International Journal of Mosquito Research

ISSN: **2348-5906**
CODEN: **IJMRK2**
IJMR 2021; 8(4): 11-15

www.dipterajournal.com
Received: 07-05-2021
Accepted: 09-06-2021

Gurpreet Kaur Basra
National Vector Borne Disease Control Programme
DGHS, Min. of H&FW, 22-Sham Nath Marg, Delhi, India

Sandeep Rohilla
National Vector Borne Disease Control Programme
DGHS, Min. of H&FW, 22-ShamNath Marg, Delhi, India

Sandeep Rohilla
National Vector Borne Disease Control Programme
DGHS, Min. of H&FW, 22-Sham Nath Marg, Delhi, India

Corresponding Author:
Gurpreet Kaur Basra
National Vector Borne Disease Control Programme
DGHS, Min. of H&FW, 22-Sham Nath Marg, Delhi, India

Prevalence of *Aedes aegypti* in Shahdara Zone, Delhi, India

Gurpreet Kaur Basra, Sandeep Rohilla and Sukhvir Singh

DOI: https://doi.org/10.22271/23487941.2021.v8.i4a.543

Abstract
Delhi is a union territory and the capital of India. There are three municipal corporations in Delhi viz. North Delhi Municipal Corporation (NDMC), South Delhi Municipal Corporation (SDMC) and East Delhi Municipal Corporation (EDMC). Out of total 12 zones in Delhi, two zones are under EDMC namely Shahdara South and Shahdara East. Entomological surveys were carried out in different localities of Shahdara East zone of Delhi from January to December 2019 with the view to study the prevalence of *Aedes aegypti* mosquito for required intervention. Random houses were selected for checking all type of water filled containers in and around the houses. The immature stages of *Aedes aegypti* were collected during larval surveys. Density prevalence level was recorded using different indices. House Index (HI) in the study area was highest in the month of October. However, HI started increasing from August. Container Index (CI) and Breteau index (BI) were also highest in the month of October and increase was found from August, the larval breeding was negligible during winter season. It was also observed during the study that plastic containers were the most preferred breeding habitats. The study concluded that timely intervention including sustained vector surveillance could help in controlling upsurge of Dengue in densely populated areas of Shahdara zone.

Keywords: dengue, *Aedes aegypti*, larval indices, surveillance

Introduction
Dengue a mosquito borne infection is currently one of the most important arboviral disease found in tropical and subtropical regions [1] and is responsible for significant morbidity and mortality especially in tropical countries [2]. Disease is caused by four serotypes DENV1, DENV2, DENV3 and DENV4 which are closely related, yet antigenically distinct [3]. All four serotypes can cause a spectrum of illnesses ranging from inapparentor mild febrile dengue fever to severe and fatal haemorrhagic disease [4, 5]. It is mainly transmitted by *Aedes aegypti* mosquito and also by Aedes albopictus [6].

India is one of the most susceptible countries to Dengue epidemic. In India, the epidemiology of dengue fever has been very complex and has significantly changed over past six decades (1960-2019) in terms of disease severity, prevalent strains and affected geographical areas. Major dengue outbreaks were recorded over the last few decades from almost all parts of the country. During 1996, one of the most severe outbreaks of dengue fever (DF) occurred in Delhi with reporting of a total 10252 cases and 423 deaths (country total was 16517 cases and 545 deaths). Following this, DENV-1 was reported in the post epidemic phase [7]. A study carried out in 2006 shows the co-circulation of all the four dengue serotypes with and high percentage of concurrent infections [8]. The major dengue outbreak in northern India in 2003 and 2004 was caused by dengue virus type-3 (subtype III). The reemergence of highly fatal subtype III of DEN-3 in a dominant form, replacing the earlier circulating subtype IV of DEN-2 in India is a matter of great concern. Detailed and continuous epidemiological surveillance is warranted to monitor the incursion and spread of dengue viruses, which will help to undertake effective control and management strategies at the earliest[9]. In 2006, the country witnesses an outbreak of DF with 12317 cases and 184 deaths. In 2013, 75454 cases and 167 deaths were recorded from India, out of which Delhi's contribution was 5574 cases and 6 deaths [10]. Delhi is one of the state in North India that has been endemic for Dengue from past several years [11]. Comprehensive field surveys of *Aedes aegypti* breeding in Delhi were carried out by to know

the presence of serotypes in Delhi [12]. In 2019, 157315 cases with166 deaths were reported in India with 5077 cases and 0 deaths reported from Delhi (www.nvbdcp.gov.in).

