PEER REVIEW HISTORY

ARTICLE DETAILS

Title (Provisional)

Spatiotemporal distribution characteristics and impact factors of hepatitis C in Chongqing, China, 2014-2020

Authors

Chen, Saijuan; Wang, Qiuting; An, Yunyi; Chen, Ying; Liu, Hua; Tan, Weijie; Zhou, Xinyun; Xing, Dianguo; Zhang, Yan

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VERSION 1 - REVIEW

Reviewer	**1**
Name	**Chen, En-Qiang**
Affiliation	**Sichuan University West China Hospital, Infectious Diseases**
Date	**04-Sep-2023**
COI	**no**

The prevention and treatment of hepatitis C virus infection have made significant progress, and antiviral treatment for most hepatitis C patients can achieve satisfactory results. This article only focuses on the patient data of hepatitis C in a certain region and conducts some data analysis based on it. The research results have limited reference value for other regions or globally.

Reviewer	**2**
Name	**Feng, Haihuan**
Affiliation	**West China Hospital of Sichuan University**
Date	**10-Sep-2023**
COI	**I declare that I have no competing interests**

Line 237:What is the relationship between this analysis and the model? Is the analysis based on model fit results or on real data? If the analysis is based on the results of the model fitting, please list the specific values of the model fitting parameters.

Line 250:Is the analysis based on models or real data? What's the relationship to the model?

Reviewer	**3**
Name	**Oshinubi, Kayode**
Affiliation	**Northern Arizona University**
Date	**11-Mar-2024**
COI	**None**

In this study, the authors collected data on hepatitis C cases in Chongqing (located in the southwest direction of China) from 2014 to 2020, analyzed the spatio-temporal heterogeneity of hepatitis C incidence in different populations and identified factors that may influence the incidence of hepatitis C by constructing a Bayesian spatio-temporal model.

The article is well written and the methods are adequately described. I believe that after minor revisions, the article can be published in this journal.

Reference 3 is missing in the introduction.

Work on spacing between words. See the example on line 225. There are several others.

VERSION 1 - AUTHOR RESPONSE

3. Reviewer: 1

Dr. En-Qiang Chen, Sichuan University West China Hospital

Comments to the Author:

The prevention and treatment of hepatitis C virus infection have made significant progress, and antiviral treatment for most hepatitis C patients can achieve satisfactory results. This article only focuses on the patient data of hepatitis C in a certain region and conducts some data analysis based on it. The research results have limited reference value for other regions or globally.

Response: Thank you to the reviewer for the thorough review of this manuscript and for the valuable comments provided. As the reviewer noted, antiviral treatment for most hepatitis C patients can achieve satisfactory results, relevant studies indicated that direct-acting antivirals (DAAs) could achieve cure rates of over 95% in hepatitis C patients. However, in our country, the diagnosis rate for hepatitis C is 32%, and the treatment rate is only 11%, which is still far from the 2030 targets of a 90% diagnosis rate and an 80% treatment rate. Moreover, previous studies showed that only 56% of HCV-infected individuals are informed of their infection status, with HCV screening conducted in only 17% to 78% of high-risk

populations. This suggests a significant proportion of hepatitis C carriers remain undiagnosed within the general population, increasing the risk of hepatitis C transmission. Furthermore, surveys indicated that public awareness of basic hepatitis C knowledge is insufficient, with less than 40% of the public possessing adequate knowledge, and the incidence of hepatitis C continues to rise. Therefore, relevant authorities need to intensify efforts to prevent and control hepatitis C, particularly focusing on key locations and high-risk populations. This study analysed the spatiotemporal distribution characteristics and influencing factors of hepatitis C incidence across different regions and populations. The findings can serve as a reference for relevant authorities in implementing hepatitis C prevention and control measures.

