Research Article

A Comparative Study of Five-Year Dengue Mortality in Madhya Pradesh and Chhattisgarh

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Introduction: Dengue is the most widely dispersed mosquito-borne illness, and infected Aedes species mosquitoes convey it. The four dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) of the Flavivirus genus cause dengue infection in humans. According to the WHO classification from 1997, there are three different types of symptomatic dengue virus infection: dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS). Dengue fever is prevalent in more than 100 nations, with the majority of cases coming from the WHO's Western Pacific, South-east Asia, and Americas areas.

Methods: This retrospective analytical study was done using the Global Burden of Disease Compare (GBD Compare) tool, where the data of Madhya-Pradesh and Chhattisgarh State for the five-year duration from year 2013 to year 2017 was collected. Factors studied included Dengue Mortality as a percentage of total-all-cause mortalities, its range, and annual percent change (APC).

Result: Despite of resonating year-wise results of percentage of total all cause mortalities in MP (0.17, 0.34, 0.19, 0.35, 0.21%) and Chhattisgarh (0.17, 0.38, 0.19, 0.39, 0.21%), there is alarming difference of APC in MP (2.702, 6.11, 2.72, 6.11, 2.72%) and Chhattisgarh (4.19, 4.75, 4.19%,4.75%,4.19%). The mortality and its range are proportionate to APC in MP, whereas APC is found high despite of the mortalities of dengue being same in MP and Chhattisgarh.

Conclusion: Addressing the complexities of morbidity and mortality trends requires a multifaceted approach that considers age, gender, and regional differences. By doing so, researchers can contribute to a more nuanced understanding of disease profiles, paving the way for targeted interventions and policies that address the specific health needs of diverse populations.

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Introduction

Dengue is the most widely dispersed mosquito-borne illness, and it is conveyed by infected Aedes species mosquitoes. The four dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) of the Flavivirus genus cause dengue infection in humans. According to the WHO classification from 1997, there are three different types of symptomatic dengue virus infection: dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS).[1] Dengue fever is prevalent in more than 100 nations, with the majority of cases coming from the WHO's Western Pacific, South-East Asia, and Americas areas.[2] Dengue is the most common reason for hospitalization in India and is endemic in practically all states. Prior to a few decades, dengue fever was primarily urban-based, but reports today also come from peri-urban and rural areas.[2,3] The National Vector Borne Disease Control Programme (NVBDCP) the Integrated Disease Surveillance Programme (IDSP) and a network of 52 Virus Research and Diagnostic Laboratories (VRDL) established by the Department of Health Research all work together to conduct dengue fever surveillance in India.[4] High dengue disease burden and frequent outbreaks result in a serious drain on country's economy and stress on the health systems. Dengue has entrapped almost all Madhya-Pradesh and Chhattisgarh State districts in addition to other adjoining States of India. Hence, there is a need to study the patterns of Dengue infection and compare mortalities in two States, which were parts of undivided Madhya Pradesh before 1st November, 2000.

Methodology

This retrospective analytical study was done using the Global Burden of Disease Compare (GBD Compare) tool where the data of Madhya-Pradesh and Chhattisgarh

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State for a five-year duration from year 2013 to year 2017 was collected. GBD Compare allows users to:

- Explore trends over time: Users can examine trends in diseases, injuries, and risk factors from 1990 to the most recent available year.
- Compare across regions and countries: Users can compare the burden of diseases, injuries, and risk factors across different countries or regions.
- Analyze specific health metrics: GBD Compare offers a wide range of health metrics, including mortality rates, years of life lost (YLL), years lived with disability (YLD), disability-adjusted life years (DALYs), and more.
- Visualize data: The tool provides various visualization options, such as charts, graphs, and maps, to help users understand and interpret the data more effectively.
- Customize analyses: Users can customize their analyses by selecting specific diseases, injuries, risk factors, age groups, and other relevant parameters.

For India specifically, GBD Compare provides detailed information on the burden of diseases, injuries, and risk factors within the country. Users can explore how various health indicators have changed over time, compare India's health outcomes with those of other countries, and identify key areas for intervention and improvement in public health policy and practice. Overall, GBD Compare is a valuable resource for policymakers, researchers, public health professionals, and other stakeholders interested in understanding and addressing the global disease burden.[5]

Factors studied included Dengue Mortality as percentage of total-all-cause mortalities, its range, and annual percent change (APC). MP and Chhattisgarh compared these indicators. Analysis was supported qualitatively by dengue risk assessment related meta-analysis and systematic reviews. The data analysis was done using Microsoft Excel.

Ethical Approval

Since the data was available on open portal, the ethical approval is not required.

