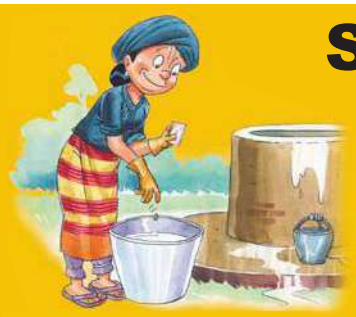
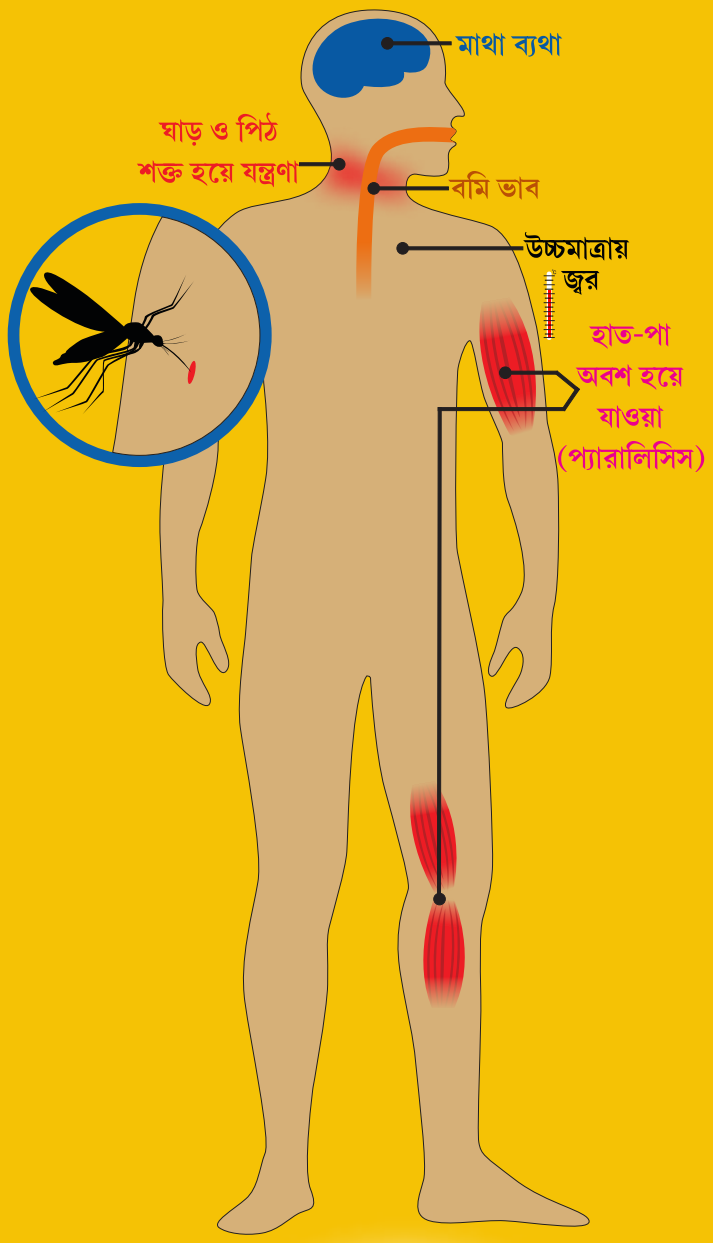
"National Awareness Campaign Week on Japanese Encephalitis (JE) / Acute Encephalitis Syndrome (AES)"

(from 1st to 24th August, 2014)

Survey Result





Organized & Supported by

Water & Sanitation Support Organisation
Public Health Engineering Department
Government of West Bengal

Panchayats & Rural Development Department
Government of West Bengal

Ministry of Drinking Water and Sanitation
Government of India

জাপানীজ এনকেফেলাইটিস প্রতিরোধে জাতীয় সচেতনতা অভিযান সপ্তাহ
২৩ - ২৭ শে জুন, ২০১৪
বিশুদ্ধ জল, স্বাস্থ্যবিধান
উন্নত করে জীবনের মান