Knowledge of prominent breeding sites in a locality is a prerequisite for source reduction achieved by vector surveillance that is an important tool in generating entomological data for knowledge of breeding sites and their control. This study was carried out to study the breeding sites and study various larval indecis throughout the year.

Materials and Methods

Delhi has a population of nearly 1.68 crores as per census 2011 and is the 2nd most populous city of the country. It has an area of 1483 sq. km surrounded on three sides by Haryana and to the east, across the river Yamuna by Uttar Pradesh. Delhi is located at 28.53º North latitude and 77.20º East longitude on the intersection topography. Topographically Delhi is divided into three parts- the Yamuna flood plain, the Ridge and the plain area. The ridge constitutes the most dominating physiographic features of this territory. The average annual rainfall is 800 mm and annual temperature ranged 5ºC-40ºC respectively [13].

In Delhi, there are total 12 municipal zones. Of which, Shahdara zone was selected for the study based on high Dengue cases in the area. Shahdara zone is divided into four clusters, Cluster 1 (Radhey Vihar, Saboli Colony, Sanoli, Mandolk and Budh Vihar), Cluster 2 (Ashok Nagar, Nand Nagri, Kadampuri, Babarpur West and Shiv Park), Cluster 3 (Yamuna Vihar, Kabir Nagar, Maujpur, Jafrabad and New Seelampur) and Cluster 4 (BholaNath Nagar, New Vishwasnagar, Vishwasnagar, Sanjay Nagar and Shanti Vihar).

Monthly field visits were undertaken in all clusters for checking the presence of *Aedes* larvae. The study areas were visited once every month. Door to door entomological survey was conducted in houses of the study sites from January to December 2019. Survey was carried out to find out *Aedes aegypti* breeding in all types of water filled containers present in and around houses and their premises. Larval collections were made from each selected locality with the help of flash light by dipping and pipetting method [14]. All types of breeding habitats in the study area like earthen pots, plastic containers, iron drums, coolers and solid waste were screened for presence of immature stages of *Aedes aegypti* mosquitoes.

Results

The results revealed that all clusters were found positive for *Aedes aegypti* breeding in the transmission season (i.e. August to October) it was found that House Index (HI) was zero in all the four clusters during winter season. Breeding of *Aedes aegypti* started increasing from the month of March and April thereafter there was a slight dip in the month of July in all clusters except in cluster 2. However, there was increase in House Index (HI) after August. HI was highest in the month of October thereafter there was a dip in the month of November and HI was almost zero in the month of December (Figure 1)