Additionally, regarding the reviewer's concern about the limitation of this study on hepatitis C data in Chongqing, we acknowledge that this may constrain the generalisability of the findings. However, we believe that research focused on specific regions can still offer valuable insights for other areas with similar geographical or demographic characteristics. Firstly, the methods and analytical techniques employed in this study provide a potential framework for other researchers, who can apply similar approaches within their own regions to assess the spatiotemporal distribution characteristics of hepatitis C for prevention and control purposes. Secondly, our study incorporated a range of socio-economic factors to assess the extent of their impact on the incidence of hepatitis C, which are also present in many other regions around the globe. The analyses in this study allow for targeted interventions to prevent hepatitis C in similar regions. Finally, we are acutely aware of the limited generalisability of our findings. In subsequent research, we intend to broaden the geographical scope of our study to enhance the generalisability of our results. We extend our gratitude once again for your review and suggestions. We have emphasised the limitations of our findings' applicability to other regions or globally in the revised manuscript, as detail in lines 389-391.

4. Reviewer: 2

Dr. Haihuan Feng, West China Hospital of Sichuan University

Comments to the Author:

Line 237: What is the relationship between this analysis and the model? Is the analysis based on model fit results or on real data? If the analysis is based on the results of the model fitting, please list the specific values of the model fitting parameters.

Line 250: Is the analysis based on models or real data? What's the relationship to the model?

Response: We greatly appreciate the reviewer’s insightful questions and valuable comments. The analysis in line 237 pertains to the spatiotemporal distribution of relative risk of hepatitis C in the whole population. We utilised a Bayesian spatiotemporal model to analyse the characteristics of hepatitis C incidence risk in Chongqing, aiming to identify high-risk

areas and temporal trends. The analysis was based on the model fit results. A Bayesian spatiotemporal model typically includes temporal effects 〖(Φ〗_t), spatial effects (v_i+u_i), and spatiotemporal interaction effects (δ_it). The model assumes certain parameters, such as spatial and temporal effects, follow specific prior distributions. For instance, the prior distribution of the spatial structured effect u_i follows a Conditional Autoregressive (CAR) process, while the prior distribution of the temporal effect 〖(Φ〗_t) follows an Autoregressive (AR) process. By employing Bayesian computational methods, such as the Markov Chain Monte Carlo (MCMC) algorithm, the model integrates spatiotemporal information from the data, estimates the posterior distribution of the parameters, and facilitates inference and prediction. In this section of the analysis, we calculated exp(Φ_t) to observe the overall temporal trend of the relative risk of hepatitis C incidence in the entire population of Chongqing from 2014 to 2020. Additionally, we calculated 〖exp(v〗_i+u_i) and exp(δ_it) to observe the spatial effects and spatiotemporal trends of hepatitis C incidence risk in the whole population. We did not include the specific values of the model's fitted parameters in the manuscript. Instead, we visualised the results of the parameter fitting using ArcGIS, presenting them in the form of maps， such as Figure 1.

In line 250, for the analysis of the spatiotemporal distribution characteristics of hepatitis C incidence risk among different genders, we divided the entire population of Chongqing into male and female groups for analysis. The Bayesian spatiotemporal model was decomposed into temporal effects 〖(Φ〗_t), spatial effects (v_i+u_i), and spatiotemporal interaction effects (δ_it). This allowed us to observe the overall temporal trend, spatial effects, and spatiotemporal trends of hepatitis C incidence risk for different genders. Similarly, the parameter fitting results were visualised as maps using ArcGIS, such as Figure 2.

5. Reviewer: 3

Dr. Kayode Oshinubi, Northern Arizona University

Comments to the Author:

In this study, the authors collected data on hepatitis C cases in Chongqing (located in the southwest direction of China) from 2014 to 2020, analyzed the spatio-temporal heterogeneity of hepatitis C incidence in different populations and identified factors that may influence the incidence of hepatitis C by constructing a Bayesian spatio-temporal model.

The article is well written and the methods are adequately described. I believe that after minor revisions, the article can be published in this journal.

Reference 3 is missing in the introduction.

Work on spacing between words. See the example on line 225. There are several others.

Response: We are very grateful to the reviewer for the recognition of this manuscript and for the invaluable suggestions provided. In the revised manuscript, we have meticulously checked each reference to ensure accurate citation and have adjusted the spacing between words.

We sincerely appreciate the time and effort invested by the editor(s) and reviewers in evaluating our manuscript. Again, thank you for giving us the opportunity to strengthen our manuscript with your valuable comments and queries. We have worked hard to incorporate your feedback and hope that these modifications have answered the questions and suggestions you have raised well.

Yours sincerely,

Saijuan Chen

VERSION 2 - AUTHOR RESPONSE