CONTENTS

Executive summary

Japanese Encephalitis (JE) is a common mosquito borne flaviviral encephalitis. It is one of the leading forms of viral encephalitis worldwide, mostly prevalent in eastern and southern Asia, covering a region with a population of over three billion. Though underreported, JE causes an estimated 50,000 cases and 15,000 deaths annually. JE is a disease of public health importance because of its epidemic potential and high fatality rate. Death generally occurs in children below 15 years of age. Japanese encephalitis is one of the most important forms of epidemic and sporadic encephalitis in the tropical regions of Asia, including India. In India, epidemics of JE are reported from many parts of the country, and it is considered a major pediatric problem. A major outbreak resulting in a 42.6% fatality rate was reported in the Bankura District of West Bengal in 1973. Japanese encephalitis broke out with outbreaks in many parts of West Bengal in 2014. Bankura, Darjeeling, Jalpaiguri, Dakshin Dinajpur, Maldah, Birbhum, Bardhaman, Howrah, Hoogly and Paschim Midnapur were identified districts for the outbreak. People were not sensitized about the most key sources for this disease-Water Deposits acting as Mosquito breeding centers. Polluted water was a major hazard and the intensity of hazard led to high risk and higher degree of vulnerability, resulting in a health disaster for the community. Approximately 350 deaths were reported from government hospitals in North Bengal.

Causes and Symptoms of JE and Preventive measures

According to World Health Organization (WHO), Most JE virus infections are mild (fever and headache) or without apparent symptoms, but approximately 1 in 250 infections results in severe disease characterized by rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and death. Major outbreaks of JE occur every 2-15 years. JE transmission intensifies during the rainy season, during which vector populations' increase. JE is a potentially severe disease. It usually occurs in rural or agricultural areas, often associated with rice farming. Public Health and Engineering Department, Government of West Bengal has launched a four week awareness campaign in three subdivisions namely Alipurdwar, Siliguri and Jalpaiguri. The awareness campaign was carried out in 17 Blocks consisting of 158 Gram Panchayats. The awareness campaign included activities like IEC, on ground activity, orientation programmes, and water sample testing and sanitary surveys. The issues under IEC campaign included all the water and sanitary activities.

Basic Objectives of Household Survey

The broad objective of the household survey is to link knowledge, attitude and practices of the targeted audience with regards to water borne diseases, health, sanitation and water management and usage.

Some of the objectives of the study are as follows:

- To study the type of water sources are available in the
- To know whether the people have tested their drinking water
- To assess households having toilet facilities and their regular use pattern.
- To assess people's awareness and knowledge about Japanese Encephalitis
- To understand people's awareness about the symptoms of Japanese Encephalitis affected people
- To assess the precautionary measures like boiled water, proper use of toilets, using mosquito net, vaccination of children, etc taken by the people in area and rate of Japanese Encephalitis
- To understand and establish the co-relation between the usage pattern of latrine and drinking water and Japanese Encephalitis.

Methodology, study universe, survey and data analysis

The study is solely based on the primary sample data which was collected by the ASHA workers of the locality through interpersonal communication process. Households were randomly selected. The universe of the study was three divisions, namely, Siliguri, Alipurduar and Jalpaiguri. All the rural development blocks (16) in these divisions were covered. A total number of 16498 households were surveyed in the sample three divisions. The filled up schedules were properly coded and decoded and different values were assigned to different questions in the schedule. SPSS, the only package was used for the data entry, cross checking, data cleaning, and table and charts generation purposes. The report was presented and analyzed based on the tables / charts generated from the data.

Study Area Profile

Jalpaiguri, Siliguri and Alipurduar are the three divisions of the North Bengal. The region is predominantly rural. These districts are predominantly characterized by Scheduled Caste and Scheduled Tribe Population. The available statistics indicate that with reference to the three main civic amenities i.e. electricity, safe drinking water and sanitation facilities, the districts of North Bengal were poorly placed in comparison to the State of West Bengal. Similar situation exists in terms of human development indicators. The lack of basic amenities along

with water logging was the major reasons for the spread of Japanese Encephalitis in the region. In the study area, the family size was not too big and not too small. Majority of households have family members in between 3 to 6. Extended or large size family was mostly found in Siliguri division.

