

Burden of ischemic heart diseases in Iran, 1990-2010: Findings from the Global Burden of Disease study 2010

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Background: Cardiovascular diseases are viewed worldwide as one of the main causes of death. This study aims to report the burden of ischemic heart diseases (IHDs) in Iran by using data of the global burden of disease (GBD) study, 1990-2010. **Materials and Methods:** The GBD study 2010 was a systematic effort to provide comprehensive data to calculate disability-adjusted life years (DALYs) for diseases and injuries in the world. Years of life lost (YLLs) due to premature mortality were computed on the basis of cause-of-death estimates, using Cause of Death Ensemble model (CODEm). Years lived with disability (YLDs) were assessed by the multiplication of prevalence, the disability weight for a sequel, and the duration of symptoms. A systematic review of published and unpublished data was performed to evaluate the distribution of diseases, and consequently prevalence estimates were calculated with a Bayesian meta-regression method (DisMod-MR). Data from population-based surveys were used for producing disability weights. Uncertainty from all inputs into the calculations of DALYs was disseminated by Monte Carlo simulation techniques. **Results:** The age-standardized IHDs DALY specified rate decreased 31.25% over 20 years from 1990 to 2010 [from 4720 (95% uncertainty interval (UI): 4,341-5,099) to 3,245 (95% UI: 2,810-3,529) person-years per 100,000]. The decrease were 38.14% among women and 26.87% among men. The age-standardized IHDs death specified rate decreased by 21.17% [from 222 (95% UI: 207-243) to 175 (95% UI: 152-190) person-years per 100,000] in both the sexes. The age-standardized YLL and YLD rates decreased 32.05% and 4.28%, respectively, in the above period. **Conclusion:** Despite decreasing age-standardized IHD of mortality, YLL, YLD, and DALY rates from 1990 to 2010, population growth and aging increased the global burden of IHD. YLL has decreased more than IHD deaths and YLD since 1990 but IHD mortality remains the greatest contributor to disease burden.

Key words: Burden of disease, disability-adjusted life years (DALYs), Iran, ischemic heart diseases (IHDs), years lived with disability (YLDs)

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INTRODUCTION

Cardiovascular diseases are viewed worldwide as one of the main causes of death. They are also known to

have numerous side effects and to cause various old age disabilities.^[1,2] Regarding the increase in ischemic heart diseases (IHDs) in the world, it has been estimated that this type of disease will be the main cause of death worldwide by the year 2020.^[3]

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Cardiovascular diseases had been assessed to be the cause of 28% of 50.4 million deaths and 9.7% of 1.4 billion years of life lost (YLLs) due to inabilities across the world in the year 1990. It has been estimated that by the year 2030 when the population of the world will increase to 8.2 billion people, 30.5% of the world death toll will be caused by cardiovascular diseases.^[4]

Half the death toll and 80% of the global burden of cardiovascular diseases are known to be from low-and medium-income countries and the number is increasing. Moreover, the highest number of deaths caused by cardiovascular diseases occur in the Eastern Mediterranean countries including Iran and these chronic diseases are turning increasingly epidemic.^[5,6]

In the study of the global burden of disease (GBD) 2010, it has been mentioned that the burden of IHDs have increased by 29% from the year 1990 to 2010 and that over 90% of the disability-adjusted life years (DALYs) of ischemic cardio muscle diseases lead to the death of patients.^[7]

In the study of the burden of disease in Iran 2003, the DALYs of the ischemic cardio muscle disease (thoracic angina, stroke, heart failure) was ranked first with 437,709 years for women and fifth with 433,627 years for men. Unfortunately from the 871,336 DALYs in Iran, 60% still belongs to YLLs.^[8] In a study conducted in 2010 in Iran, it was shown that from the burden of the disease under study, 860,000 years of life were lost in 2005 and by 2025, this number would increase to 1600,000 YLLs.^[9]

