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Nature of Complex Network of Dengue Epidemic as a Scale-Free Network

By: [Malik, HAM](#) (Malik, Hafiz Abid Mahmood)^[1]; [Abid, F](#) (Abid, Faiza)^[2]; [Mahmood, N](#) (Mahmood, Nadeem)^[3]; [Wahiddin, MR](#) (Wahiddin, Mohamed Ridza)^[4]; [Malik, A](#) (Malik, Asif)^[5]

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Abstract

Objectives: Dengue epidemic is a dynamic and complex phenomenon that has gained considerable attention due to its injurious effects. The focus of this study is to statically analyze the nature of the dengue epidemic network in terms of whether it follows the features of a scale-free network or a random network. Methods: A multifarious network of *Aedes aegypti* is addressed keeping the viewpoint of a complex system and modelled as a network. The dengue network has been transformed into a one-mode network from a two-mode network by utilizing projection methods. Furthermore, three network features have been analyzed, the power-law, clustering coefficient, and network visualization. In addition, five methods have been applied to calculate the global clustering coefficient. Results: It has been observed that dengue epidemic follows a power-law, with the value of its exponent $\gamma = -2.1$. The value of the clustering coefficient is high for dengue cases, as weight of links. The minimum method showed the highest value among the methods used to calculate the coefficient. Network visualization showed the main areas. Moreover, the dengue situation did not remain the same throughout the observed period. Conclusions: The results showed that the network topology exhibits the features of a scale-free network instead of a random network. Focal hubs are highlighted and the critical period is found. Outcomes are important for the researchers, health officials, and policy makers who deal with arbovirus epidemic diseases. Zika virus and Chikungunya virus can also be modelled and analyzed in this manner.

Keywords

Author Keywords: [Dengue Virus](#); [Arboviruse](#); [Epidemics](#); [Big Data](#); [Network Meta-Analysis](#)

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Author Information

Reprint Address: Malik, HAM (reprint author)

AMA Int Univ, Dept Comp Sci, Salmabad, Bahrain.

Addresses:

[1] AMA Int Univ, Dept Comp Sci, Salmabad, Bahrain

+ [2] King Khalid Univ, Dept Comp Sci, Abha, Saudi Arabia

+ [3] Univ Karachi, Fac Comp Sci, Dept Comp Sci, Sindh, Pakistan

+ [4] Int Islamic Univ, Fac Informat & Commun Technol, Selangor, Malaysia

+ [5] Govt Coll Univ, Dept Sci, Lahore, Pakistan

E-mail Addresses: hamalik@amaui.edu.bh

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