

# “Aedes sp., Community Health and Septic Tank: A Survey from Contemporary Ecology and Entomological Vector Point of View”

\*Arup Ghosh (1)

Shailendra Kumar Sinha(2)

Pradip Kumar Bandyopadhyay(3)

1. Ghosh, Arup (Department of Zoology, BBMK University, Dhanbad, Jharkhand) , 2. Sinha, S K, Dean (Student Development), BBMK University, Dhanbad, Jharkhand), 3. Bandyopadhyay, P K (Department of Botany, Burdwan Raj College, West Bengal)

1. [aghoshbbc@gmail.com](mailto:aghoshbbc@gmail.com), 2. [sinhashailendra66@gmail.com](mailto:sinhashailendra66@gmail.com), 3. [drpkbbot@gmail.com](mailto:drpkbbot@gmail.com)

## ABSTRACT:

“Aedes sp. can’t develop in the dirty water, it bred and develop only in the clean and clear water” - it is widely accepted theory. Some information of WHO are supportive to the above statement. To establish the Hypothesis of the Study, a survey, both Unstructured and Structured, carried out on the alternative pathway of life cycle of Aedes sp.,

**Unstructured study**, through questionnaire and through daily newspaper also. Finally got 3 types of feedback. **Structured Study (Primary )-I**, screened out how many types of manmade water reservoir remained active all around the year, it was revealed from primary study that, 11 nos. of Septic Tank found supposed to be infested with Aedes sp. out of total 15 nos. Through confirmatory test, all 11 nos. tank (100%) got infested with Aedes sp.

So from the above survey it can be concluded that Aedes sp. mosquito can successfully grow in the so called dirty water of Septic Tank in addition to normal mode of growth and development.

Creating a severe Contemporary Ecology and Community health problem all over the world.

**Key Word:** Aedes sp., Community Health Problem, Contemporary Ecology, Entomological Vector, Septic Tank

## INTRODUCTION:

“Aedes sp. mosquito can’t develop in the **dirty** water, it bred and develop only in the clean and **clear** water” (1) - it is widely accepted theory regarding the life cycle of this notorious and dreaded vector.

As per “WHO Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Haemorrhagic Fever” – Page No-71: “Throughout most of South-East Asia, Ae. aegypti oviposits almost entirely in domestic and man-made water receptacles. (y) These include a multitude of receptacles found in and around urban environments (households,

construction sites and factories) such as water-storage jars, saucers on which flowerpots rest, flower vases, cement baths, foot baths, wooden and metal barrels, metal cisterns, discarded tyres, bottles, tin cans, polystyrene containers, plastic cups, discarded wet-cell batteries, glass containers associated with “spirit houses” (shrines), drainpipes and ant-traps in which the legs of cupboards and tables are often rested”. (2)

Again in another report in ‘Down to Earth’ – Mosquito Matter -The blood-sucking pest is altering itself with changing environment. But studies on it are few and far between: ‘Dengue-causing *Aedes aegypti* mosquito breeds in stagnant water containers such as drums, buckets, pots and flower vases. Surveys by NIMR [National Institute of Malarial Research- New Delhi] reveal that now *Aedes aegypti* also breeds in wells and tree holes, usually found in rural areas. (3)

More over this theory is also being followed for control and prevention of *Aedes Sp.* borne community health problem all over the world, like Indonesia, Ethiopia, Thailand, Miami-Florida, India etc. (1,2,3,4,5,6,7).

But consequences are possibly about to nil and day after day conditions are snaking to the horrible situations. Followings are some information (15<sup>th</sup> April 2019) from WHO (8,9) which are supportive to the above statement.

- **Before 1970, only nine countries had experienced severe dengue epidemics. The disease is now endemic in more than 100 countries.**
- **Africa, the Americas, the Eastern Mediterranean, South-east Asia and the Western Pacific are affected out of which South-east Asia and the Western Pacific regions are the most seriously affected**

So it is revealed that conditions are really severe and alarming that’s beyond doubt.