Many of the 32 million people who experience heart attacks and strokes every year have one or more than one of the risk factors of this disease such as high blood pressure, diabetes, smoking, unhealthy diets, dyslipidemia, and sedentary lifestyle, all of which can be easily prevented or controlled. Studies have documented that elevated low-density lipoprotein (LDL)-cholesterol plays the most crucial role in atherosclerosis and IHDs. It is estimated that high cholesterol level is the cause of 18% of brain vascular diseases, 56% of ischemic cardiovascular diseases, and as a whole 7.9% of deaths across the world.^[10] The mentioned factors are related to the lifestyle of the people, the economic, social, and cultural changes, which occur due to globalization, industrialization, and the aging of the population as well as stress and being from a low income status, which are also known to be the cause of such factors.^[11]

To be able to control global epidemic of noncommunicable diseases (NCDs), early prevention based on international planning needs to take place. The aim of such an act is preventing the spread of epidemic diseases and somehow controlling them.^[9] Health centers have been established

from the year 2005 to 2009 by the management center of NCDs of the Ministry of Health to correct and adjust the lifestyle of the population to prevent and control such diseases.^[1]

Although the awareness of the people has increased regarding the importance of controlling and preventing cardiovascular diseases, the number of people who refer to treatment centers due to such diseases is increasing by the day. Some of these people lose their lives because of the disease and others have to take medications for long periods of time.^[12] Even on considering that the risk factors of cardiovascular diseases will not increase, in the next 30 years, a large number of people aged 35-64 years will die due to this type of disease and the consequences of IHD will also increase in middle-aged people.^[4]

For better planning regarding such a matter, officials need to pay closer attention to IHDs. Therefore, calculating the burden of IHDs can play a crucial role as data for better and more effective policy-making, designing and managing of intervening models. The current study therefore, aims to report the burden of IHDs in Iran by using data of the GBD study, 1990-2010. Furthermore, this study aims to compare the results with the similar findings and discuss the limitations of the GBD project.

MATERIALS AND METHODS

Using data of the GBD study 2010, this paper presents the trends in deaths and DALYs attributed to IHDs in Iran by sex and age from 1990 to 2010. The GBD study 2010 was a comprehensive and systematic effort in data-gathering and estimations of 291 types of diseases and injuries and 67 risk factors in 187 countries to calculate the global and regional comparative risk assessment of deaths and DALYs caused by different risk factors and diseases.^[4,13-18]

The burden of disease, injuries, and risk factors are expressed in DALYs, which is mostly considered as a summary measurement of the population health gap.^[13,16] DALYs show the sum of the YLL due to premature mortality in the population and the years lived with disability (YLDs).^[4,13,16] YLLs as the first component of DALYs was calculated based on cause-of-death estimates for different causes of death, different age groups, and both sexes. Such estimates were developed with a broad and complete database of vital registration, verbal autopsy, and surveillance. To develop ensembles of the best performance models, the Cause of Death Ensemble model (CODEm) strategy was used,^[18] in which uncertainty was taken with standard simulation methods.^[19]

YLDs constituted the second component of DALYs, estimated by multiplying prevalence, the disability weight for a sequel, and the duration of symptoms.

First, the estimation of prevalence for all age-sex-country-year groups, followed through comprehensive systematic review of published and unpublished data, was performed on the prevalence, incidence, remission, and excess mortality and with a Bayesian meta-regression method of the GBD 2010.^[18] Data collected through population-based surveys in five countries and an open Internet survey were used for generating disability weights. The details on the methods for analyzing the results of pairwise comparisons to produce disability weights are provided elsewhere.^[4] Uncertainty in the disability weight for each sequel was disseminated into the estimations of YLDs (4).