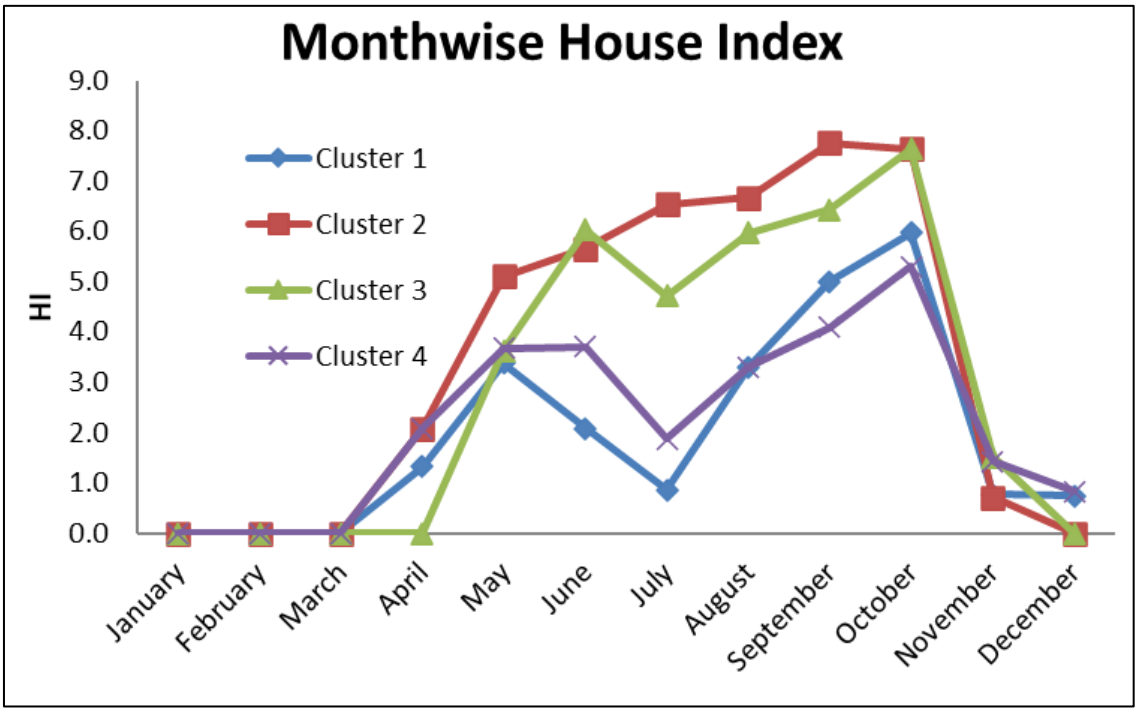

Fig 1: Month wise House Index

Month wise container index was calculated from January to December 2019. Container index was high in October in all four clusters however cluster 1 and 2 showed high CI from May till October. (Figure 2)

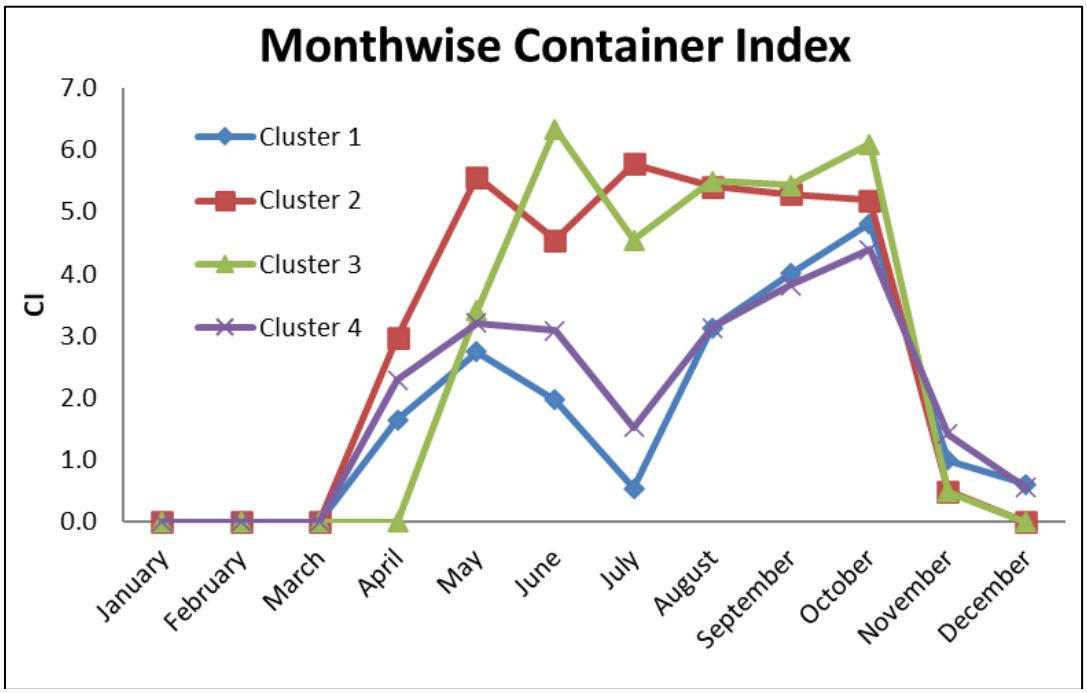

Fig 2: Monthwise Container Index

Breeding preference of *Aedes aegypti* was also studied among all types of containers. Container wise presence of larvae is given in Table 1. Among all positive containers maximum breeding of *Aedes aegypti* was found in plastic containers. Least breeding was found in coolers. Positivity of coolers ranged from 1.3 to 1.7. Out of the four containers earthen pots were the second most preferred breeding habitat. Breeding preference ratio (BPR) varied in all containers details are shown in Table 1.

