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Socio-Cultural Practices and Environmental Determinants for Dengue Incidences: a Case Study of Jaipur City

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Abstract

This study is conducted to determine the interrelationship between socio-cultural factors and incidence of Dengue in the city of Jaipur. The subjects of survey include both Dengue affected as well as non-affected households. Socio-cultural and socio-economic factors such as sanitation, housing patterns, mode of ensuring water coverage, prevention against mosquito breeding, frequency of water supply and waste disposal techniques have been investigated to understand DF/DHF/DSS incidences. This study further draws a connection between the socio-cultural practices and spatial distribution of Dengue by examining the affected and unaffected areas using GIS. Through systematic analysis, this study tried to identify the social risk indicators that contribute to increase in the disease transmission. This paper has identified four levels of risk in Jaipur. It could be presumed that any preventive step mentioned in this study to address the socio-cultural practices would prove helpful in reducing cases of Dengue through implementation of various preventive and control management strategies. The final outcome of the study offers a valuable guidance for planning preventive measures and managing the DF/DHF/DSS transmission.

Keywords: Spatial relationships, Dengue, Transmission, DF/DHF/DSS, socio-cultural

Introduction

The incidence of dengue virus infection first recorded in humans are not known, wherein the study by Garrett, dengue has been illustrated in Africa in the Swahili language the term "ki denga pepo," which means, "a sudden overtaking by a spirit" (Garrett, 1994). The first clinically identified dengue epidemics transpire almost concurrently in many parts of the colonial world, namely Asia, Africa, and North America in the 1780s. The term "dengue" has been adopted by the Spanish to describe an epidemic in the Spanish West Indies from 1827-1828 (Garrett, 1994; Holmes 1998). Dengue viruses belong to family *flaviviridae*, and there are four types of serotype which are primarily transmitted by *Aedes aegypti* and *Aedes albopictus* mosquito (Shrivastava, et al., 2012).

Over the last two decades, climatic change on a global scale has significantly contributed to the rise in the transmission rate of dengue cases globally. The ever-increasing greenhouse gases, exponential rise in global temperature are encountering the spread of vector habitat, mainly caused by anthropological factors (Pham, et.al., 2016). There are a large number of studies that have substantiated that a change in the climatical factors can significantly influence various aspects of the vector's life cycle and survival, the vector population, vector distribution, vector behaviour and vector pathogen association. (Kuno, 1995, Gubler, 2002). Lately there have been few studies that scrutinise several other non-climatic aspects like human population growth, human migration, socio-economic constraints as resulting to the spread of dengue transmission to new geographical regions (Sitepu, et.al., 2013,

Coosemansand Mouchet, 1990). The population growth explosion in developing countries became a causative factor for the rise of dengue transmission and expansion (Gubler, 2011).

Dengue Fever (DF) is related to Dengue Shock Syndrome (DHF/DSS), also known as Haemorrhagic fever that has been identified as a public health concern across the Western Pacific and South-East Asian countries (WHO, 1975). DHF/DSS was known in India since the beginning of 19th century. We have reports of occurrence of this epidemic from all across the country. Ajmer city was the first recorded case of dengue fever outbreak during year 1974 (Padbidri, et.al., 1973) and during the year 1973 in Jaipur (Ghosh, et.al., 1974). As per observation, the outbreak of Dengue fever in Jaipur generally occurs during Post-monsoon season (Late August to late November). More or Less all Investigation and studies have emphasized on the entomological, clinical and biological aspects of DHF/DSS/DF. The spatial studies have shown the inadequacy of an integrated use of socio-cultural practices. Therefore, the need of the hour is a thorough exploration of the association between socio-cultural practices, and identification of common risk factors. This study is to assess, evaluate and scrutinise the epidemic situation and the linkage between socio-cultural practices and Dengue incidences. The investigation examines the sociocultural factors effecting the Dengue incidences (DF/DHH/DSS).

