

CIFT, Cochin
CENTRAL DIARY
No. 4849
Date 20/2/16

CIFT, Cochin
SECTION DIARY
No. 3360
Date 20/2/16



भारत सरकार/GOVERNMENT OF INDIA

पत्तन स्वास्थ्य संगठन/PORT HEALTH ORGANSIATION

विलिंग्डन आइलैंड/WILLINGDON ISLAND

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No. QC/PHECP/2016/135

Date : 15.02.2016

To
The Director,
Central Institute of Fisheries Technology,
W/Island, Cochin.

SUB:- Public Health Emergency of International Concern - prevention and control measures for Zika Virus Disease – req.

19/2/16
Dear Sir,

As per guidelines issued by Ministry of Health and Family Welfare, Government of India and consequent to the World Health Organisation declaration on Zika Virus Disease to be a Public Health Emergency of International Concern (PHEIC) on 1st February 2016, Government of India has recommended measures for prevention and control of Zika Virus Disease in India.

In this regard, Cochin Port Trust - the port authority and port users will be updated about Zika Virus Disease as and when communication and instructions are received from Ministry of Health and Family Welfare, New Delhi and which then has to be complied with by all stakeholders of the port.

Port Health Organisation is the competent authority under International Health Regulations - 2005 to monitor and implement guidelines issued by the Ministry with respect to all Public Health Emergencies of International concern and emerging diseases.

Keeping the Zika Virus Disease risk in mind, utmost vigil is to be maintained by Cochin Port authorities and concerned stakeholders of the possible consequence of national spread in view of the presence of vector *Aedes Egypti* in India and the virulence, mortality and sequeleae associated with the disease. Health ministry has suggested intensified mosquito control activities in and around port areas.

GNB/pls

19/2/16

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As the implementing agency, we expect coordinated support from all stakeholders to ensure effective and efficient implementation and monitoring of Zika Virus Disease control measures which include infection prevention and control, community awareness, surveillance, monitoring, communication of timely and accurate information to all Cochin Port users.

The Director is requested to alert and to circulate among all the officers and staffs of your institute information about Zika Virus Disease. Please find enclosed the Guidelines on Zika Virus Disease and Integrated Vector Management for Control of *Aedes Egypti* mosquito from Ministry of Health and Family Welfare

Your timely action in this matter will be highly appreciated.

Yours Sincerely,


PORT HEALTH OFFICER
COCHIN

Enclo: 4

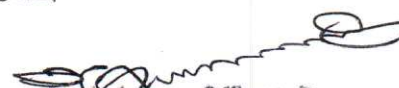
1. Guidelines on Zika Virus Disease from Ministry of Health and Family Welfare
2. Guidelines on Integrated Vector Management for Control of *Aedes Egypti* mosquito.
3. Facts sheet on Zika Virus Disease
4. Vector management for Mosquito

Encl. No. 30-15/2015 Cdn. dtd. 4.03.2016

To

The OIC, AKMU

CIFT, Cochin-29 - with a request to upload the same
in the Institute website.

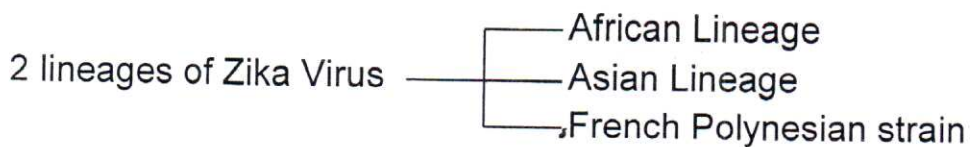

Asst. Admin. Officer
CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY
(Indian Council of Agricultural Research)
Willingdon Island, CIFT Junction
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FACTS SHEET

What is Zika Virus ?

Zika is a mosquito borne single stranded RNA virus related to dengue virus. Zika Virus is transmitted by *Aedes aegypti*, but *Aedes albopictus* mosquitoes can also transmit the virus.

The Zika Virus was first isolated in April 1947 from a Rhesus Macaque Monkey in Zika forest of Uganda near lake Victoria by scientist of Yellow fever research institute. The second isolation was from the mosquito *Aedes africanus* in 1948 from the same site. When the monkey developed fever, the scientists isolated from its serum Zika Virus. in 1952, the virus was name Zika Virus. From human, it was isolated in 1954 from people living in Nigeria. Since 1951-1981 human infections was reported from other African countries as Central African Republic, Egypt, Gabon, Sierra Leone, Tanzania, Uganda, Indonesia, Malaysia, Phillipines, Thailand, Vietnam.



Vertebrate hosts of the virus are monkeys and human. Global distribution of Zika Virus Vector *Aedes Aegypti* is expanding because of Global trade and travel. The first well documented case of Zika virus was in 1964.