Source of Data

Global Burden of Disease Compare (GBD Compare) tool

Table 1: Five-year all-cause mortality: Madhya Pradesh, Year 2013-2017

S. No.	*Particulars*	*2013*		*2014*		*2015*		*2016*		*2017*	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
1	% of all-cause mortality	0.17	0.17	0.18	0.19	0.19	0.19	0.19	0.2	0.2	0.21
2	Range	0.012-0.23	0.0095-0.25	0.014-0.27	0.01-0.27	0.013-0.28	0.011-0.29	0.014-0.3	0.012-0.31	0.015-0.32	0.013-0.33
3	Annual Percent Change (APC)	2.24	3.28	2.24	3.28	2.24	3.28	2.24	3.28	2.24	3.28

Table 2: Five-year all-cause mortality: Chhattisgarh, Year 2013-2017

S. No.	*Particulars*	*2013*		*2014*		*2015*		*2016*		*2017*	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
1	% of all-cause mortality	0.22	0.11	0.24	0.12	0.25	0.13	0.26	0.13	0.27	0.14
2	Range	0.01-0.33	0.0068-0.17	0.012-0.37	0.0077-0.19	0.012-0.39	0.0082-0.2	0.012-0.42	0.0089-0.21	0.013-0.46	0.0095-0.23
3	Annual Percent Change (APC)	4.3	4.03	4.3	4.03	4.3	4.03	4.3	4.03	4.3	4.03

Table 3: Comparative percentage of all-cause mortality: Madhya Pradesh vs Chhattisgarh

Particulars	*2013*			*2014*			*2015*			*2016*			*2017*		
	M	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*
Madhya Pradesh	0.22	0.11	0.17	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.2	0.2	0.2	0.21	0.21
Chhattisgarh	0.22	0.11	0.17	0.24	0.12	0.19	0.25	0.13	0.19	0.26	0.13	0.2	0.27	0.14	0.21

Results

Firstly, the mortality rates in both states exhibit fluctuation over the years. In MP, the percentages of total all-cause mortalities vary annually: 0.17, 0.34, 0.19, 0.35, and 0.21%. Similarly, in Chhattisgarh, the rates fluctuate: 0.17, 0.38, 0.19, 0.3, and 0.21%. Despite these fluctuations, a proportional relationship between mortality rates and APC in MP seems to exist. However, Chhattisgarh consistently demonstrates higher APC figures than MP, indicating potentially different underlying factors that influence mortality rates (Table 1).

Examining the APC figures, it's evident that while MP experiences fluctuations in APC from year to year (ranging from 2.72–6.11%), Chhattisgarh maintains a more stable APC, albeit at a consistently higher level (ranging from 4.19–4.75%). This disparity suggests that possibly unique factors drive mortality trends in each state, leading to differing rates of change over time (Table 2).

Interestingly, despite similar percentages of mortalities attributed to dengue in both states, Chhattisgarh exhibits higher APC figures. This implies that while dengue might contribute to overall mortality, other factors not specific to dengue likely influence the overall mortality rates and APC in Chhattisgarh.

Gender-specific observations reveal maximum and minimum mortality rates for both males and females over the observed years. In MP, the maximum mortality for males occurred in 2013 (0.22), while for females, it was in 2017 (0.21). Conversely, the minimum mortality for males was in 2014 (0.18), and for females, it was in 2013 (0.11). These fluctuations are consistent with the general trend of varying mortality rates over time (Table 3).

Similarly, Chhattisgarh shows fluctuations in gender-specific mortality rates, with maximum mortality for males in 2013 (0.22) and for females in 2017 (0.21). Minimum mortality for males was observed in 2014 (0.18), while for females, it was in 2013 (0.11). These observations suggest that gender-specific factors may play a role in mortality trends in both states (Table 4).

Lastly, the stationary nature of APC during consecutive years (2013-2017) in both MP and Chhattisgarh further emphasizes the consistency of mortality rate changes over time. In MP, APC remains relatively stable across genders, with figures ranging from 2.24 to 3.28%. Similarly, in Chhattisgarh, APC figures remain consistent, ranging from 4.03 to 4.3%. This stability indicates a consistent trend in mortality rate changes over the observed period (Table 5).

Discussion

In order to comprehensively address the pressing issues surrounding morbidity, mortality, and disease dynamics, a detailed exploration of the trends in communicable and non-communicable diseases is essential. This involves an in-depth analysis of various factors, such as morbidity rates, causes of diseases, risk factors, etiology, impairment, injuries, and deaths, while considering age and gender distributions. To facilitate a thorough examination, assessing these trends across different years and comparing them inter-state is imperative.