Materials and Methods

Study Area

The city of Jaipur is located in the eastern part of Rajasthan, approximately positioned equally from Alwar in the north-east and Ajmer in the south-west. The city was founded in 12th century BC by a Rajput king named Maharaja Sawai Jai Singh to substitute Amber as the capital city. Jaipur has grown consistently in size since the late 20th and 21st centuries. It is relatively densely populated, covering a total area of 467 sqkms. Its population has doubled between years 1991 - 2011. With a steady growth of 3%, the recent surveys have estimated the population to be about 3,073,350 with a density of 6,500 people per sq km. (Census of India web site). The dominant religions practiced here are Hinduism and Islam. As far as the climate is concerned, Jaipur is hot and semi-arid with long, sweltering summers and short, mild winters. The precipitation scale is 63 cm in the monsoon months of July and August. The average temperature in July and August are comparatively less than the drier months of May and June. Temperature can reach as high as 49˚c in the summer months. During monsoon season, Jaipur receives frequent thunderstorms and rain showers. Flooding is rare. In winter months the city's average temperature falls below 20˚c. The lowest temperature ever recorded was -3.0˚c in the year 2019.

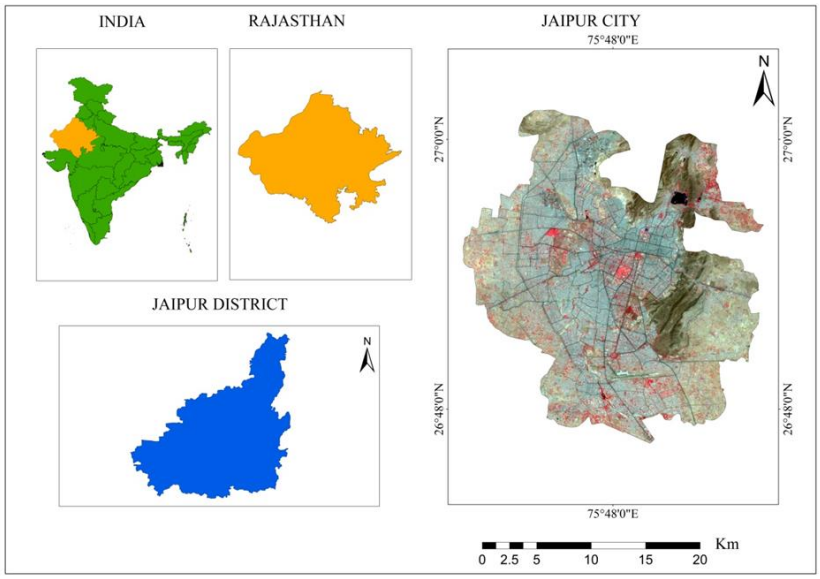


Figure no.1: Study Area

Primary Data

Data was directly collected from field survey. The questionnaire consisted of sixty questions related to DF/DHF/DSS. Survey methodology included personal interviews of people from both dengue affected and unaffected areas. The personal details of the interviewees included their family information, occupation, human dwellings patterns, mosquito preventive practices, knowledge and awareness of Dengue, sanitation and waste removal and disposal system, cultural habits in terms of health care and storage of water containers. Households were selected on the basis of sampling unit. The data on dengue reported patients were considered as a sample, and equal number non dengue patients were randomly sampled for the study were also interviewed.

Secondary Data

It included demographic aspects about the city, entomological data of Dengue, list of patients and reported deaths, physical environmental factors and administrative map. Demographic data was collected from government census survey report, reports of government/non-government organizations and recently published articles.

The factors with the unassailable positive or negative association are marked as significant indicators. All socio-cultural factors were selected on the basis of two types: (i) the empirical studies- an attempt was made to conflate associated factors into one group. (ii) The collected data was sorted into six sampled groups: Socioeconomic, pattern of human dwellings, mosquito protection techniques, environment and management practices, cultural behaviour for the technological adoptions, and water storage.

Jaipur city Wards

Jaipur city is administered by Municipal Corporation and Jaipur Development Authority. For ease of management, it t is divided into ten administrative zones or wards as shown below. The Census of India 2011 report suggests that the population of Jaipur is about 3,046,163 (male, 1,603,125 and female 1,443,038). The city is densely populated (6,500 residents per square kilometre). The area of Jaipur is 467 square kilometres. Among the wards, blocks 45 to 61 have a relatively higher density of population compared to others.