The models used for estimating YLLs and YLDs generated the 95% uncertainty interval (95% UI) around each quantity of interest. Uncertainty from all inputs into the calculations of DALYs was propagated by means of Monte Carlo techniques.^[18]

RESULTS

The age-standardized IHDs DALY specified rate decreased 31.25% over 20 years from 1990 to 2010 (from 4729; 95% UI: 4,341-5,099 person-years per 100,000 to 3,245; 95% UI: 2810-3529 person-years per 100,000). The decrease were 38.14% among women and 26.87% among men [Table 1].

The age-standardized IHDs death specified rate decreased by 21.17% from 1990 to 2010 (222; 95% UI: 207-243 person-years per 100,000 in 1990 to 175; 95% UI: 152-190 person-years per 100,000 in 2010) among both sexes although IHDs death-specified rate increased 26.04% over these years (from 96; 95% UI: 88-104 person-years per 100,000 in 1990 to 121; 95% UI: 105-131 person-years per 100,000 in 2010). This decrease in age-standardized death specified rate was 17.4% among men (from 264; 95% UI: 242-302 person-years per 100,000 to 218; 95% UI: 179-242 person-years per 100,000) and was 26.96% among women (from 178; 95% UI: 161-199 person-years per 100,000 to 130; 95% UI: 107-146 person-years per 100,000) [Table 2].

Although the crude YLL due to premature mortality increased by 11.21% from 1990 to 2010, the age-standardized YLL rate decreased by 32.05% from 4580; 95% UI: 4,180-4,970 person-years per 100,000 to 3,112; 95% UI: 2,667-3,388 person-years per 100,000 over these years.

Table 1: DALY rate and number of ischemic heart diseases in Iran by age and sex in 1990 and 2010

All causes and both genders	Number of DALYs (thousands) [95% UI]			Rates of DALY (per 100 000) [95% UI]		
	1990	2010	% ^Δ	1990	2010	% ^Δ
Both sexes						
15-49 years	374,832 [313,407, 425,496]	394,507 [322,185, 465,652]	5.24	1,572 [1,314, 1,784]	864 [705, 1,019]	-45.03
50-69 years	602,700 [539,948, 685,498]	720,142 [583,864, 819,937]	19.48	12,033 [10,780, 13,686]	8,296 [6,726, 9,446]	-31.05
70+ years	251,473 [228,272, 280,148]	611,106 [532,624, 672,072]	143.01	26,691 [24,228, 29,734]	23,148 [20,175, 25,457]	-13.27
All ages	1,515,590 [1,319,200, 1,699,020]	1,760,830 [1,514,420, 1,919,020]	16.18	2,765 [2,406, 3,099]	2,381 [2,048, 2,595]	-13.88
Age-standardized	-	-	-	4,720 [4,341, 5,099]	3,245 [2,810, 3,529]	-31.25
Male						
15-49 years	239,132 [193,299, 283,794]	279,807 [209,045, 346,197]	17.00	2,030 [1,641, 2,409]	1,210 [904, 1,497]	-40.39
50-69 years	401,451 [348,914, 478,269]	497,092 [377,401, 585,396]	23.82	15,529 [13,496, 18,500]	1,1476 [8,713, 13,515]	-26.09
70+ years	147,740 [130,156, 169,831]	384,726 [326,259, 437,636]	160.40	30,672 [2,7021, 35,258]	27,525 [23,342, 31,310]	-10.26
All ages	949,186 [802,388, 1,105,050]	1,181,550 [938,820, 1,312,160]	24.48	3,430 [2,899, 3,993]	3,148 [2,501, 3,496]	-8.22
Age-standardized	-	-	-	5813 [5,256, 6,593]	4,251 [3,419, 4,730]	-26.87
Female						
15-49 years	135,700 [98,290, 161,726]	114,700 [88,253, 146,170]	-15.47	1,125 [815,1,341]	508 [391,648]	-54.84
50-69 years	201,249 [170,986, 232,918]	223,051 [175,425, 264,325]	10.83	8,304 [7,055,9,611]	5,129 [4,034, 6,078]	-38.23
70+ years	103,733 [89,914, 119,178]	226,379 [185,043, 261,175]	118.23	22,527 [19,526, 25,881]	18,223 [14,896, 21,024]	-19.10
All ages	566,406 [443,236, 666,567]	579,280 [492,889, 647,717]	2.272	2,086 [1,633, 2,455]	1,590 [1,353, 1,778]	-23.77
Age-standardized	-	-	-	3,579 [3,121, 3,986]	2,214 [1,868, 2,479]	-38.13