## **MATERIAL AND METHODS:**

To establish the hypothesis of the Study, a survey work carried out at Department of Zoology, BBMK University, Dhanbad along with some other associated laboratory (10) and continuing the study on alternative pathway of life cycle of *Aedes sp.*,

### **Ist Step: Unstructured Study- (Qualitative Study)**

First, the investigators conducted a preliminary unstructured (Qualitative) study through interview and by using questionnaire with different personalities of different localities and shared their experience on mosquitoes and related problem, and findings are as following categories.

1. Apparently there are no nearby (200 mtr.) water bodies, ditch or open drain where mosquito can breed and develop, - yet they are facing mosquito problem severely all-round the year.
2. One Person from Ranchi exclaimed through daily News Paper (11) that ‘our area is very much neat and clean, but god knows where from those mosquitos are coming!’
3. In heavy summer and winter season when in natural condition growth of mosquito larva and pupa are not possible and adult mosquitoes also can’t survive, - yet in those unfavorable situation adult mosquitoes frequently and lavishly move inside the room of dwelling houses and surroundings.

In the next phase:

Investigators screened out type of manmade / created **free** water reservoir those are permanent i.e. all around the year remain active or functioning as reservoir for mosquito breeding and development, better to termed as **reserve of *Aedes sp.***

- a. 1<sup>st</sup> type, - container like discarded vehicle tyre, plastic tea cup, disposed pet bottle, ice-cream cup, garden tub, tree hole, cold drinks container etc. remain active mainly in the rainy season with the rain shower.
- b. 2<sup>nd</sup> type, - man made water reservoir (both underground and overhead) for domestic purpose use. Most of them remain in closed condition for maintaining the proper quality of water.
- c. 3<sup>rd</sup> type, - temporarily constructed for civil construction for certain period, and more important that those water are admixture with different civil work materials like cement, sand, brick wash, chemical paint, lime, mosaic tiles wash etc. those are not favorable for mosquito breeding and development
- d. 4<sup>th</sup> type, - most **important** but **neglected** one is the SEPTIC TANK with each and every holding in the urban sector.

## **2nd Step: Structured Study - I - Primary (Quantitative Study) for general test:**

Such type of Contemporary Ecological Problem related to Community Health, instigate the investigator to make study on infestation rate of Septic Tank with *Aedes sp.*

For the purpose a trick was adopted for adult mosquitoes trapping by using a new designed mosquito trapping cage Fig- 1 and Fig - 2

Fig. - 1: (Newly designed mosquito trapping cage) .View from a distance –Mosquito Trapping Cage is fitted at the outlet port of a Septic Tank



Fig. - 2: Mosquito Trapping Cage (Newly Designed) Fitted at the Out let Port of the Septic Tank for Trapping Adult Mosquito, after 48 hrs. Hundreds of Aedes Sp. Adult mosquitoes are trapped in the cage



Cages were fitted randomly at the 15-outlet port of the 3<sup>rd</sup> chamber of Multi Segmented Septic Tank at the 3 different selected urban area of Paschim Bardhaman district of West Bengal, India.

It was identified primarily that how many septic tanks **may be infested** with *Aedes* sp. and how many are not due to ecotrophic condition.