Table 1: Breeding preference ratio (BPR) of *Aedes aegypti* in different containers

Study Site	Type of Container	Container examined (X)	X%	Containers Positive (Y)	Y%	Y%/X%
Cluster 1	Plastic	1722	88.7	25	67.5	0.76
	Earthen pots	91	4.7	0	0	0.00
	Iron pots	78	4.0	6	16.21	4.05
	Coolers	30	1.5	3	8.1	5.40
	Solid Waste	21	1.1	3	8.1	7.50
	Total	1942		37		
Cluster 2	Plastic	1577	87.3	40	68.96	0.79
	Earthen pots	108	5.9	8	13.7	2.32
	Iron pots	56	3.0	5	8.6	2.87
	Coolers	23	1.3	5	8.6	6.77
	Solid Waste	43	2.4	0	0	0.00
	Total	1807		58		
Cluster 3	Plastic	1763	88.4	45	76.27	0.86
	Earthen pots	91	4.5	12	20.33	4.52
	Iron pots	67	3.3	2	3.38	1.02
	Coolers	31	1.6	0	0	0.00
	Solid Waste	41	2.0	0	0	0.00
	Total	1993		59		
Cluster 4	Plastic	1757	86.9	30	68.18	0.78
	Earthen pots	109	5.3	9	20.45	3.86
	Iron pots	64	3.1	2	4.54	1.46
	Coolers	35	1.7	3	6.81	4.01
	Solid Waste	57	2.8	0	0	0.00
	Total	2022		44		

The Breteau index in all four clusters was below the critical value (i.e. 20). BI was highest in the month of October in cluster 1,3 and 4. However it was highest in the month of September in cluster 2. (Figure 3)

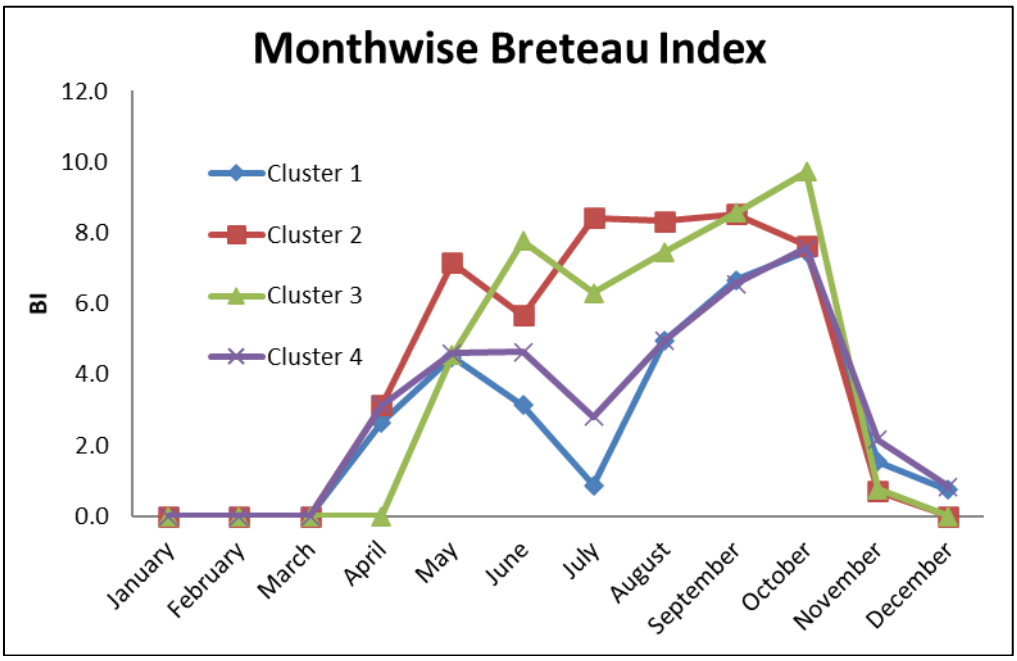

Fig 3: Monthwise Breteau Index

Discussion

The study demonstrated that plastic containers are preferred breeding site followed by earthen pots in cluster 2 and 3. Iron pots were positive in all clusters but few in number. Very little breeding was found in coolers because of awareness by IEC/BCC activities through media. The results are in confirmation with the studies done in 2016 where plastic containers and earthen pots were predominant habitats for *Aedes aegypti* breeding [15]. The results of larval indices study show that HI and CI was zero during winter season i.e., January to March. Even during the month of December, larval breeding was zero or negligible in all four Clusters. Larval breeding started increasing from the month of March and larval indices (HI, CI, and BI) were higher from August to October and thereafter it decreased and almost zero in the month of December. All the indices were very high in October, due to water storage practices in these areas as they do not have regular water supply.