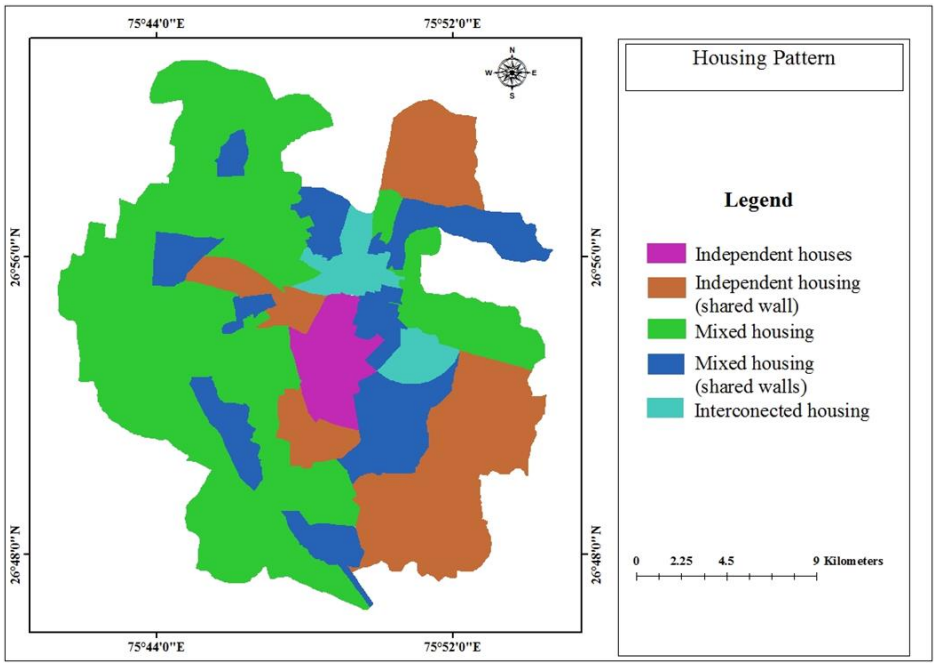


Figure No.2 Jaipur City Zone Map

Human Dwellings and Housing Patterns

Independent House: Where housing pattern is independent thus limiting the flight range of the vector (Aedes aegypti Mosquitoes) the transmission incidence reduces Mixed: In this type of housing pattern, the transmission of the disease remains high. Interconnected: High density of population, living short flight range of vector raises the tendency to the higher transmission of the disease.

Interconnected: The connected houses are those houses where the households share single walls. It has been observed that the density of population residing is significantly high.

Independent Houses: The housing where the household do not share single wall and have open space, thence localities catering independent housing have low density of population.

Mix houses: the housing pattern having both type of housing independent as well as interconnected housing type.

City Waste Management

Solid waste management of the city municipal the type of waste generated can be classifies as (a) Municipal waste (b) Biomedical waste (c) Industrial waste (d) Construction & demolition. The daily production of solid waste is estimated to around 1100 metric tons per day, out of which 200 to 250 metric tons are dispersed by the streets and localities it signifies that the waste removal efficiency is around 80%. As Jaipur is a rapidly developing city, it is essential to develop proper management system of waste in the city. The waste collection methods generally adopted by the majority of localities are door to door collection informal sectors with monthly charges of 40 to 50 rupees. These informal sectors are unreliable; the number of households can range from 60 to 80 in localities with independent to mix housing pattern whereas 150 to 200 households in localities with interconnected housing pattern. Contrasting to this view there are some localities where waste is dumped in the community bin or vacant plots, many localities of the city neither get their waste removed from the locality nor collected by the informal waste collectors.

Waste commutation resource: Jaipur Municipal Corporation (JMC) collect municipal waste through vehicles like loaders, dumpers, Refuse Garbage compactor, Dumper Placer, tractor trolley, road sweeper, battery rikshaw. The number of garbage collection vehicles under JMC are 115 and private contractors are 267, exposing the fact that majority of the municipal waste are transported through private contract that many times leads to delay in the waste removal.

Waste collection sites of the city: The collection sites in the city are distributed on bases of zones. Two collection point are demarcated at Hawamahal (Hawamahal East and Hawamahal West), one at motidungri, Civil LinesandVidhyadharnagar. Rest of the city do not have any collection site due to unavailability of allocated land the wastes are directly transferred from the locality to the bumping site.

