

# The Economic Burden of Heart Diseases in Peru

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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 Peru 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 Peru 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 Peru 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 3.2 million people in 2015 in Peru (16% of the adult population). This leads to significant wellbeing loss, estimated at 281,829 DALYs, and economic burden, estimated at totalling 2.9 billion soles in 2015. Assuming a willingness to pay threshold of 18,724 – 56,172 soles per quality adjusted life year, which equates approximately to 1 to 3 times the gross domestic product per capita in Peru, the cost effectiveness analysis suggests that TM and STS may both 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

- 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<sup>1,2</sup>
- Common risk factors for heart disease are: tobacco intake; high cholesterol; obesity; high blood pressure; diabetes; alcohol intake; dietary factors; physical inactivity and depression.<sup>3-6</sup>

## Objective

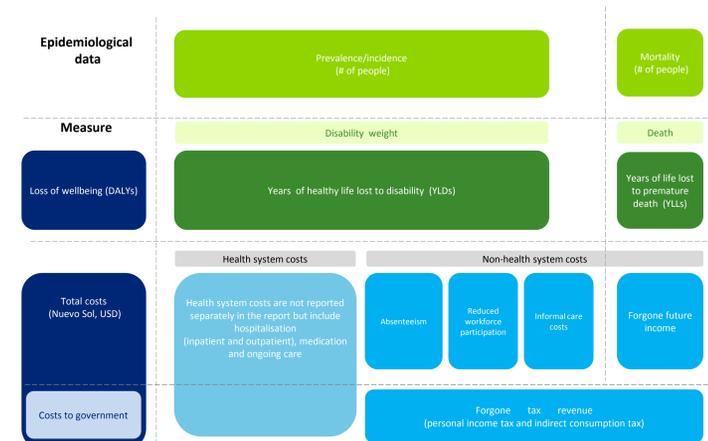
- The economic burden of heart disease in the Latin American region has not been previously quantified. This study assessed the economic burden of the four main heart conditions: HTN; HF; MI; and AF in Peru. In addition, the cost-effectiveness of TM and STS for the management of HF was assessed.

## Methods

### Burden of heart diseases

- The burden of heart disease in Peru, 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<sup>7</sup> was used as the basis for a cost effectiveness analysis from the perspective of the Peruvian Ministerio de Salud.

### Data sources

- The analysis was informed by a targeted literature review, data scan and modelling, with inputs and methods validated through a consultation process with stakeholders from the Minsa-H Cayetano Heredia, Sociedad Peruana de Cardiologia and Essalud-Rebagliati.

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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, Peru 2015

Condition	Number of people	Percentage of the adult population*
HF	396,650	2.0
MI	39,309	0.2
AF	157,625	0.8
HTN	2,922,041	14.7
<b>Total conditions</b>	<b>3,515,625</b>	<b>17.7</b>
<b>Total persons with any condition (i.e. accounting for comorbidities)</b>	<b>3,185,028</b>	<b>16.0</b>

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 (1.3 billion soles/427 million USD), followed by HF (970 million soles/308 million USD), HTN (453 million soles/144 million USD) and, finally, AF (169 million soles/54 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 Peru, 2015 (millions of soles)

Category	HF	MI	AF	HTN	Total (unadjusted)	Total (adjusted for comorbidities) <sup>^</sup>
<b>Health system costs</b>	179	354	150	73	756	756
	18%	26%	89%	16%	26%	26%
<b>Productivity losses</b>	791	989	19	381	2,180	2,154
	82%	74%	11%	84%	74%	74%
<b>Income forgone by individuals*</b>	423	834	15	247	1,521	1,502
	44%	62%	9%	55%	52%	52%
<b>Income forgone by businesses*</b>	17	16	1	98	132	128
	2%	1%	1%	22%	4%	4%
<b>Opportunity cost of informal care by family/friends</b>	254	17	-	-	271	271
	26%	1%	-	-	9%	9%
<b>Tax revenue forgone by government**</b>	97	122	2	35	256	254
	10%	9%	1%	8%	9%	9%
<b>Total cost</b>	<b>970</b>	<b>1,344</b>	<b>169</b>	<b>453</b>	<b>2,936</b>	<b>2,911</b>

<sup>^</sup>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 281,829 DALYs, after adjusting for comorbidities.

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

Condition	YLDs	YLLs	DALYs
HF	41,055 (25%)	22,973 (18%)	64,028 (22%)
MI	261 (0.2%)	97,704 (78%)	97,966 (34%)
AF	35,265 (21%)	4,343 (3%)	39,607 (14%)
HTN	90,583 (54%)	-	90,583 (31%)
<b>Total (unadjusted)</b>	<b>167,165</b>	<b>125,020</b>	<b>292,184</b>
<b>Total (adjusted for comorbidities)<sup>^</sup></b>	<b>162,769</b>	<b>119,060</b>	<b>281,829</b>

<sup>^</sup>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

- 396,650 people in Peru 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 179 million soles (57 million USD) which is 18% of HF total costs
- HF imposed the greatest care giver burden among the four conditions studied
- Income losses for those with HF cost a further 423 million soles (135 million USD)
- HF productivity impacts resulted in government taxation forgone of 97 million soles (31 million USD)
- Assuming a willingness to pay threshold of 18,724–56,172 soles per quality adjusted life year, which equates approximately to 1 to 3 times the gross domestic product per capita in Peru, the cost effectiveness analysis suggests that TM and STS may both be cost effective treatment options for the management of patients with HF.

## Conclusion

- Heart conditions impose substantial loss of wellbeing and financial costs in Peru 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.

### Acknowledgements

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