In April 2007, 1st documented outbreak outside Africa occurred in the Islands of Yap state in Micronesia. Zika outbreaks have occurred in Africa, South East Asia and Pacific Islands. In May 2015, 1st local transmission was reported from Brazil. In may 2015, Pan American Health Organisation (WHO) issued an alert regarding the first confirmed virus infections in Brazil. By December 2015, 4,40,000 – 13,00,000 suspected cases have occurred in Brazil and subsequently spread to rest of South America, Central America and the Caribbeans. Since then cases have been reported in USA, Australia, Italy, UK, Canada, Switzerland, Denmark and Portugal.

Areas with Zika

Americas :

Barbados, Bolivia, Brazil, Columbia, Dominican Republic, Ecuador, El Salvador, French Guyana, Guyana, Guatemala, Guadeloupe, Haiti, Honduras, Martinique, Mexico, Panama, Paraguay, Puerto Rico, Saint Martin, Suriname, US Virgin Islands, Venezuela

Oceanic / Pacific Islands :

Samoa

Africa :

Cape Verde

Who are the Persons at risk

- Anybody who is living or travelling to an area where Zika Virus is found.
- Wide geographical distribution of mosquito vector.
- Lack of immunity among population in newly affected areas.
- High volume of international travel.

Potential for Zika Virus spread to India

Currently local transmission has not been reported. With returning travellers, chance of infection with Zika Virus increases. Viral introduction and local spread may occur as the vectors *Aedes aegypti* and *Aedes albopictus* is widely prevalent in India.

Transmission

Non human and human primates are the main reservoir of the virus and anthroponotic (human-vector-human) transmission occurs during outbreak.

- Through bite of an infected *Aedes* species mosquito. The same mosquito also spread dengue and chikungunya.
- These mosquitoes lay eggs in and near standing water like bucket, bowls, animals and birds dishes, flower pots, vases etc.

- They are aggressive day time biters i.e., they prefer to bite people and live indoors and outdoors where people live.
- Mosquitoes become infected when they feed on peoples already infected with the virus. Infected mosquitoes can then spread the Zika Virus to other people through bite.
- Zika Virus has been detected in milk but transmission through breast feeding has not been documented.
- Through blood transfusion also.

Mode of transmission

- A mother already infected with Zika Virus at the time of delivery can pass on the virus to her new born.
- Zika Virus could be passed from mother to foetus during pregnancy.
- No report of infants getting Zika Virus through breast feeding.
- Spread of virus through blood transfusion and sexual contact have been reported.

Incubation Period

Is not known in human but could be from 2 - 10 days. In mosquitoes the incubation period is 10 days.

Clinical signs and symptoms

80% of the people infected are asymptomatic. Zika Virus should be considered in persons with acute onset of fever and who travelled to areas with ongoing transmission in 2 weeks preceeding illness. About 1 in 5 people infected with Zika Virus become symptomatic. The clinical findings are

- Acute onset of fever
- Maculo papular rash
- Arthralgia
- Conjunctivitis

Other symptoms

- Myalgia
- Headache

Clinical illness is usually mild with symptoms lasting for several days to a week. Severe cases requiring hospitalisation is uncommon and case fatality is low.

- Cases of microcephaly in maternal Zika Virus infection and Guillain Barre Syndrome have been also associated.

Zika Virus remain in blood of an infected persons for few days but can be found longer in some people. Deaths are rare.

Diagnosis

Zika Virus can be diagnosed by Reverse Transcriptase – Polymerase Chain Reaction (RT-PCR) on serum virus specific IgM. Neutralising antibodies develop towards the end of first week of illness.

Treatment

- No vaccine or medications are available to prevent or treat Zika infection.
- Symptomatic treatment
 - Plenty of rest
 - Drink fluids to prevent dehydration
 - Take medicines as paracetamol to relieve fever, pain
 - Do not take Aspirin and other NSAID like ibuprofen and Naproxen (to reduce the risk of bleeding).

Prevention

- No vaccines exist to prevent Zika Virus Disease
- Prevent Zika by avoiding mosquito bites
- Wear full sleeves shirts and pants
- Sleep under mosquito net
- Sleep in places with window screens or mesh
- Once a person has been infected he / she is likely to be protected from future infection.

Travel Advisory

- Non-essential travel to the affected countries to be deferred / cancelled.
- Pregnant women should consider postponing travel to areas with Zika Virus Infection.
- All travellers to the affected countries / areas should strictly follow individual protective measures, especially during day time, to prevent mosquito bites (use of mosquito repellent cream, electronic mosquito repellents, use of bed nets, and dress that approximately covers most of the body parts)
- Persons with co-morbid conditions (diabetes, hypertension, chronic respiratory illness, immune disorders etc.) should seek advice from the nearest health facility, prior to travel to an affected country.
- Travellers having febrile illness within two weeks of return from an affected country should call 0471 2552056 or 1056
- Pregnant women who have travelled to areas with Zika Virus transmission should mention about their travel during ante-natal visits in order to be assessed and monitored approximately.