### 3<sup>rd</sup> Step: Structured Survey – II - Secondary (Quantitative Study) for confirmatory test :

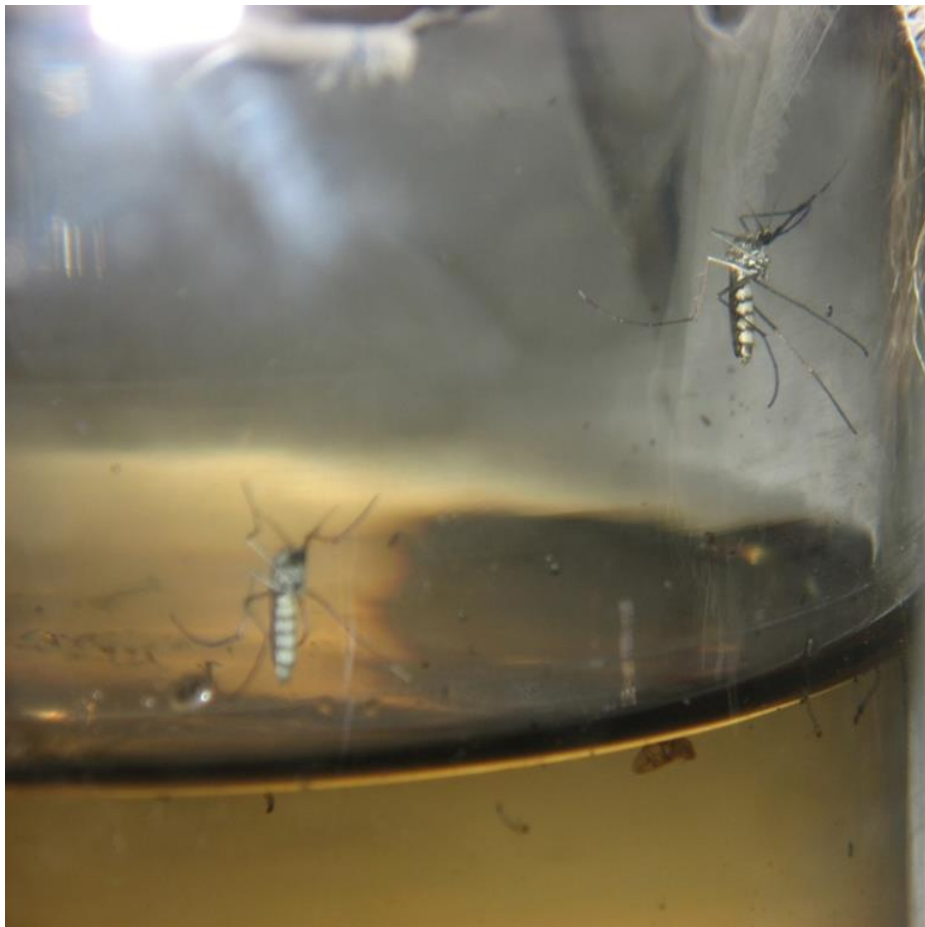
Those septic tanks under study found with possibility of *Aedes* sp. infestation were marked.

Then water was collected for nurturing at the laboratory for study ( Fig. - 3) the life cycle and consequences of collected egg, larva and pupa for their further development and ultimately for the climax i.e. emerging out of adult one for confirmation and identification of the types of mosquito by which the septic tank is confirmed infested (Fig.- 4)

Fig. - 3: Water collected from Septic Tank Primarily identified as Mosquito Infested for Nurturing at Laboratory for Confirmed Identification of Type of Mosquito by Which the Tank is Infested.



Fig.- 4: Adult *Aedes Sp.* infestation has been confirmed after emerging of the adult mosquito, after nurturing of the collected water at laboratory.



## RESULT AND DISCUSSION :

From general test through primary Structured (quantitative) survey -I, it was revealed that 73 % i.e. 11 tanks out of 15 tanks were found suspected with *Aedes* infestation .

In the next step of confirmatory test under Quantitative study/Structured Survey – II, it was found that cent percent tank i.e. out of 11 suspected infested septic tank, all the 11 tank were found infested, confirmed, with *Aedes sp* mosquito.

Data Collected from different site produced in tabular form in below.

TABLE - 1: Asn. (Urban):

Sl. No	Location	Site No	Adult Mosquito Trapped (Yes / No)
1	Asansol	A/1	Yes
2	„	A/2	Yes
3	„	A/3	Yes
4	„	A/4	No
5	„	A/5	Yes

TABLE - 2: Burn. (Urban):