^ΔBetween 1990 and 2010; DALYs = Disability-adjusted life years; UI = Uncertainty interval

In men, this decrease from 1990 to 2010 was equal to 27.55% (from 5658; 95% UI: 5,116-6,442 person-years per 100,000 to 4,099; 95% UI: 3,294-4,555 person-years per 100,000), whereas in women this rate decreased by 39.26% over this period of time (from 3456; 95% UI: 3,014-3,885 person-years per 100,000 to 2,099; confidence interval (CI) 95% 1,772-2,354 person-years per 100,000) [Table 3].

The number of the YLDs increased from 39,399; 95% UI: 24,232-61,844 (91.11 growth) from 1990 to 2010. The crude YLD rate also grew 41.66% (from 72; 95% UI: 44-113 person-years per 100,000 to 102; 95% UI: 60-157 person-years per 100,000) during this period of time. However, the age-standardized YLD rate decreased by 4.28% from 1990 to 2010 (from 140; CI 95% 86-219 person-years per 100,000 to 134; CI 95% 78-205 person-years per 100,000). This decline in the age-standardized YLD rate among men and women were equal to 1.93% (from 155; 95% UI: 92-248 person-years per 100,000 to 152; 95% UI: 88-237 person-years per 100,000) and 7.25% (from 124; 95% UI: 74-193 person-years per 100,000 to 115; 95% UI: 69-178 person-years per 100,000) over the mentioned period of time, respectively [Table 4]. The percentage of total DALY, death, YLLs, and YLDs attributed to IHDs are presented in Table 5. The percentage of total DALYs, deaths, and YLLs increased significantly in 2010 compared to 1990.

DISCUSSION

Based on our finding, in Iran the global burden of IHD in 2010 has reduced age-standardized IHD burden since

1990. All age populations have decreased both YLLs and the burden of IHD. However, the crude YLD has increased in all age populations except for the middle age, i.e., between 50 years and 69 years. These results are not consistent with finding in the GBD 2010 study at the global level.^[20]

Moreover, the Prospective Urban Rural Epidemiologic (PURE) study found that among cardiovascular disease patients, YLD increased about 0.4%.^[21] Our findings in which YLD decreased about 4.3% from 1990 to 2010 are not consistent with this study.

Since 1990, number of years of disability IHD has grown faster than the IHD mortality that is consistent with the study of the global burden of ischemic heart disease^[7] while our findings on the decreased relative difference in YLD compared with mortality and YLL from 1990 to 2010 are not consistent with that study, and it might suggest the need for a strategy shift in IHD treatment.^[7]

Anthony and Kim in their study conducted in 2004 based on the data for all 192 member countries of the World Health Organization and revealed that the global variation in IHD mortality rates ranged 13 per 100,000 in Kiribati to 456 per 100,000 in Turkmenistan, and the disease burden from ischemic heart disease ranged 145 DALYs lost per 100,000 in Kiribati to 4,259 DALYs lost per 100,000 in Afghanistan.^[22] According to our findings, the age-standardized mortality rate and DALY were 175 and 3,245 per 100 000, respectively, in 2010 and the relative difference reduction of about 21% and 31%, respectively,

Table 2: Death rate and number of ischemic heart diseases in Iran by age and sex in 1990 and 2010