Water

Majority of the population lives in the rural areas and it is a huge challenge to provide them safe drinking water. The health burden of poor water quality is enormous. The government has undertaken various programmes since independence to provide safe drinking water to the rural masses. Use of safe drinking water is one of the major components in JE awareness programme in the study area. Different water sources are available in the region. Among the water sources, the most common of them are Tubewell, piped water, well, river, stream. Piped water is the main source of drinking water followed by tubewell in the study area. Besides, water from ring well, pond, river and PHE supply water are also used for the drinking purposes. Stream water was used for the drinking purposes in the hill areas. Water quality monitoring is one of the important components of the government programme in order to provide safe drinking water. Water quality monitoring has been accorded a high priority and institutional mechanisms have been developed at national, state, district, block and Panchayat levels. For ensuring safe drinking water, water testing is very important which was also highlighted by the executing agencies during the JE awareness campaign in the area. Water testing by the sample households is very low as only 13% percent households have done the test and remaining 87% have not done any test. 41% users of the pond water have tested the water followed by stream water (37%). The rate testing of lake water and piped water is very low among the sample households. Around one-fifth households in Jalpaiguri have done the water test followed Alipurduar (near about 12%).

Sanitation

According to recent UNICEF report, around three-fourth of the people practice open defecation and 60% of them belong to India. Open defecation has many health hazards and are the sole reason of many water borne diseases like Cholera. Effective sanitation prevents fecal matter from contaminating waterways, groundwater and drinking water supplies. Sanitary survey was of the major component of the household survey in JE awareness campaign. Two-third households have the sanitary facility. Three-fourth people use toilet regularly and the remaining practices open defecation or use toilet irregularly. Among those

who have toilet facility, 98% of them use toilet regularly. Around 70% households have latrine facility in Alipurduar followed by Jalpaiguri (around 68%). Regular use of latrine is higher among the people of Alipurduar compared to other two divisions.

Japanese Encephalitis

PHED, West Bengal with its partner organizations initiated various awareness campaign programmes in the region to make people aware about the origin and growth of the JE virus. Household survey was one of the most important components in the JE awareness campaign to assess people knowledge and awareness about the JE virus. Around 62.2% respondents are aware about the virus and also know the causes and its health consequences. See chart 5.1 for the further details about the Japanese Encephalitis virus. JE awareness level is below fifty per cent in Alipurduar division compared to around 81% in Jalpaiguri division. The health consequences cited by the respondents are as follows: fever, high fever, headache, vomiting tendency, neck and back bone pain, senseless, irritation, red eye, vein and head damage, affect one to 15 year children, and death. About the causes, respondents believed that it is a virus, it causes due to water and environment pollution, its related to birds, pigs and mosquito. Around 30% respondents knew that JE is related to Mosquito and Pig. Around 16% respondents said that its symptoms are fever (15.6%), Headache (12.7%), High Fever (11.6%) and vomiting tendency (6.5%). Three-fourth people in Siliguri division believe red eye is the symptom of Japanese Encephalitis and near about three-fourth people in Jalpaiguri believe high fever is the symptom of Japanese encephalitis. Near about 59% people each in Alipurduar division believe JE causes death and it is related to polluted environment.

Around 8% households reported that people are suffering from JE either in their home or in their neighbourhood. Around 13% population suffers from Japanese Encephalitis virus in Alipurduar compared to Jalpaiguri (4.7%) and Siliguri (4.6%). Lack of awareness level is one of the major reasons in Alipurduar for suffering from Japanese Encephalitis.

Vaccination of children against JE virus up to 15 years is very important. Near about 68 per cent families have vaccinated their children against the Japanese Encephalitis virus and remaining 32% have either not vaccinated or nor they have children in this age group. Around 55% children in Alipurduar Divisions have been vaccinated compared to around 83% Siliguri division and 69% in Jalpaiguri.

Using mosquito net is one of the important preventive measures against Japanese Encephalitis. In the study area, it was found that 95% households use mosquito net regularly

before sleep. 98% households in Jalpaiguri (highest) use mosquito net compared to lowest 93% in Siliguri.