Disposal and processing: There are three land fill sites in the city for the disposal of the garbage produced by the city Mathuradaspura located 17 kilometers east of the city, this site covers about half a square kilometers. The waste received by this site is approximately 350 tonnes per day. Sewapura is located 20 north of the city with half a square area and the waste received are 250 tonnes per day and Langadiyawas is located 21 kilometers east of Jaipur city it is spread over 1.2 square kilometers it is first scientifically developed sanitary landfill site of the city. This site receives 460 tonnes of waste per day (Pratap Singh, 2013)

Current scenario of Solid Waste Management (SWM) of the city is that even after there is prohibition of dumping of waste in open areas, it was observed that there is a limited area for storage of waste at the sources leading to open dumping at the streets, drains and vacant plots. The regular cleaning of roads is limited to some important streets in the walled city and some institutional roads only, this is due to the lack of labours mechanical cleaning equipment's. There is no system for segregated collection of waste most of the waste are mixed. There are only 1400 bins installed by the authorities which accounts to 30% of the required number. The existing scenario of covered transportation of waste is about 20 to 30 percent which includes Refuse Garbage Compactor, Dumper Placer and plastic or canvas sheet cover for Tractor trolley.

Results and Discussion

Socio-Cultural Practices

Periodicity of water storage containers cleaning regime: This study projects that the "number of days for cleaning water storage containers" had contributed to the significant rise in dengue cases. The Aedes aegypti mosquito can breed in domestic environment and breeding can take place in water containers which are not drained or sanitized at regular periods of time. The Aedes aegypti mosquito's eggs are laid on the damp walls of both artificial as well as natural containers, and they can resist dehydration for long periods ranging from numerous weeks to even numerous months. The eggs hatch's when deluge in water. Given that water is a necessary element for the initial first week for the mosquito's life cycle, if the regularity of cleaning practices is delayed beyond a week's time, it could accelerate the growth of mosquitoes and consequently lead to a rise in dengue incidences. Hence, water must be changed and water containers cleaned at least two times a week to control dengue transmission.

It was observed that people only cleaned those containers that were used for storing water. Whereas the rest that were used to carry water or for other domestic utility were not sanitized that often. Such containers were sanitized or cleaned after 10-15 days, sometimes after a month, or at times only once a year thus providing an ideal breeding ground for mosquitoes. Subsequently, this leads to the survival of eggs and larvae under domestic condition. These eggs and larva are transformed to mosquitoes as optimal temperature and humidity is attained which meets the requirements for the growth and survival of the vectors.

Installation of water coolers and Air-conditioning: In Jaipur, the use of water coolers and air-conditioning basically begins from the end of March or beginning of April to the end of July. It was observed that most coolers and air-conditioners were fitted on the window, along with other containers collecting water turn out to be optimal places for Aedes mosquito breeding habitat site which could lead to the dissemination of Dengue. These artificial habitats (cooler and air-conditioning) play a Cardinal role in the generation of secondary breeding site. With the onset of monsoon season, the breeding larvae habitat spreads from its natural breeding sites to the secondary breading sites. Mosquitoes lay their eggs during the Monsoon seasons or the damp periods (use of coolers and air-conditioning during summer). Whereas the condensing water tray of the Air conditioners (ACs) act as breeding site throughout the months of May to October. This study suggests a positive association of dengue incidence to the "use of water cooler/AC". (Katyal, et.al., 1996) Studies have highlighted that water cooler plays a crucial role in the breeding of mosquitoes that seems to validate in this study.

Uncovered containers of water for storage: open and stagnant water serve as an ideal breeding space for Aedes mosquitoes. Throughout the study, it was assumed that metallic or plastic drums, overhead or underground tanks, cement tanks were used to contain water within the households. Storing of water within houses is a common practice in the region, due to intermittent and irregular water supplies, apart from underground tanks most containers were kept uncovered except for underground tanks. This provides ideal breeding grounds for Aedes aegypti mosquitoes. Many studies stipulate those containers and earthen pitcher were significantly associated with dengue infection

(Koopman, et.al., 1991; Khera, et.al., 1992). This study argues that the water containers play a positive role in the occurrence of dengue incidence. It was noted that there is a significant rise in dengue incidences in the April and May months when water is scarce. The irregularity of water supply results in the increased practice of water storage. The habit of leaving water containers uncovered can provide ideal environment for breeding vector, while Aedes aegypti in the stored water of the houses and the risk of dengue incidence keeping a positive association.