All causes and both genders	Number of deaths (thousands) [95% UI]			Rates of death (per 100 000) [95% UI]		
	1990	2010	%Δ ¹	1990	2010	%Δ ¹
Ages						
Both sexes						
15-49 years	7,356 [6,221, 8,390]	8,068 [6,418, 9,687]	9.67	31 [26, 35]	18 [14, 21]	-41.93
50-69 years	22,274 [19,921, 25,450]	25,621 [20,833, 29,069]	15.026	445 [398, 508]	295 [240, 335]	-33.7
70+ years	19,822 [18,216, 21,808]	55,141 [48,100, 60,736]	-72.182	2,104 [1,933, 2,315]	2,089 [1,822, 2,301]	-0.71
All ages	52,874 [48,270, 57,076]	89,250 [77,673, 97,058]	68.79	96 [88, 104]	121 [105, 131]	26.04
Age-standardized	-	-	-	222 [207, 243]	175 [152, 190]	-21.17
Male						
15-49 years	4,748 [3,879, 5,648]	5,823 [4,181, 7,331]	22.64	40 [33, 48]	25 [18, 32]	-37.5
50-69 years	14,876 [12,949, 17,708]	17,701 [13,635, 20,626]	18.99	575 [501, 685]	409 [315, 476]	-28.86
70+ years	11,321 [10,047, 12,998]	34,010 [28,738, 38,771]	200.415	2,350 [2,086, 2,698]	2,433 [2,056, 2,774]	3.53
All ages	32,865 [29,829, 36,979]	57,773 [47,413, 64,549]	75.78	119 [108, 134]	154 [126, 172]	29.41
Age-standardized	-	-	-	264 [242, 302]	218 [179, 242]	-17.4
Female						
15-49 years	2,608 [1,879, 3,128]	2,245 [1,644, 2,945]	-13.91	22 [16, 26]	10 [7, 13]	-54.54
50-69 years	7,398 [6,239, 8,642]	7,920 [6,094, 9,499]	7.05	305 [257, 357]	182 [140, 218]	-40.32
70+ years	8,502 [7,467, 9,770]	21,131 [17,363, 24,208]	148.54	18,46 [1,622, 2,122]	1,701 [1,398, 1,949]	-7.85
All ages	20,009 [17,713, 22,315]	31,478 [26,116, 35,283]	57.31	74 [65, 82]	86 [72, 97]	16.21
Age-standardized	-	-	-	178 [161, 199]	130 [107, 146]	-26.96

¹Between 1990 and 2010; UI = Uncertainty interval

Table 3: YLL rate and number of ischemic heart diseases in Iran by age and sex in 1990 and 2010