In the light of the current disease trend, and its possible association with adverse pregnancy outcomes, the Directorate General of Health Services, Ministry of Health and Family Welfare advises on the following:

1. Enhanced Surveillance

1.1. Community based Surveillance

- Integrated Disease Surveillance Programme (IDSP) through its community and hospital based data gathering mechanism would track clustering of acute febrile illness and seek primary case, if any, among those who travelled to areas with ongoing transmission in the 2 weeks preceding the onset of illness.
- IDSP would also advise its State and District level units to look for clustering of cases of microcephaly among newborns and reporting of Gullian Barre Syndrome.
- The Maternal and Child Health Division (under NHM) would also advise its field units to look for clustering of cases of microcephaly among new borns.

1.2 International Airports/ Ports ,

- All the International Airports / Ports will display billboards/ signage providing information to travelers on Zika virus disease and to report to Custom authorities if they are returning from affected countries and suffering from febrile illness.
- The Airport / Port Health Organization (APHO / PHO) would have quarantine / isolation facility in identified Airports.
- Directorate General of Civil Aviation, Ministry of Civil Aviation will be asked to instruct all international airlines to follow the recommended aircraft disinsection guidelines
- The APHOs shall circulate guidelines for aircraft disinsection (as per International Health Regulations) to all the international airlines and monitor appropriate vector control measures with the assistance from NVBDCP in airport premises and in the defined perimeter.

Government of India
Ministry of Health and Family Welfare
Directorate General of Health Services

Guidelines on Zika Virus Disease following Epidemic in Brazil and other countries of America

Background

Zika virus disease is an emerging viral disease transmitted through the bite of an infected Aedes mosquito. This is the same mosquito that is known to transmit infections like dengue and chikungunya. Zika virus was first identified in Uganda in 1947.

World Health Organization has reported 22 countries and territories in Americas¹ from where local transmission of Zika virus has been reported. Microcephaly in the newborn and other neurological syndromes (Guillain Barre Syndrome) have been found temporally associated with Zika virus infection. However, there are a number of genetic and other causes for microcephaly and neurological syndromes like Guillain Barre Syndrome.

Zika virus disease has the potential for further international spread given the wide geographical distribution of the mosquito vector, a lack of immunity among population in newly affected areas and the high volume of international travel. As of now, the disease has not been reported in India. However, the mosquito that transmits Zika virus, namely Aedes aegypti, that also transmits dengue virus, is widely prevalent in India.

A majority of those infected with Zika virus disease either remain asymptomatic (up to 80%) or show mild symptoms of fever, rash, conjunctivitis, body ache, joint pains. Zika virus infection should be suspected in patients reporting with acute onset of fever, maculo-papular rash and arthralgia, among those individuals who travelled to areas with ongoing transmission during the two weeks preceding the onset of illness.

Based on the available information of previous outbreaks, severe forms of disease requiring hospitalization is uncommon and fatalities are rare. **There is no vaccine or drug available to prevent/ treat Zika virus disease at present.**

World Health Organization has declared Zika virus disease to be a Public Health Emergency of International Concern (PHEIC) on 1st February, 2016.

¹ Zika virus disease has been reported so far in the following countries; Brazil, Barbados, Bolivia, Columbia, Dominican Republic, Ecuador, El Salvador, French Guyana, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Martinique, Mexico, Panama, Paraguay, Puerto Rico, St Martin, Suriname, Virgin Island and Venezuela. It may be noted that this list is likely to change with time. Hence, updated information should be checked periodically.

1.3 Rapid Response Teams

- Rapid Response Teams (RRTs) shall be activated at Central and State surveillance units. Each team would comprise an epidemiologist / public health specialist, microbiologist and a medical / paediatric specialist and other experts (entomologist etc) to travel at short notice to investigate suspected outbreak.
- National Centre for Disease Control (NCDC), Delhi would be the nodal agency for investigation of outbreak in any part of the country.

1.4 Laboratory Diagnosis

- NCDC, Delhi and National Institute of Virology (NIV), Pune, have the capacity to provide laboratory diagnosis of Zika virus disease in acute febrile stage. These two institutions would be the apex laboratories to support the outbreak investigation and for confirmation of laboratory diagnosis. Ten additional laboratories would be strengthened by ICMR to expand the scope of laboratory diagnosis.
- RT- PCR test would remain the standard test. As of now there is no commercially available test for Zika virus disease. Serological tests are not recommended.

2. Risk Communication

- The States/ UT Administrations would create increased awareness among clinicians including obstetricians, paediatricians and neurologists about Zika virus disease and its possible link with adverse pregnancy outcome (foetal loss, microcephaly etc). There should be enhanced vigilance to take note of travel history to the affected countries in the preceding two weeks.
- The public needs to be reassured that there is no cause for undue concern. The Central/ State Government shall take all necessary steps to address the challenge of this infection working closely with technical institutions, professionals and global health partners.

