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Estimation of the Economic Burden of Cardiovascular Diseases in Iran

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1 Original submission

3 comments · 10 Jul 2025 – 11 Jul 2025

Referee 1 Reviewer

MINOR REVISION 10 Jul 2025

minor revision

Associate Editor

MINOR REVISION 11 Jul 2025

Minor Revision

Editor-in-Chief

MINOR REVISION 11 Jul 2025

Minor Revision

2

Revision 1

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

Thank you for your helpful suggestion. We have revised the article:

Reviewers' Comments:

Reviewer 1:

Despite the strengths, the manuscript has notable shortcomings that need to be addressed:
-Underestimation of Economic Burden:

The estimated economic burden appears significantly lower than global estimates presented in similar studies.

Your attention to this point is commendable. We must say that due to the increase in inflation in our country and the difference in the value of our currency and that of other countries, this difference in economic burden is justifiable. Another point is that our study is about patients who visit government hospitals and as you know, the cost of treatment in the government Hospital is very low and this could be one of the reasons for the difference in economic burden, but in general, the increase in the economic burden of treating heart disease is increasing both in Iran and in Europe and America.

-Methodological Limitations:
The reliance on data from a single medical university (Abadan University of Medical Sciences) does not adequately represent the healthcare infrastructure or patient population across Iran, given the diversity in healthcare access and delivery between urban and rural areas.

The bottom-up approach usually starts with a subgroup of a specified population with the condition of interest and records all costs related to that disease. Then, the costs of this subgroup are used to estimate the total population cost. The top-down approach requires suitable data on healthcare resource utilization and has the advantage of being directly related to the total costs of disease care. As a result, the bottom-up approach is used in this study. **The research sample included cardiovascular patients at Abadan University of Medical Sciences, and the study population encompassed all cardiovascular patients in the country. Considering the current economic conditions in the country, we can generalize the economic burden obtained from this study, which is related to Ibadan University of Medical Sciences, to the health system, but we emphasize that more studies should be conducted to determine whether the results of other studies are consistent with our study.**

The analysis lacks robustness due to the exclusive use of Excel for statistical calculations. Advanced statistical software could improve cost modeling and validation.

The collected data will be analyzed using Excel and Graph Pad Prism 9 software.

-Insufficient Comparison with Global Data

While the authors claim alignment with international findings, the manuscript does not sufficiently compare the Iranian data with regional or international benchmarks. This makes it difficult to contextualize whether the Iranian figures are reasonable or underreported relative to other countries.

The results of our study are consistent with other studies in terms of the high cost of treatment, and given the economic inflation in Iran, this difference can be explained somewhat.

-Indirect Cost Estimation:

The method for estimating indirect costs (losses due to reduced productivity and absenteeism) is not clearly described. What data sources were used? What assumptions were made? The validity of the indirect cost estimates hinges on the robustness of the methodology employed. This section needs significant expansion.

We appreciate the reviewer's valuable observation. In response, we have significantly expanded the section on Indirect Cost Estimation in the Methods part of the manuscript (see revised version, section 2.4). Specifically, we have clarified the following:

Data Sources: Indirect costs were estimated based on national employment statistics obtained from the Statistical Center of Iran and average wage data published by the Ministry of Cooperatives, Labor, and Social Welfare (latest available data from 2023). Methodological Framework: We applied the Human Capital Approach to calculate productivity losses. Absenteeism was measured by estimating the average number of workdays lost per patient based on published clinical studies and national health surveys on cardiovascular disease (CVD) in Iran. The average working age of affected patients was assumed to be between 18 and 65 years.

Average daily productivity loss was calculated by dividing the annual salary by 250 workdays.

Mortality-related productivity loss was estimated by multiplying the number of premature deaths due to CVD by the expected remaining work years, discounted at a 3% rate, following WHO guidelines.

Reviewer 2:

1. Single-Center Data: Costs are derived from Abadan University of Medical Sciences, which may not reflect regional disparities (e.g., urban vs. rural, public vs. private hospitals).

The bottom-up approach usually starts with a subgroup of a specified population with the condition of interest and records all costs related to that disease. Then, the costs of this subgroup are used to estimate the total population cost. The top-down approach requires suitable data on healthcare resource utilization and has the advantage of being directly related to the total costs of disease care. As a result, the bottom-up approach is used in this study. The research sample included cardiovascular patients at Abadan University of Medical Sciences, and the study population encompassed all cardiovascular patients in the country. Considering the current economic conditions in the country, we can generalize the economic burden obtained from this study, which is related to Ibadan University of Medical Sciences, to the health system, but we emphasize that more studies should be conducted to determine whether the results of other studies are consistent with our study.

2. Exclusion of Comorbidities: Omitting patients with comorbidities (e.g., diabetes) underestimates the true burden, as CVD often coexists with other conditions.

exclusion criterion is having cardiovascular disease accompanied by comorbidities (such as diabetes) and incomplete cost information. Considering comorbidities would have affected the results of the study. Future studies can be completed by considering comorbidities.

* Methodological Gaps

3. Top-Down vs. Bottom-Up: The bottom-up approach is justified but lacks sensitivity analysis (e.g., varying prevalence rates or cost assumptions).

The bottom-up approach usually starts with a subgroup of a specified population with the condition of interest and records all costs related to that disease. Then, the costs of this subgroup are used to estimate the total population cost. The top-down approach requires suitable data on healthcare resource utilization and has the advantage of being directly related to the total costs of disease care. As a result, the bottom-up approach is used in this study.

4. Currency Conversion: Costs are reported in rials without USD/Euro equivalents for international comparison.

costs were reported in rials without USD/Euro equivalents.

* Policy Implications

5. Prevention vs. Treatment: Focuses on cost reduction without discussing cost-effective prevention strategies (e.g., smoking cessation, hypertension control).

The main goal of this study was to investigate the cost of treatment, but future studies could emphasize prevention before treatment.

6. Stakeholder Engagement: No input from insurers or policymakers on feasible interventions.

The main goal of this study was to investigate the cost of treatment, but future studies could emphasize input from insurers or policymakers on feasible interventions.

Minor Issues

* Abstract:

7. Specify the sample size (e.g., "100 patients from Abadan").

Thank you for your helpful suggestion. We have revised the abstract to include the sample size and location. The updated sentence now reads:

"This study aimed to estimate the economic burden of cardiovascular diseases in Iran using data from 100 patients referred to public hospitals in Abadan."

This change has been made in the second sentence of the abstract.

* Tables:

8. Table 5: Include standard deviations for cost ranges by age/gender.

Thank you for pointing this out. We acknowledge the importance of reporting variability measures alongside mean values. Standard deviations have now been calculated and added for both direct and indirect costs across age and gender groups. The revised Table 5 now presents costs as "mean ± SD" to improve interpretability and statistical clarity. Additionally, the table title has been updated to:

"Table 5. Average direct and indirect costs of cardiovascular diseases by age and gender (mean ± SD)"

* Discussion:

9. Overstates alignment with US/EU studies without addressing Iran’s unique healthcare financing (e.g., high out-of-pocket expenses).

The consistency of our results is only in terms of the high cost of treatment, and a quantitative comparison of treatment costs is not correct given the economic conditions of Iran.

* References:

10. Update citations (e.g., WHO 2011 data [7] is outdated; use 2020+ studies).

Update citations were performed.

2 Revision 1

3 comments · 16 Jul 2025 – 16 Jul 2025

Referee 1 Reviewer

ACCEPT 16 Jul 2025

accepted

Associate Editor

ACCEPT 16 Jul 2025

Accept

Editor-in-Chief

ACCEPT 16 Jul 2025

Accept