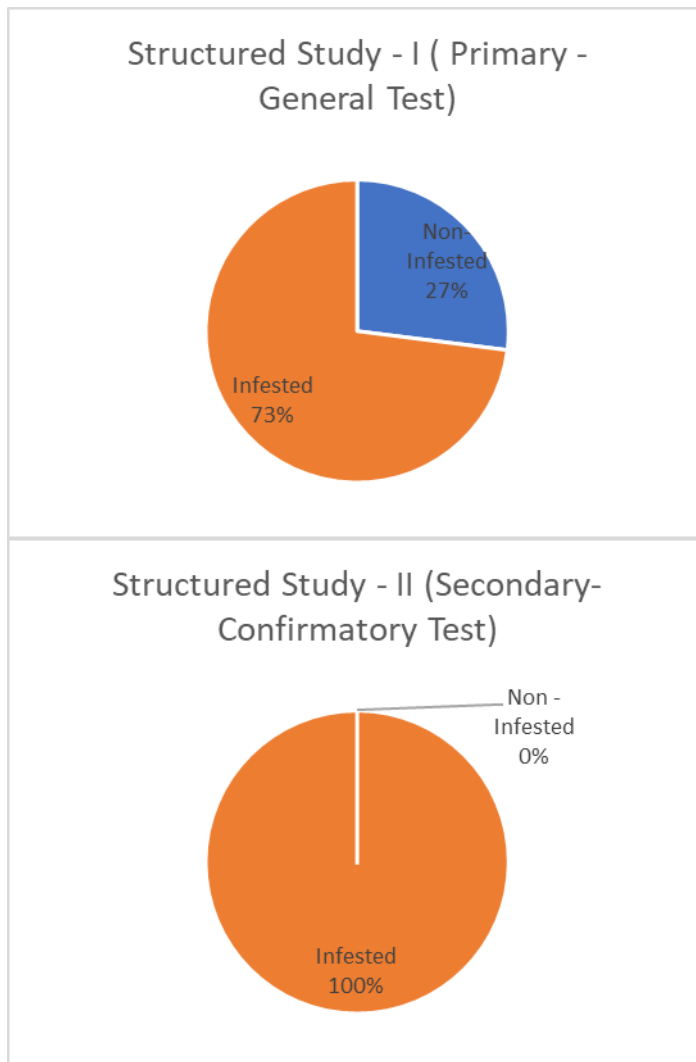
Sl. No	Location	Site No	Adult Mosquito Trapped (Yes / No)
1	Burnpur	B/1	Yes
2	„	B/2	Yes
3	„	B/3	No
4	„	B/4	No
5	„	B/5	Yes

TABLE - 3: Durg. (Urban):

Sl. No	Location	Site No	Adult Mosquito Trapped (Yes / No)
1	Durgapur	D/1	No
2	„	D/2	Yes
3	„	D/3	Yes
4	„	D/4	Yes
5	„	D/5	Yes

## GRAPHICAL REPRESENTATION OF DATA OF STRUCTURED STUDY :

Fig. 5. Structured Study I and II (Primary Test and Secondary Test )



## CONCLUSION:

So, from the above survey it can be inferred that *Aedes* sp. mosquito can successfully grow in the so called dirty water of Septic Tank, in addition to normal mode of growth and development (1-7), hence Septic Tank is their alternate pathway of life cycle, but so far no clear information in this context has been reported in literature.

. Main reason of negligence and giving no stress on this ‘Man Made Viler Water Reservoir’ of Septic Tank mainly due to following two reasons

1st reason: Constructional structure and mode of the activity of multi-chambered septic tank is completely unknown to most of the **entomologists**, which is quite natural.

2nd reason: widely accepted theory regarding conventional mode of life cycle of *Aedes*:

**“Aedes Mosquito Can’t Develop in the Dirty Water, it Breed and Develop only in the Clean and Clear Water” (1-7).**

By honoring the above theory all the entomologist and investigators working on mosquito, especially with *Aedes*, have completely excluded **that silent viler water source**, more also its existence is not easily visible and remain out of sight of the human being that’s why they have not considered this factor for prevention and control of the *Aedes* mosquito, a vector for transmitting many arboviruses. Knowledge of the breeding habitat of this vector is vital for



implementing appropriate interventions (12) and for effective control and prevention of Chikungunya, Yellow Fever, Dengue and Zika (Micro-Cephalocephaly) etc. problem. All concerned Zoologist and Urban planner should give stress on this burning problem of strong and complicated interaction between *Aedes* sp. and Septic Tank, an inevitable component of **Contemporary Ecology** of modern as well neat and clean **Urban life**, under which situations *Aedes* sp. performing the role of entomological vector silently as well uninterruptedly and creating a severe community health problem all over the world. This contemporary ecological problem is very much significant and relevant from Life Security on Earth, Point of view also.