3. Vector Control

- There would be enhanced integrated vector management. The measures undertaken for control of dengue/ dengue hemorrhagic fever will be further augmented. The guidelines for the integrated vector control will stress on vector surveillance (both for adult and larvae), vector management through environmental modification/ manipulation; personal protection, biological and chemical control at household, community and institutional levels. Details are at Annexure-I.
- States where dengue transmission is going on currently due to conducive weather conditions (Kerala, Tamil Nadu etc) should ensure extra vigil.

4. Travel Advisory

- Non-essential travel to the affected countries to be deferred/ cancelled².
- Pregnant women or women who are trying to become pregnant should defer/ cancel their travel to the affected areas.
- All travelers to the affected countries/ areas should strictly follow individual protective measures, especially during day time, to prevent mosquito bites (use of mosquito repellent cream, electronic mosquito repellents, use of bed nets, and dress that appropriately covers most of the body parts).
- Persons with co-morbid conditions (diabetes, hypertension, chronic respiratory illness, Immune disorders etc) should seek advice from the nearest health facility, prior to travel to an affected country.
- Travelers having febrile illness within two weeks of return from an affected country should report to the nearest health facility.
- Pregnant women who have travelled to areas with Zika virus transmission should mention about their travel during ante-natal visits in order to be assessed and monitored appropriately.

5. Non-Governmental Organizations

- Ministry of Health &FW / State Health Departments would work closely with Non-Governmental organizations such as Indian / State Medical Associations, Professional bodies etc to sensitize clinicians both in Government and private sector about Zika virus disease.

² Based on available evidence, World Health Organization is not recommending any travel or trade restrictions.

6. Co-ordination with International Agencies

- National Centre for Disease Control, Delhi, the Focal Point for International Health Regulations (IHR), would seek/ share information with the IHR focal points of the affected countries and be in constant touch with World Health Organization for updates on the evolving epidemic.

7. Research

- Indian Council of Medical Research would identify the research priorities and take appropriate action.

8. Monitoring

- The situation would be monitored by the Joint Monitoring group under Director General of Health Services on regular basis. The guidelines will be updated from time to time as the emerging situation demands.

**GUIDELINES FOR
INTEGRATED VECTOR MANAGEMENT FOR
CONTROL OF AEDES MOSQUITO**

**Govt of India
National Vector Borne Disease Control Programme,
Directorate General of Health Services,
Ministry of Health & Family Welfare**

1 INTRODUCTION

Aedes aegypti (*Ae aegypti*) is the main vector species of Zika Virus Disease. This vector is widely prevalent in India and is common in most of the urban areas on account of deficient water management, presence of non-degradable tyres and long-lasting plastic containers as well as increasing urban agglomerations and inability of the public health community to mobilize the population to respond to the need to eliminate mosquito breeding sites. Overhead tanks, ground water storage tanks and septic tanks are usually the primary habitats. That is, *Ae aegypti* breeds almost entirely in man made water receptacles found in and around households, construction sites, factories.

Natural larval habitats are rare, but include tree holes, leaf axles and coconut shells. The population of *Ae aegypti* fluctuates with rainfall and humidity. Under the optimal conditions the life cycle of aquatic stage of the *Ae Aegypti* (the time taken from hatching to adult emergence) can be as short as seven days. At low temperatures, however, it may take several weeks for adults to emerge. During the rainy season, when survival is longer, the risk of virus transmission is greater.

The rural spread of *Aedes* is a relatively recent occurrence associated with expanding network of rural water supply schemes and other development projects without health impact assessments, scarcity of water with consequent water storage, changing lifestyle with improper use of air coolers and indiscriminate use of disposable containers, bottles, etc, improved transport system.

Therefore, the key to control Zika virus disease is adoption of a comprehensive approach by way of regular vector surveillance and integrated management of the *Aedes* mosquitoes through biological and chemical control that are safe, cost effective; and environmental management, legislations as well as action at household and community levels.

2 VECTOR SURVEILLANCE

2.1 Larval surveys: For larval surveys, the basic sampling unit is the house or premise, which is systematically searched for water holding containers. Containers are examined for the presence of mosquito larvae and pupae. Depending on the objective of the survey, the search may be terminated as soon as *Aedes* larvae are found, or it may be continued until all containers have been examined. The collection of specimens for laboratory examination is necessary to confirm the species. Four indices that are commonly used to monitor *Ae aegypti* infection levels are:

- i) House index (HI): percentage of houses infected with larvae and/or pupae

$$HI = \frac{\text{Number of Houses infected}}{\text{Number of Houses inspected}} \times 100$$

- ii) Container Index (CI): percentage of water holding containers infected with larvae or pupae.

$$CI = \frac{\text{Number of positive containers}}{\text{Number of containers inspected}} \times 100$$

- iii) Breteau Index (BI): number of positive containers per 100 houses inspected

$$BI = \frac{\text{Number of positive containers}}{\text{Number of houses inspected}} \times 100$$

- iv) Pupae Index (PI): number of pupae per 100 houses

$$PI = \frac{\text{Number of pupae}}{\text{Number of houses inspected}} \times 100$$