In the study, it was observed that prevalence of *Aedes aegypti* is high from August to October as water accumulation of post rains water in the area provides a suitable breeding habitat for *Aedes aegypti* mosquito. Breeding was mainly found in the plastic and earthenware containers which are placed outside the houses. Less breeding in Coolers was probably due to awareness among the community to regularly change the water of cooler or to add suitable larvicide or oil in the containers. Studies in 2020 have also demonstrated seasonal variation of breeding preference of *Aedes aegypti* in different containers in Delhi [16]

Conclusion

The study showed that larval indices (HI, CI and BI) were high from the month of August to October and it was almost zero or negligible during the winter. The study showed plastic containers and earthen pots were the most productive container for breeding. Role of cooler for breeding of *Aedes aegypti* mosquito was found negligible. Therefore emphasis should be made for control of breeding in plastic and earthen pots as compared to coolers. Vector control activities should be geared up before monsoon

References

1. World Health Organisation. Dengue and Severe Dengue. May 2021: http://www.who.int/newsroom/FactSheet/Details/
2. Khan MIH, Anwor E, Adha A, Udah NSM, Syed A, Raya A. Factors, predicting sever Dengue in patients with dengue fever Mediterranean. Journal of Hematology &Infectious diseases. 2013;5(1):e2013014.
3. Defoliant GR, Waits DM, Grimstad PR. Changing patterns in mosquito borne Arboviruses. Journal of American mosquito control Association 1986;2(4):437-455.
4. Gubler DJ. Dengue and Dengue hemorrhagic fever. Clinical Microbiology Reviews 1998;11(3):480-496.
5. Whitehorn J, Farer J. Dengue. Br. Med Bull 2010;95:161-173.
6. Sharma RS, Kaul SM, Jotna Sokhey. Seasonal fluctuation of dengue fever vector. *Aedes aegypti* (diptera: culicidae) in Delhi. India. South Eastesian J Trop Med Public Health. 2005;36 (1):186-190
7. Vajpayee M, Mohan Kumar K, Wali JP, Dar L, Seth P, Broor S. Dengue virus infection during post epidemic period in Delhi, India. The Southeast Asian Journal of Tropical Medicine and Public Health 1999;30(3):507-510.
8. Bharaj P, Chahar HS, Pandey A, Diddi K, Dar L, Guleria R *et al*. Concurrent infections by all four dengue virus serotypes during an outbreak in 2006, Delhi. Indian Virology Journal 2008; 5(1):5-10.
9. Dash PK, Parida MM, Saxena P, Abhyankar A, Singh CP, Tewari KN *et al*. Re-emergence of dengue virus type 3 (subtype III) in India: Implications for increased incidences of DHF, DSS. Virology Journal 2006;3(55):1-10.
10. www.nvbdcp.gov.in/diseases/dengue/stitutation in India
11. Hussain Ahmed N, Broor S. Dengue Fever Outbreak in Delhi, North India A Clinico –Epidemiological study.

Indian J Community Med 2015;40(2):135-138
12. Gupta E, Mohan S, Bajpas M, Chaudhary A, Singh G. Circulation of Dengue virus (DEN V-I) serotype in Delhi during 2010-11 after Dengue virus-3 (DEN V-3) predominance a single centre hospital based study J Vector Borne dis 2012;49(2):82- 85.
13. https://www.climatestotravel.com/climate/india assessed on 4.6.2021.
14. WHO/CDS/Whopes/GCDPP/2005.13
15. Kumar G, Singh RK, Pande V, Ojha VP, Das R, Haq S, Dhiman RC. Prevalence of Dengue Transmission in Delhi Research Journal of pharmaceutical Biological and Chemical Science 2016;7(6):755-760
16. Patel S, Singh P, Prakash V, Sharma AK, Dhan S, Singh R, *et al*. A study on influence of climatic factors on the preferential breeding places of Aedes aegypti, the Dengue Vector in Delhi, India International Journal of Mosquito Research 2020;7(4B):95-104.