All cause and both gender	Number of YLLs (thousands) [95% UI]			Rates of YLL (per 100,000) [95% UI]		
	1990	2010	%Δ ¹	1990	2010	%Δ ¹
Both sexes						
15-49 years	374,832 [313,407, 425,496]	370,545 [299,386, 440,849]	-1.14	1,522 [1,260, 1,735]	811 [655, 965]	-46.71
50-69 years	602,700 [539,948, 685,498]	688,124 [554,653, 785,954]	14.17	11,621 [10,443, 13,257]	7,927 [6,390, 9,054]	-31.78
70+ years	251,473 [228,272, 280,148]	591,941 [511,317, 653,622]	135.38	25,972 [23,542, 28,904]	22,422 [19,368, 24,758]	-15.37
All ages	1,515,590 [1,319,200, 1,699,020]	1,685,540 [1,444,250, 1,838,400]	11.21	2,693 [2,329, 3,030]	2,279 [1,953, 2,486]	-15.37
Age-standardized	-	-	-	4,580 [4,180, 4,970]	3112 [2667,3388]	-32.05
Male						
15-49 years	232,584 [187,519, 278,079]	265,900 [195,201, 332,236]	14.32	1,974 [1,592, 2,361]	1,150 [844, 1,437]	-41.74
50-69 years	389,588 [338,019, 466,870]	478,960 [360,070, 564,000]	22.94	15,070 [13,075, 18,059]	11,058 [8,313, 13,021]	-26.62
70+ years	143,903 [126,750, 165,834]	373,355 [315,804, 427,030]	159.44	29,875 [26,314, 34,428]	26,711 [22,594, 30,551]	-10.59
All ages	926,848 [781,542, 1,084,680]	1,138,050 [897,138, 1,270,190]	22.78	3,349 [2,824, 3,920]	3,032 [2,390, 3,384]	-9.46
Age-standardized	-	-	-	5,658 [5,116, 6,442]	4,099 [3294,4555]	-27.55
Female						
15-49 years	130,411 [92,787, 156,731]	104,644 [78,577, 136,220]	-19.75	1,081 [769, 1,299]	464 [348, 604]	-57.07
50-69 years	192,482 [162,271, 224,028]	209,163 [163,664, 249,117]	8.66	7,942 [6,696, 9,244]	4,809 [3,763, 5,728]	-39.44
70+ years	100,794 [87,409, 116,175]	218,586 [178,177, 251,797]	116.86	21,888 [18,982, 25,229]	17,596 [14,343, 20,269]	-19.60
All Ages	549,345 [425,443, 65,3176]	547,486 [465,373, 614,512]	-0.33	2,024 [1,567, 2,406]	1,503 [1,278, 1,687]	-25.74
Age-standardized	-	-	-	3,456 [3,014, 3,885]	2,099 [1,772, 2,354]	-39.26

¹Between 1990 and 2010; YLL = Years of life lost; UI = Uncertainty interval

from 1990 to 2010. These estimates are included between the lower and upper bounds of mortality and DALY rates of Kim and Johnston's report but these are more close to the upper bound. The results suggest the necessity for more intensive intervention to prevent and control the problem.

Our finding revealed that the age-standardized (5 years to 70+ years) mortality, YLL, YLD, and DALY rates were higher in men than in women. These findings were concordant with the study of age-standardized rates for 35-64-year-olds in the incidence of acute myocardial infarction from the MONICA study in 1985 to 1987 and a Japanese study in 1989 to 1993. The incidence rates of Japan, China, the United Kingdom, Canada, Iceland the United States, the Czech Republic, New Zealand, Australia, Belgium, Germany, Switzerland, France, Spain, and Italy were higher in men than in women.^[23,24]

It is important to consider that GBD report presents data at the national level and as we know in vast countries such as Iran; large variations exist in the prevalence and burden of IHDs at the regional and provincial levels. Therefore, providing an estimate of aggregated data on IHDs for all provinces of the country cannot be enough for policymakers to prioritize health problems at the provincial level. Moreover, the GBD is designed at the global level and these data are more accurate at the global level and at most at the national level. Because of using only national surveys, GBD estimations are more model-driven than data-driven. Therefore, subnational studies with more data on provincial and even county data to estimate the IHDs burden more accurately for providing evidence for health policy makers could be helpful. Recently, National and Sub-national Burden of Disease (NASBOD) study has been conducted in Iran to calculate the burden of diseases, injuries, and risk factors at the national and subnational levels from 1990 to 2013.^[25]

It is also important to note that disease burden DALY is a measure of health loss alone, not financial or productivity loss due to disease such as hospitalization costs or medications of disease, lost work time, and involved family related to the burden of IHD.^[13]

Exploring and describing the burden of IHD attributed to sex could potentially provide useful information on the importance of the problem. For instance, the percentage of age-standardized mortality and YLL rates are decreasing less in men compared to women from 1990 to 2010; this might provide some gender-specific actions for the public health system.