2.2 Adult Surveys:

- i) Landing/biting collection: Landing/biting collection of humans is a sensitive means of detecting low level infestations of *Ae aegypti*, but are very labour intensive. Because adult males have low dispersal rates, their presence can be a reliable indicator of clear proximity to hidden larvae habitats. It is usually expressed in terms of landing/biting counts per man hour.
- ii) Resting collection: During periods of inactivity, adult mosquitoes typically rest indoors, especially in bedrooms and mostly in dark places, such as cloth closets and other sheltered sites. Resting collection requires systematic searching of these sites for adult mosquitoes with the aid of flashlight. Following a standard timed collection routine in selected rooms of each house, densities are recorded as the number of adults per house or number of adults per man hour of human efforts.
- iii) Oviposition traps: Ovitrap are devices used to detect the presence of *Ae aegypti* where the population density is low and larval surveys are largely unproductive (when the Breteau index is less than 5) as well as normal conditions. The ovitrap is used for *Ae aegypti* surveillance in urban areas to evaluate the impact of adulticidal space spraying on adult female population.

3 VECTOR MANAGEMENT

3.1 Environmental Management

The major environmental management methods used for control of immature stages of *Aedes* mosquito are:

- (i) **Environmental modification:** Long lasting physical transformation of vector habitats. For example, improved water supply, mosquito proofing of overhead tanks, cisterns or underground reservoirs.
- (ii) **Environmental manipulation:** Temporary changes to vector habitats that involve the management of "essential" and "non-essential" containers and management of or removal of "natural" breeding sites.
- (iii) **Changes in human habitations:** Efforts are made to reduce man-virus contact by mosquito proofing of houses with screens on doors/windows.

3.2 Personal Protection

Protective clothing and repellents are common means of personal protection against mosquitoes and other biting insects. Household insecticide products, namely, mosquito coils, pyrethrum space spray and aerosols have been used extensively for personal protection against mosquitoes. Insecticide treated mosquito nets have limited utility in Zika control, since the vector species bite during the day time. However, insecticide treated bed nets can be effectively used to protect infants and night workers while sleeping in daytime.

3.3 Biological Control

- (i) Larvivorous fish are recommended for control of *Ae. aegypti* in large water bodies or large water containers.
- (ii) Endotoxin-producing bacteria, *Bacillus thuringiensis* serotype H-14 (Bt H-14) has been found an effective mosquito control agent.

3.4 Chemical Control

Chemical control measures (larvicides, adulticides) are recommended in permanent big water containers where water has to be conserved or stored because of scarcity of water or irregular and unreliable water supply.

- (i) **Larvicide:** Since *Ae aegypti* breeds in clean water, which is stored and used for household purposes, as such all the larvicides, which are safe, without any odour or colour, have residual effect with low mammalian toxicity and do not pose any health hazard should be used. Temephos, an organophosphate compound meets all the above mentioned requirements and this insecticide is being used under the public health programme. The recommended dose for application of Temephos (50 EC) is 1 ppm (1 mg per liter of water).
- (ii) **Adulticide:** The following methods are recommended for the control of adult *Ae aegypti* mosquitoes:
 - a) **Pyrethrum spray:** It may be used in indoor situations as space spray at a concentration of 0.1% - 0.2% @ 30-60 ml/1000 cu. ft. Commercial formulation of 2% pyrethrum extract is diluted with kerosene in the ratio of one part of 2% pyrethrum extract with 19 parts of kerosene (volume/volume). Thus, one litre of 2% pyrethrum extract is diluted by kerosene into 20 litres to make 0.1% pyrethrum formulation ('ready-to-spray' formulation). After dilution, pyrethrum extract is sprayed with Flit pump or hand operated fogging machine fitted with micro-discharge nozzle.
 - b) **Malathion fogging or Ultra Low Volume (ULV) spray:** In application of ULV, minimum volume of liquid insecticide formulation is applied per unit area. That is, the insecticide is broken down into small droplets of a volume median diameter (VMD) of 40-80 'microns with an objective of producing a cloud of insecticide droplets that remain suspended in air for an appreciable time and driven under the influence of wind. This provides maximum effectiveness against target vectors.

Since no diluent is used, the technique is more cost-effective than thermal fogging but it does not generate a visible fog. Most organophosphorus insecticides in their technical form can be applied as ULV spray. Under the public health programme, ULV spray (fogging) is undertaken by using 95% or pure technical malathion. The ground equipment mostly used for ULV spray includes portable motorized knapsack blowers and cold aerosol generators.

3.5 Legislative Measures

Suitable laws and byelaws should be enacted and implemented for regulating storage/utilization of water by communities, various agencies and avoidance of mosquitogenic conditions at construction sites, factories.