The Protection measures of mosquitoes: presence of full wire net screens, use of mosquito nets, fumigating or creating smoke with Neem leaves, application of indoor residual spraying (IRS) or Insecticide vaporisers, the locking of windows and doors were the basic preventive measures against mosquitoes. And these measures can either help to provide protection or reduce the number of mosquitoes to minimize the increasing rate of dengue infection. This paper demonstrates that the "mosquito protection measures" very little association with dengue incidences.

Human dwellings or Housing pattern: The empirical studies have identified that populaces living near the short flight range of vector that is Aedes mosquitoes from its source of breeding are more exposed to the risk of transmission in high population density areas. Thus, high population density and congested housing patern can lead to higher transmission of virus and increased risk of infection. The transmission of virus is mostly restricted by the flight range of Aedes mosquitoes during their lifetime that ranges from 1.6 km/day in the open space (Honório, et.al., 2003), to few meters per day (Reiter, et.al., 1995), to below 50 meters in a compacted urban space (Morlan, et.al., 1958). With respect to urban space, the housing pattern is independent in nature, restricting the flight range also reduce the transmission of virus in the near future.

Water coolers cleaning: the factor "periodicity of cleaning of water coolers "impacting the dengue incidences. Usually, the extended period of water left to a cooler permits damp space and a waste formation which in turn provide nutrition among larval habitats. It allows the transmission and growth of mosquitoes and thus increases dengue risk. If the frequency of water cooler cleaning is high, then it may be fewer attempts of dengue infection. It can further be materialised as the evidence were given regarding the fact that cleaning of storage can prevent breeding of mosquitoes after clearing trash and garbage's.

Periodicity of water supply: However, the frequency of water supply has little to no association to Dengue incidences. Water supplies in most houses, especially during March to June were inadequate and not reliable. Water scarcity is resulting increased and prolonged storage of water for the purpose of domestic use in various kinds of containers; substantially, it becomes the breeding places for Aedes aegypti. The storage of water in the area; due to irregular supplies of water were the possible cause for higher concentration of vector in the study sampled, increasing transmission. It indicates that more infrequent supply of water; the more practice of storage water, the more presence of vectors leads to increase the transmission, growth and increased the risk of dengue infection.

Periodicity of waste removal regime: the periodical waste removal was another contributing factor which showed positive effect on the rise of dengue reports. The junk and waste around the

households create perfect breeding space. Dumping of daily wastes for 15 to 20 days reinforce the breeding places of mosquitoes and escalate the transmissions of virus. If the frequency of waste collection by local bodies or municipal staffs is regularized, it can check the breeding of Aedes and subsequently reduce Dengue transmission.

Proper solid waste management in the community and locality will ensure to destroy the breeding habitat for the vector, which involves preventing development of mosquito larvae. Study shows that the vectors have adapted to the urban lifestyle. The vector now breeds into manmade sites, for example, overhead water tanks, vehicle tyres, coconut shells, discarded plastic containers etc. Henceforth by reducing the breeding habitat for mosquitoes, we can control Dengue infection. Moreover, anti-larval control measures are cost effective and eco-friendly.

The socio-cultural and spatial parameters are crucial in determining the emergence and transmission of diseases. In this study, Geospatial techniques create the possible linkages between spatial data and related information, including sociocultural and socioeconomic indicators. The aim of developing spatial variation is to examine the geoinformatics applicability to identify the proliferated degree of spatial social risks in Jaipur and related this to the occurrence and transmission of dengue.

Contemplating the Socio-cultural Practices: The process of assigning "weights" to waste technique that was combined to the effects of social risk factors contributing to increase in Dengue incidence. A group of eight social indicators were identified from the systematic analysis to make a combined social risk category. Based on the empirical studies, the weights were further designate to their correlated indicators showing the risk of individual indicator. A constant weighing system was applied to make same uniformity among all social risk indicators. Weights ranged from one to three assigned to associated practices. Among the social risk criterion, high weightage (3) was assigned to the practices associated with a high prevalence of dengue, medium weightage (2) was assigned to the one presenting medium risk associated with the dengue prevalence and the value of low score (1) was assigned to the practice associated with lower prevalence of dengue. According to the risk criterion "frequency of waste removal", the value one was assigned to the short duration of practice that is once in 1to 4 days for removal of the waste, 2 to medium duration that is once in every 5 to 15 days and lastly 3 to longer duration that is over 15 days for removal of waste is in practices. Below, the weighing of all eight high-risk criterions is presented in the Table. Although the sociocultural practices are correlated to a set of eight social criteria which varied from one to other household and the scores were assigned separately for each household belonging to Dengue reported Cases and Dengue Unaffected Cases.