## REFERENCE :

1. Faiz Madzlana , Nazri Che Doma, Chua Say Tiong, Nurmahirah Zakariaa,- Breeding Characteristics of *Aedes* Mosquitoes in Dengue Risk Area - ASEAN-Turkey ASLI (Annual Serial Landmark International) Conferences on Quality of Life 2016 ,AMER International Conference on Quality of Life, - AicQoL2016Medan25 – 27 February 2016, Medan, Indonesia - // -Faiz Madzlan et al. / Procedia - Social and Behavioral Sciences 234 ( 2016 ) 164 – 172
2. World Health Organization Comprehensive guidelines for prevention and control of dengue and dengue haemorrhagic fever. 2011; Available from: [http://apps.searo.who.int/pds\\_docs/B4751.pdf](http://apps.searo.who.int/pds_docs/B4751.pdf)
3. *Magazine* - Down To Earth: Mosquito Matter- The blood-sucking pest is altering itself with changing environment. But studies on it are few and far between By [Jyotika Sood](#) Last Updated: Monday 25 April 2016. <https://www.downtoearth.org.in › coverage › health › mosquito-matters-42...>
4. Breeding Sites of *Aedes aegypti*: Potential Dengue Vectors in Dire Dawa, East Ethiopia Dejene Getachew,<sup>1,2</sup> Habte Tekie,<sup>1</sup> Teshome Gebre-Michael,<sup>3</sup> Meshesha Balkew,<sup>3</sup> and Akalu Mesfin<sup>2</sup>  
1Department of Zoological Sciences, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia  
2Department of Life Sciences, Dire Dawa University, P.O. Box 1362, Dire Dawa, Ethiopia  
3Aklilu Lemma Institute of Pathobiology, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia
5. T. Chareonviriyaphap, P. Akwatanakul, S. Nettanomsak, and S. Huntamai, “Larval habitats and distribution patterns of *Aedes aegypti* (Linnaeus) and *Aedes albopictus* (Skuse), in Thailand,” Southeast Asian Journal of Tropical Medicine and Public Health, vol. 34, no. 3, pp. 529–535, 2003.
6. Urbanization creates diverse aquatic habitats for immature mosquitoes in urban areas

André B. B. Wilke, Catherine Chase, Chalmers Vasquez, Augusto Carvajal, Johana Medina, William D. Petrie & John C. Beier , Scientific Reports volume 9, Article number: 15335 (2019), Published: 25 October 2019

7. K. D. Thete and L. V. Shinde, “Survey of container breeding mosquito larvae in Jalna City (M.S.), India,” Biological Forum, vol. 5, no. 1, pp. 124–128, 2013

8. WHO - Dengue Fact Sheet, 15th April -2019,  
[www.searo.who.int/entity/vector\\_borne\\_tropical\\_disease/data\\_factsheet/dengue](http://www.searo.who.int/entity/vector_borne_tropical_disease/data_factsheet/dengue)

9. W <https://en.m.wikipedia.org/wiki>

10.

### **The Telegraph**

— online edition —

Ranchi vector menace now alarming

RMC upgrades arsenal to fight mosquitoes, but irregular fogging aggravates problem

By Our Bureau in Ranchi/Jamshedpur

Published 16.04.19, 1:04 AM Updated 16.04.19, 1:04 AM

11. “A NEW ECOSYSTEM OF *Aedes* sp. MOSQUITO, THE VECTOR OF DENGU & CHIKUNGUNIA” - AN ORIGINAL SURVEY, OBSERVATION AND CONTROL.” - By Dr. Amalesh Chatterjee, Dr. Sanjay Mandal, Dr. Mrs Anusua Biswas, Sri Arup Ghosh Sri Swapan Kumar Mondal - presented at 19th West Bengal State Science and Technology Congress, 2012

12. Getachew Ferede, Moges Tiruneh, [...], and Belay Tessema- “Distribution and larval breeding habitats of *Aedes* mosquito species in residential areas of northwest Ethiopia”: epiH Epidemiology and Health : e-epih.org: Epidemiol Health. 2018;40:e2018015.