While numerous studies have been conducted on individual diseases in various geo-social settings, there is a noticeable gap in comprehensive research that spans administrative regions. Consequently, there is a need for a broader approach that integrates data from diverse regions to gain a holistic understanding of disease profiles. The study by Bhatt S *et al*. emphasizes the universal relevance of socioeconomic factors in

Table 4: Comparative range of dengue mortality (%): Madhya Pradesh vs Chhattisgarh

Particular	2013			2014			2015			2016			2017		
	M	F	B	M	F	B	M	F	B	M	*F*	*B*	*M*	*F*	*B*
Madhya Pradesh	0.012-0.23	0.0095-0.25	0.018-0.22	0.014-0.27	0.01 -0.27	0.021-0.25	0.013-0.28	0.011-0.29	0.022-0.26	0.014-0.3	0.012 -0.31	0.023-0.27	0.015-0.32	0.013 -0.33	0.024-0.29
Chhattisgarh	0.01 -0.33	0.0068-0.17	0.014-0.24	0.012-0.37	0.0077-0.19	0.016-0.27	0.012-0.39	0.0082-0.2	0.017-0.29	0.012-0.42	0.0089-0.21	0.017-0.31	0.013-0.46	0.0095-0.23	0.019-0.33

Table 5: Comparative annual percentage change (APC) of dengue mortality: Madhya Pradesh vs Chhattisgarh

Particulars	*2013*			*2014*			*2015*			*2016*			*2017*		
	M	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*	*M*	*F*	*B*
Madhya Pradesh	2.24	3.28	2.72	2.24	3.28	2.72	2.24	3.28	2.72	2.24	3.28	2.72	2.24	3.28	2.72
Chhattisgarh	4.3	4.03	4.19	4.3	4.03	4.19	4.3	4.03	4.19	4.3	4.03	4.19	4.3	4.03	4.19

dengue risk assessment.[6] By including socioeconomic covariates in assessments of dengue risk, researchers and policymakers can gain a more comprehensive understanding of the factors influencing the spread of the disease and develop more effective strategies for prevention and control

The study examining the mortality of dengue underscores a critical concern – the reported Age-Period-Cohort (APC) trends for both male and female populations have remained constant over a five-year period in Madhya Pradesh and Chhattisgarh. This uniformity raises questions about the accuracy of the data and necessitates a meticulous verification process to ensure the reliability of the findings. This has been observed in the study done by Kakkar M where India reported only an average of 4.2% of the total number of cases reported in the World Health Organization South East Asia region between 2000 and 2010.[7]

Intriguingly, the disproportionate relationship between APC and mortalities observed in Chhattisgarh prompts a deeper exploration. Geo-socio-behavioural differences may contribute significantly to this phenomenon, and a partial explanation might lie in conducting meta-analyses or systematic reviews. These methodologies can unveil hidden nuances in the data by considering the broader context of social, cultural, and behavioural factors that influence disease patterns.

By conducting a comprehensive inter-state comparison, researchers can unravel unique insights into the variations in disease dynamics. This approach goes beyond individual disease studies and enables a more robust understanding of the health landscape. Moreover, it emphasizes the importance of collecting accurate and representative data and considering the contextual factors that might influence disease patterns in diverse geographical and social settings.

Conclusion

Addressing the complexities of morbidity and mortality trends requires a multifaceted approach that considers age, gender, and regional differences. By doing so, researchers can contribute to a more nuanced understanding of disease profiles, paving the way for targeted interventions and policies that address the specific health needs of diverse populations.

References

1. Bhatt P, Sabeena SP, Varma M, Arunkumar G. Current. Understanding of the Pathogenesis of Dengue Virus Infection. Curr Microbiol. 2021;78(1):17-32. doi: 10.1007/s00284-020-02284-w.
2. Guleri SK *et al*. Community awareness on dengue and practices of mosquito bite prevention in urban residents of a central Indian city, Sagar, Madhya Pradesh. Int J Community Med Public Health;6(6):237-2362. DOI:10.18203/2394-6040.ijcmph20192079
3. Anoop M, Issac A, Mathew T, Philip S, Kareem NA, Unnikrishnan R, Sreekumar E. Genetic characterization of dengue virus serotypes causing concurrent infection in an outbreak in Ernakulam, Kerala, South India. Indian J Exp Biol. 2010;48(8):849-57. doi: 10.4103/ijmr.IJMR_452_16.
4. National Vector Borne Disease Control Programme: Ministryof Health and Family Welfare GOI. Availablefrom:https://main.mohfw.gov.in/?q=organisation%2FDepartments-of-Healthand-Family-Welfare%2Fnational-vector-borne-disease-controlprogramme [last accessed on: 20th February, 2024]
5. Global Burden of Disease Compare: India (GBD India) Tool. Available online as-https://vizhub.healthdata.org/gbd-compare/india.[Last accessed on: 20th February, 2024]
6. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, *et al*. The global distribution and burden of dengue. Nature.2013; 496:5047. doi: https://doi.org/10.1038/nature12060.
7. Kakkar M. Dengue fever is massively under-reported in India,hampering our response. BMJ. 2012;345: e8574. doi: 10.1136/bmj.e8574. PMID: 23255584.