To get the social risk scores at the household, the scores were transformed into social risk levels. To explore the risk levels, four risk levels were classified (low, medium, high and very high) with a scores of one, two, three and four for the assigned risk levels.

Evolution of a Sociocultural Risk: The households that were taken as samples were geographically distributed and the information of social risk samples were collected and analysed. It can produce the spatially varied social risk levels. The spatial data points with their attributes were used in GIS techniques and spatial point-wise risk level maps were drawn. It was further explored by digitising

spatial locations of Dengue reported Cases and Dengue Unaffected Cases. Samples were collected which is identified in the administrative map of Jaipur, Rajasthan. On the map, locations of Dengue reported Cases and Dengue Unaffected Cases were overlaid. While the GIS database was initiated separately for Dengue reported and unaffected cases having proper information of the social risk levels.

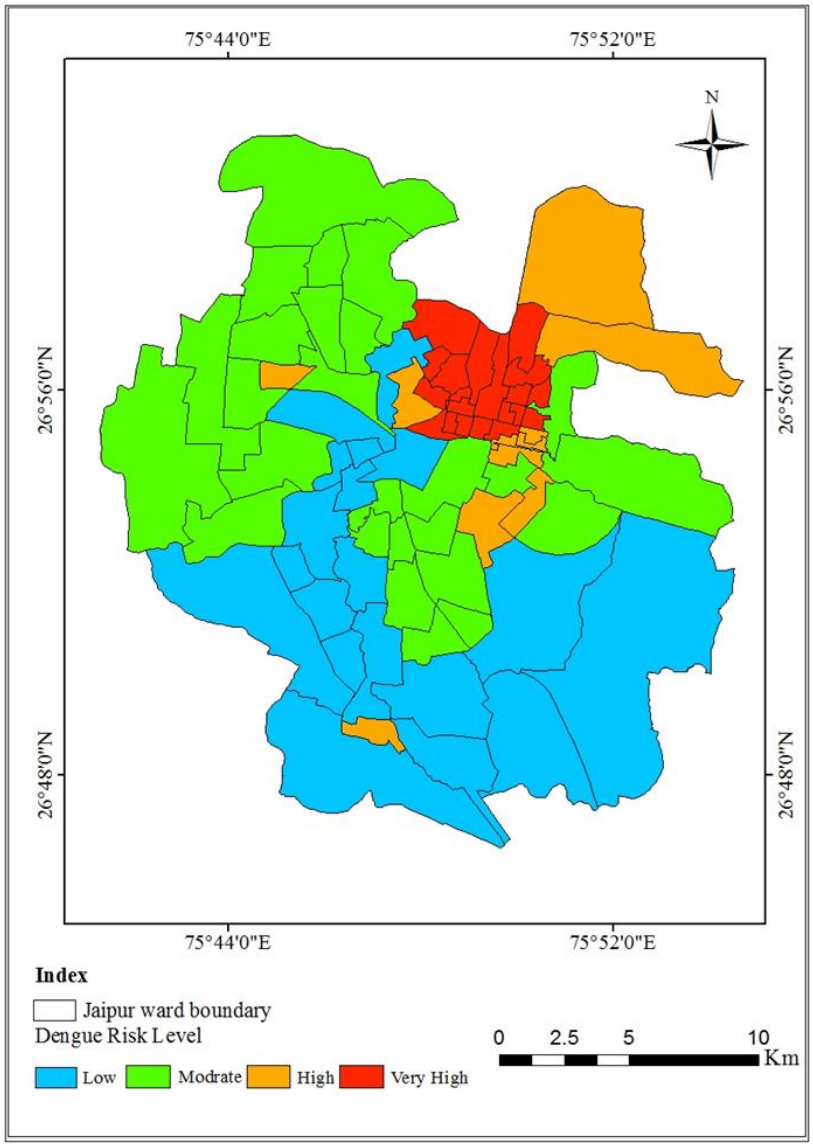
The nearest neighbourhood methods were used for extraction of socio-cultural map for the study. It provided place-specific to sociocultural risks of dengue incidence. The results are displayed in Figure5. The map presents geographical variation of the risk of socio-cultural levels that were identified in the whole analysis. This study indicates that a higher proportion of area had low social risk, while some densely populated areas had the higher risk, whereas significantly few areas fall within the medium risk overall, largely most of the parts of the city fall between low to medium socio-cultural risk.