- (i) **Model civic byelaws:** Under this act fine/punishment is imparted, if breeding is detected. These measures are being strictly enforced by Mumbai, Navi Mumbai, Chandigarh and Delhi Municipal Corporations.
- (ii) **Building Construction Regulation Act:** Building byelaws should be made for appropriate overhead / under ground tanks, mosquito proof buildings, designs of sunshades, porticos, etc for not allowing stagnation of water vis-à-vis breeding of mosquitoes. In Mumbai, prior to any construction activity, the owners/builders deposit a fee for controlling mosquitogenic conditions at site by the Municipal Corporation.
- (iii) **Environmental Health Act (HIA):** Suitable byelaws should be made for the proper disposal/storage of junk, discarded tins, old tyres and other debris, which can withhold rain water.
- (iv) **Health Impact Assessments:** Appropriate legislation should be formulated for mandatory HIA prior to any development projects/major constructions.

3.6 HEALTH EDUCATION FOR COMMUNITY MOBILIZATION AND INTER-SECTORAL CONVERGENCE

Involvement of household, community for *Aedes* mosquito control is of paramount importance as the problem revolves mainly around man and his environment. There should be a continuous dialogue between health personnel and the community so that people may accept *Aedes* control programmes as their own programme. Community should be involved in the task of elimination of *Aedes* breeding in and around their houses for keeping houses free of larval breeding and reduction/elimination of adult mosquitoes.

Towards these objectives, massive, repetitive, intense and persistent Behavior Change Communication (BCC) campaign is crucial. The community must be assured that this is a preventable disease and empowered with the knowledge about mode of transmission, vector control options, availability of services in addition to correct treatment, so that timely and appropriate action is taken. Special campaigns may be carried out through mass media including local vernacular newspapers/magazines, radio and TV, especially using local cable networks as well as outdoor publicity like hoardings, miking, drum beating, rallies, etc. Health education materials should be developed and widely disseminated in the form of posters, pamphlets, handbills, hoardings. Inter-personal communication through group meetings, traditional / folk media particularly must be optimally utilized.

At different levels, following action may be taken:

(i) At Household Level:

- ☐ *Ae aegypti* mosquito bites during daytime. Adult mosquitoes should be killed by using of commercially available safe aerosols (Pyrethroid-based). Rooms including closets, bathrooms and kitchens should be sprayed (by removing/covering all food items properly) for a few minutes and closing the room for 15-20 minutes. The timing of the spray should coincide with the peak biting time of the *Ae aegypti* mosquito, e.g., early morning or late afternoon.
- ☐ Taking personal protection measures like wearing protective clothing (full sleeved shirts & full pants during day time) and using mosquito nets, preferably insecticide treated ones, while sleeping, even during day time. Using commercially available repellents during day time.
- ☐ Using mosquito repellents or burning neem leaves, coconut shells and husk to kill or repel the mosquitoes.
- ☐ Using tight-fitting screens/wire mesh on doors and windows.
- ☐ Intensifying efforts to reduce actual or potential larval habitats in and around houses by:
 - ☐ Covering all water containers in the house to prevent fresh egg laying by the vector.
 - ☐ Emptying, drying water tanks, containers, coolers, bird baths, pets' water bowls, plant pots, drip trays at least once each week.
 - ☐ Regularly checking for clogged gutters and flat roofs that may have poor drainage.
 - ☐ Introducing larvivorous fishes (e.g., Gambusia / Guppy) in ornamental water tanks/garden. These small fishes eat mosquito larvae.

(ii) At Community Level:

- ☐ People should form groups to supplement and reinforce efforts at household level. Such groups can identify commercial activities such as traders dealing in used tyres or small construction projects, etc, which may be creating larval habitats for the vector.
- ☐ The Groups should launch awareness campaigns on Zika Virus Disease and seek cooperation for prevention of mosquito breeding and protection from mosquito bites. Community activities against larvae and adult mosquitoes can include:
 - o Cleaning and covering water storage containers.
 - o Keeping the surroundings clean and improving basic sanitation measures.
 - o Burning mosquito coils to kill or repel the mosquitoes/burning neem leaves, coconut shells and husk to repel mosquitoes and eliminating outdoor breeding sites.
 - o Aiding in screening houses.
 - o Making available hand aerosols for killing mosquitoes.
 - o Cleaning weeds and tall grass to reduce available outdoor resting places for adult mosquitoes near houses.
 - o Promoting use of mosquito nets to protect infants and small children from mosquito bites during day time and also insecticide treated nets and curtains to kill mosquitoes attempting to bite through the nets or resting on nets and curtains. Organizing camps for insecticide treatment of community owned mosquito nets/curtains.
 - o In case water containers cannot be emptied, applying Temephos (1 ppm) on weekly basis in coordination with the Health authorities.
 - o Mobilizing households to cooperate during spraying / fogging.