Table 4: YLD rate and number of ischemic heart diseases in Iran by age and sex in 1990 and 2010

All cause and both gender	Number of YLDs (thousands) [95% UI]			Rates of YLD (per 100,000) [95% UI]		
	1990	2010	%Δ ¹	1990	2010	%Δ ¹⁰
Ages						
Both sexes						
15-49 years	11,837 [7,086, 18,674]	23,962 [13,799, 37,794]	102.43	50 [30, 78]	52 [30, 83]	4.0
50-69 years	20,630 [12,713, 32,496]	32,018 [18,635, 48,889]	55.20	412 [254, 649]	369 [215, 563]	-10.43
70+ years	6,776 [4,176, 10,416]	19,164 [11,377, 28,906]	182.82	719 [443, 1,106]	726 [431, 1,095]	0.97
All ages	39,399 [24,232, 61,844]	75,297 [44,020, 115,996]	91.11	72 [44, 113]	102 [60, 157]	41.66
Age-standardized	-	-	-	140 [86, 219]	134 [78, 205]	-4.28
Male						
15-49 years	6,547 [3,724, 10,696]	13,907 [7,838, 22,510]	112.41	56 [32, 91]	60 [34, 97]	7.142
50-69 years	11,863 [6,828, 19,006]	18,131 [10,176, 28,386]	52.83	459 [264, 735]	419 [235, 655]	-8.71
70+ years	3,837 [2,257, 6,132]	11,371 [6,672, 17,597]	196.35	797 [469, 1,273]	814 [477, 1,259]	2.13
All ages	22,339 [13,166, 35,563]	43,503 [24,941, 68,414]		81 [48, 129]	116 [66, 182]	43.20
Age-standardized	-	-	-	155 [92, 248]	152 [88, 237]	-1.93
Female						
15-49 years	5,289 [3,141, 8,446]	10,056 [5,720, 15,977]		44 [26, 70]	45 [25, 71]	2.27
50-69 years	8,767 [5,147, 13,734]	13,887 [8,048, 21,892]		362 [212, 567]	319 [185, 503]	-11.87
70+ years	2,939 [1,740, 4,554]	7,793 [4,717, 11,983]		638 [378, 989]	627 [380, 965]	-1.72
All ages	17,061 [10,186, 26,746]	31,794 [18,920, 49,377]		63 [38, 99]	87 [52, 136]	38.09
Age-standardized	-	-	-	124 [74, 193]	115 [69, 178]	-7.25

¹Between 1990 and 2010; YLDs = Years lived with disability; UI = Uncertainty interval

Table 5: Percentage of total DALYs, deaths, YLLs, and YLDs attributed to ischemic heart diseases in Iran in 1990 and 2010

All ages, all causes, and both sexes	1990	2010
DALYs [95% UI]	6.89 [5.98, 8.00]	9.09 [7.64, 10.34]
Deaths [95% UI]	16.46 [14.50, 18.25]	25.43 [21.27, 28.31]
YLLs [95% UI]	9.26 [7.89, 10.59]	16.03 [12.99, 18.16]
YLD [95% UI]	0.68 [0.43, 1.01]	0.85 [0.52, 1.23]

DALYs = Disability-adjusted life years; YLLs = Years of life lost; YLDs = Years lived with disability; UI = Uncertainty interval

CONCLUSION

Despite decreasing age-standardized IHD of mortality, YLL, YLD, and DALY rates from 1990 to 2010 in Iran, the population growth and aging increased the global burden of IHD. In Iran, YLL has decreased more than IHD deaths and YLD since 1990 but IHD mortality remains the greatest contributor to disease burden.

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Conflicts of interest

There are no conflicts of interest.

AUTHOR'S CONTRIBUTION

MRM contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. MTI contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. RK contributed in the conception and design of the work, drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. AG drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. FS drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. RS contributed in the conception and design of the work, drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. SD contributed in acquisition of date, revising the draft, approving the final version of the manuscript, and agreeing with all aspects of the work. SM drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. HA contributed in acquisition of date, revising the draft, approving the final version of the manuscript, and agreeing with all aspects of the work. HA drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work. MQ contributed in the conception and design of the work, drafting and revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

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