S. No	Social risk indicators	Risk Scores	S. No	Social risk indicators	Risk Scores
1	**Periodicity of cleaning water storage containers in days** a. 1-4 days b. 5-15days c. Over 16days	 1 2 3	5	**Protection of storage of water container** a. Fully covered b. Sometimes c. Mostly uncovered	 **1** **2** **3**
2	**Housing pattern**		6	**Mosquito protection measures**	
	a. independent house	1		a. Screens	**1**
	b. Mixed	2		b. Insecticides	**1**
	c. Interconnected	3		c. Close windows	**2**
3	**Installation of water cooler and AC.**		7	**Periodicity Water supply**	
	a. 5 days/ month b. 6-10days/month c. Over15days or a month	1 2 3		a. Everyday b. Alternate c. Every 3days d. 4-7days	**1** **1** **2** **2**

4	**Periodicity of cleaning of water cooler**		**8**	**Periodicity of waste removal**	
	a. 1-4 days b. 5-15days c. Over 16days	1 2 3		a. Everyday b. Weekly c. Over15 days	**1** **2** **3**

Table No. 1. Social Risk Indicators and their Weightage

Where housing pattern is independent, thus limiting the flight range of the vector (Aedes aegypti Mosquitoes) the transmission incidence reduces, the mixed type of housing pattern the transmission of the disease remains high. The interconnected housing pattern constitutes in the high density of population, living short flight range of vector raises the tendency to the higher transmission of the disease. To generate social risk levels, eight indicators were selected from the systematic analysis and field visit to the houses with Dengue reported Cases and Dengue Unaffected Cases. Therefore, a map was developed to represent the spatial distribution of the socio-cultural risk levels, which were identified through differential analysis.Areas having low risk level of outburst are from ward Civil Lines, Sanganer, BagruAnsik, areas having moderate risk level are from wards including Vidhyadhar Nagar, JhotwaraAnsik, Malviya Nagar, AdarshNagar, areas having High risk level are from wards including AmerAnsik, HawaMahal ward No.76, Civil Lines ward No. 17, Sanganer ward No. 30, Adarsh Nagar ward No. 47,51,52,53 & 54, Malviya Nagar ward No. 46 and Vidhyadhar Nagar ward No. 9, whereas areas with very High risk level are from wards falling under walled up city of Jaipur comprising wards from kisan Pole and Hawa Mahal. Moreover, the study suggests that a higher portion of the area had lower social risk, while densely populated areas had higher risk, whereas significantly few areas fall within the medium risk. Overall, largely most of the parts of the city fall between low to medium socio-cultural risk.



The spatial and socio-cultural indicators are crucial in determining disease transmission and emergence of dengue cases in Jaipur. The Geospatial techniques provide a platform to generate association between spatial data and its illustrative information, which incorporate the socioeconomic as well as sociocultural factors. The spatial distribution determines Geoinformatics as a tool to reveal the escalated spatial social risks associated to Dengue cases and transmission in Jaipur.

The process of allocating "weights" was the most appropriate methods that possibly combined the effect of social factors contributing to the reported Dengue cases. To generate social risk category, in total eight social risk criteria were identified. Based on the literature review, the assigned weights were further associated to their parameters showing the risk of individual indicator. To control the uniformity of factors were allocated an equal weighing system. the socio-cultural practices of eight social risk criterion were spread from one to another household, these scores were assigned separately

for each of the households belonging to Dengue reported Cases and Dengue Unaffected Cases.