(iii) At Institutional Level (Hospitals, Schools, Colleges, Other Institutions, Offices, etc):

- ☐ Weekly checking for *Aedes* larval habitats especially overhead tanks, ground water storage tanks, air coolers, planters, flower pots, etc
- ☐ Ensuring source elimination by:
 - ☐ Covering all water tanks with mosquito proof lids.
 - ☐ Emptying, drying water containers, coolers, plant pots at least once each week.
 - ☐ Checking for clogged gutters and flat roofs that may have poor drainage.
 - ☐ Introducing larvivorous fishes (e.g., Gambusia / Guppy) in ornamental water tanks/garden.
- ☐ Carrying out Indoor Space spraying with Pyrethrum 2%. The timing of the spray should coincide with the biting time of the *Ae aegypti* mosquito, e.g., early morning or late afternoon.
- ☐ Carrying out fogging or Ultra Low Volume (ULV) spray by using 95% or pure technical malathion.
- ☐ Promoting personal protection measures like wearing protective clothing (full sleeved shirts & full pants during day time), using commercially available repellents during day time as well as mosquito nets, preferably insecticide treated ones, while sleeping, particularly during day time.
- ☐ Putting tight-fitting screens/wire mesh on doors / windows.
- ☐ In addition, notification of fever cases (suspected/confirmed) to concerned Health authorities and appropriate case management.

In order to achieve sustainability of successful *Aedes* vector control programme, it is essential to focus on involvement of hospitals, non-health sector departments including schools/colleges, civil society organizations (NGOs, Faith Based Organizations and Community Based Organizations like Residents' Welfare Organizations, Self-Help Groups), Panchayati Raj Institutions/Municipal Bodies or such like local self-governments, local Religious Bodies, Nehru Yuvak Kendras, NSS/NCC units in schools and colleges as well as professional associations like Indian Medical Association and corporate sector. These groups should be provided information on all aspects of Zika virus disease : what it is, how it spreads and the role of mosquitoes, where & how they breed/rest, and how they can be controlled.

Mosquitoes can be controlled by

I. Environmental Modifications

- **Filling** : Filling on minor scale of burrows, pits, ditches, unused well in and around our surroundings.
- **Drainage** : Drainage is used to eliminate breeding site by draining away the water collection to a drain through pipes.
- **Netting** : Mosquito proofing of overhead tanks, cisterns or underground reservoirs or wells should be done to prevent mosquitoes laying their egg in the water.
- Improved and safe water supply
- **Drains** : Drains / storm water drains should be covered to eliminate mosquito breeding sites.

II. Environmental Manipulation

- Addition of chemicals (larvicide) to water
- Changing the salinity of water
- Silting
- Agitating the water
- Fluctuating the water levels
- Flooding

III. Changes in human habitation

- Use mosquito proofing of houses with screen on door / windows.
- Use of bed nets or mosquito nets. Mosquito nets have limited utility as the vector bites during day time but these can be used to protect infants and night workers who sleep during day time.
- Use of mosquito repellent creams, safe aerosols (Pyrethroid based) etc.
- Wearing clothes that cover maximum surface area of the body

VECTOR MANAGEMENT

Aedes aegypti is the main vector for Zika Virus Disease and this vector is widely prevalent in our neighbourhood. Overhead tanks, ground water storage tanks and septic tanks are the primary habitats. They breed mainly in man made water receptacles found in and around houses, construction sites and factories.

Natural larval habitats include tree holes, coconut shells, tyres, plastic and paper cups. The life cycle of aquatic stage of *Aedes aegypti* (i.e., the time taken from hatching to adult) can be as short as 7 days. During rainy seasons their survival is longer and therefore the risk of virus transmission is greater.

Egg laying in a suitable breeding habitat is the first step in the life cycle of mosquitoes. Prevention of clear water collection or removal / elimination of clean water collection is an environmental friendly, cost effective and easy to implement method to control mosquito.

Therefore, the key to control Zika Virus Disease is adoption of comprehensive approach by way of regular vector surveillance and integrated management of Aedes mosquito through vector management that are safe and cost effective at household level and community level.

Sequence of Integrated Vector Control

- Drain the water wherever possible
- Fill what cannot be drained
- Stock with fish which cannot be filled
 - Apply bio-larvicidal where it works
 - Use chemicals where nothing works

Keeping this in view the control strategies for ports should be envisaged.

Solid Waste Disposal

Scraps / wastes

1. Do not throw containers (paper / plastic cups, coconut shells) which can hold water for more than a week inside port area.
2. Stagnant water in buckets, junks scrap should be drained and dispose off before monsoon.
3. Solid wastes as paper cups / coconut shells should be removed and buried in landfills.
4. Scrap materials and junks of PWD should be stocked under sheds till such time these are disposed off for recycling.

Tyres

Waste and unused tyres are of critical importance in Aedes mosquito control. Concentration of tyres are seen in material depots and repair workshops. They are also used to provide cushion to boats touching disembarking stations. If it is essential to retain them, these should be stocked under shed so that no rainwater get collected. Those required for providing cushions should be punctured below so that no rain water is held in these tyres and the rest can be disposed off for recycling purpose.

