benefits both in improved wellbeing and economic savings.
- Telemedicine and structured telephone support are cost effective mechanisms for achieving improvements in the management of heart failure.

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