The frequent cleaning the water storage container in the households will turn out to be positive in curtailing dengue incidences. The mosquitoes generally breed in domestic spaces such as the water containers. If the water containers are not cleaned and emptied for a long period of time, Aedes aegypti usually lays eggs on the damp walls of natural and artificial containers and it is resistant to dehydration and could for several weeks to several months, therefore making most adaptive to urban life style. Jaipur being the capital of all state of Rajasthan, it attracts population from nearby rural sectors apart from that Jaipur has been known for its tourist attraction which facilities more migration of population most of the densely populated region of Jaipur city is the walled up old city where human dwelling and housing pattern is interconnected with high density of population and poor practice in cleaning of water containers.

The uncovered water storage containers play ideal breeding grounds for the vectors; in this study it was observed that cemented, metallic or plastic water tanks are appropriate habitat for the mosquitoes. (Koopman, et.al., 1991) stipulated that earthen pitchers and other water containers have significant association with dengue transmission in his study "Determinants and predictors of dengue infection in Mexico, American Journal of Epidemiology". Installation of water coolers and Air-conditioning is generally during summer season starting from the month of April to September. Air cooler and AC water outlet plays a cardinal role in providing suitable habitat to vectors leading to the outburst of Dengue incidence in the urban sectors.

Protection measures against mosquitoes are important control measure to mitigate the dengue transmission. The first and foremost step is to prevent the entry of adult mosquitoes into human dwellings, mosquito nets. For personal protection and prevention, one must adapt using mosquito repellents and fully covered or protective cloths. Application of insecticides like spray for instant results, residual sprays for long running effect throughout the day and insecticide vaporizers. Installation of wire net screens on the doors and windows, fumigating or creating smoke with Neem leaves.

The Aedesaegypti’s flight is ranged from 1.6 km in a day in the open environment (Honório, et.al., 2003), to less than 25 to 50 meters in a compacted urban space (Morlan, et.al., 1958). In an urban area, where the human dwellings are densely populated and the housing pattern is interconnected in nature, the independent housing pattern limits the flight range and, therefore reducing the transmission rate of the disease in near feature. In Jaipur city administration region, the housing pattern varies from being interconnected with high density of population, moderate density population with mix building pattern and independent house dwelling with low density of population. Based on the spatial distribution of housing pattern in the city the Dengue coincides with the Dengue reported cases.

Digitizing spatial locations of houses of Dengue reported Cases and Dengue Unaffected Cases samples were collected which is located in the Jaipur administrative map. The socio-cultural risk levels were identified throughout various analysis. Thelow risk level of outburst is from Civil Lines, Sanganer, BagruAnsik, moderate risk level is from Vidhyadhar Nagar, JhotwaraAnsik, Malviya Nagar, Adarsh Nagar, High risk level are AmerAnsik, HawaMahal and few other words like, ward No. 9,17, 30,51,52,53 & 54,46

and 47 whereas areas with very High risk level are from wards falling under walled up city of Jaipur comprising wards from kisan Pole and Hawa Mahal. The study shows that a large area falls under low social risk, whereas some densely populated areas projected high risk, there are few significantly areas falling within the medium risk. Overall, of the city can be termed as low to medium socio-cultural risk when it comes to dengue outbreak.

Conclusion

The estimation of socio-cultural risk factors, the study has investigated the dengue-endemic area in Jaipur. The results reveal that the socio-cultural factors, including prevention of mosquitoes, housing patterns, lack of waste management, interim water supplies, water storage due to poor water supplies during summer months, storage water for the short period of time, for domestic and other uses strongly affected the dengue cases. Water storage in the houses may have created favourable environment for breeding of mosquitoes which led to a more significant vector presence. Overall, the analysis presented well adaptive techniques in revealing the significant socio-cultural risk factors and shared increased rate of transmission of diseases. It can be concluded that if any effective measures can alter the prevailing socio-cultural practices, there would be significant effects in reduction of dengue incidence. This spatial analysis provides an in-depth information for planning preventive control measures and in management of the spread of Dengue incidence. The objective of the study constructed a relationship with households and socio-cultural practices with Dengue occurrence. The study has the efficacy for identifying into four levels Dengue incidences in Jaipur. The study contributes broadly to the spatial prediction of socio-cultural risk levels in Jaipur. Thus, this approach can help to focus on implementing preventive measure and controlling the management strategies to control and monitor the dengue incidences most effectively.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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