Flower pots, Flower vases and Dust bins

Flower pots and dust bins should be punctured to produce a drain hole so that water does not get accumulated and become breeding grounds for mosquitoes. Plastic tray kept under flower pots should be drained weekly and scrubbed because egg of mosquitoes may get attached to the sides so proper scrubbing is a must. Ditto for flower vases. Water should be changed weekly and scrubbed.

Tall grasses / Foliages

Clear and clean open space and cut tall grasses to reduce availability of outdoor resting place for mosquitoes. Deweeding should be done periodically.

Exterior of Building

Concrete roof and terrace without proper drainage may lead to water collection and may form breeding site during monsoon. Similarly drainage pipes of sunshade, roof gutters often get blocked due to leaves and other deposits and may hold water and become breeding sites for mosquitoes. Therefore periodic inspection of roof gutters, sunshades, terrace is important. Also the terrace and sunshades should be sloped to avoid water collection.

Construction sites

Construction sites require special attention. Building bye laws should be properly implemented to prevent faulty designs. Curing tanks, stored water, water tanks, containers (paint cans etc.) can become breeding grounds. Regular anti-larval treatment and weekly drainage wherever possible should be done.

Water supply Installations

Water collections / leakages in distribution pipes, sluice boxes for fire hydrants, water meter etc. can collect water and breeding can take place. These chambers can be provided with soakage pits or can be drained out if slopped or made into a gradient slope. Well in use may be covered with mosquito proof nets. Unused wells should be closed or treated with larvicides.

Overhead Tanks

Overhead tanks in houses / buildings should be mosquito proofed. The overhead tank cover should be tight fitting and the overflow pipe should be covered with mosquito proof gauge or net and checked regularly. Overflow from overhead tanks must be controlled through proper floating valves.

Water bodies / Ponds / Pools

Larvivorous fishes like Gambusia or Guppies can be added to water pools. Larvicides like Temephos, an organophosphoric compound with low mammalian toxicity without any color, odour can be added. Recommended dose of Temephos is 1ppm (1 mg / litre of water). Ornamental tanks or fountains should be checked periodically.

Soakage Pits

In the absence of facilities for waste water disposal every household should have soakage pit which can become breeding ground for mosquitoes. The soakage pit should be properly drained and tightly closed.

Septic Tanks

Are the most prolific and productive breeding sites for mosquitoes. These tanks are provided with vent pipes for escape of obnoxious gases and an outlet for excess water to be let out. Mosquitoes enter the outlet and breed when these vents are kept open. The vent pipes should be covered with 18 mesh wire gauge and the tank also should be hermetically sealed.

Choked drains / Clogged Gutters

Choked drains can harbour mosquitoes. Choked and clogged drains should be cleaned and drained with saline water flushing. Flushing of drains should be done periodically.

At Household Level

- *Aedes aegypti* bites during day time. Adult mosquitoes should be killed using safe aerosols (pyrethroid based). The time of the spray should coincide with the peak biting time of *Aedes aegypti* mosquito.
- Taking personal protective measures like wearing protective clothing i.e., full sleeve shirt and pant during day time.
- Using mosquito nets
- Use light fittings screens or wire mesh on doors and windows.
- Reduce potential larval habitats by
 - Covering all water containers
 - Emptying, drying unused water tanks, containers, bird baths, plant pools, drip tray at least once a week.
 - Regularly checking for clogged gutters
- Introducing larvivorous fishes (Gambusia / Guppy) in ornamental tanks / garden.

At Community Level

Groups formed like (RWA) can supplement and reinforce efforts at household level. They can identify commercial activities like used tyre trading, small construction projects which may be creating larval habitats for the vector.

The group can launch awareness campaigns on Zika Virus Disease and seek cooperation for prevention of mosquito breeding and protection from mosquito bites. Community activities against larval and adult mosquito can include.

- Cleaning and covering water storage containers.
- Keeping surroundings clean and improving basic sanitation measures.
- Aid in screening houses.
- Cleaning tall grasses and weeds to reduce availability of outdoor resting places for mosquitoes.
- Promote use of mosquito nets to protect infants and small children from mosquito bites during day time.
- Apply Temephos (1 ppm) on weekly basis on water bodies in coordination with health authorities.
- Mobilise household to cooperate during spraying and fogging.

At Institutional Level

(Schools, offices, hospitals etc.)

- Weekly checking for *Aedes* larval habitats especially overhead tanks, ground water storage tanks, plant and flower pots.
- Ensure source elimination by
 - Covering all water tanks with mosquito proof lids.
 - Emptying and drying water containers, coolers, plant pots once a week.
 - Checking for clogged gutters and roofs with poor drainage
 - Introducing larvivorous fishes (*Gambusia* / Guppy) in ornamental water tanks / ponds.
- Carrying out indoor spraying with pyrethrum 2%. The timing of spray should coincide with biting time of *Aedes* mosquito i.e., early morning and late afternoon.
- Using personal protection measures like wearing protective clothing during day time as well as mosquito nets.
- Putting tight fitting screens / wire mesh on doors / windows.
- Notification of fever cases to concerned health authorities and appropriate case management.