In order to know whether a patient has been affected by the Japanese Encephalitis virus or not, it is necessary to get the test of blood and spinal fluid test. More than majority of the households in the region have done the blood and cerebral spinal fluid test. Highest number of households (67%) in Jalpaiguri has done the test compared to less than majority households in other two sample divisions.

Correlation between Hygiene Practices and Japanese Encephalitis

Various research studies have proved the unhygienic practices particularly open defecation, storage of water, improper damage system are some of the important sources of the spreading JE virus. Regular use of toilet, use of drinking water after testing, vaccinating children regularly against JE virus, using mosquito net during sleep at night, blood and cerebral spinal fluid test are some of the precautionary practices to ward off JE virus. The survey based on the sample household does not prove the existence of the relation between open defecation and getting affected by Japanese Encephalitis.

There is no particular trend between the sources of drinking water and Japanese Encephalitis. Highest percentage of getting infected by JE is the user of PHE supply water (25.4%) followed by River (15.1%). Cent per cent household those who use water from pond have not suffered from Japanese Encephalitis. Around 11% population suffered from JE of those who use piped water. Compared to the sources of water, there is slightly a reverse trend as far as water testing and its relation with Japanese Encephalitis virus is concerned. Around 8% people have suffered from Japanese Encephalitis those who have not done the water testing compared to 6% of those who have tested their water.

The vaccination does not totally prevent children from getting infected by Japanese Encephalitis. By vaccinating children means less chance of getting infected by the Japanese Encephalitis. Around 7.7% children have been affected by the JE after having vaccination compared to 8.4% of those children who have not vaccinated.

There is slightly difference between using mosquito net and not using during sleep and getting affected by the Japanese Encephalitis. Near about 8% of people those who use mosquito net during sleep have got affected by the Japanese Encephalitis compared to 9% affected of those who have not used mosquito net.

Among those who have suffered from Japanese Encephalitis, around 8.3% have done blood and spinal fluid test and around 7.5% of those who suffered from Japanese Encephalitis have not done blood and spinal fluid test.

Awareness level or knowledge about certain causes and their consequences protects people getting affected by diseases. But in case of Japanese Encephalitis, the trend is reverse and that is because of the nature of the disease. Near about 11% people those who are aware about the causes and consequences of JE virus have got affected by the JE whereas near about 4% ignorant people about JE have got affected by the disease.

Conclusions

Public Health and Engineering Department, Government of West Bengal carried out a Japanese Encephalitis Programme in three divisions, namely, Jalpaiguri, Siliguri and Alipurduar of North Bengal. The basic objective of the awareness campaign is to make people aware about the Japanese Encephalitis virus. Although people are practicing hygienic water and sanitary practices, but it is not cent percent. As far as correlation between Water and Sanitary practices and JE virus is concerned, no significant relationship was found from sample household study. Further survey needs to be done to establish the link between water and sanitary practices and JE virus. Although majority of the households practice using mosquito net at night, vaccination of children against JE, but it is still not cent per cent. All people in the study area needs to be encouraged of the benefits of using mosquito net and vaccination of their children and how it protects their children of getting infected by JE virus. Attempt may be made on part of all stakeholders in providing latrine for each household and safe drinking water to all households. More arrangement like setting up mobile water testing labs needs to be made in all the villages or the villages in the remote areas those who do not have easy accessibility to the water testing lab.

1.0 INTRODUCTION

Japanese Encephalitis (JE) is a common mosquito borne flaviviral encephalitis. It is one of the leading forms of viral encephalitis worldwide, mostly prevalent in eastern and southern Asia, covering a region with a population of over three billion (Ghosh: 2009). Most infections of JE are asymptomatic, but if clinical illness develops, it causes significant morbidity and mortality. Though underreported, JE causes an estimated 50,000 cases and 15,000 deaths annually (Tsai: 1997). JE is a disease of public health importance because of its epidemic potential and high fatality rate. In endemic areas, the highest age-specific attack rates occur in children of 3 to 6 years of age (Hoke: 1992). Death generally occurs in children below 15 years of age. Approximately 20%--30% of patients die, and 30%--50% of survivors have neurologic or psychiatric sequelae (WHO: 2006).

Japanese encephalitis is one of the most important forms of epidemic and sporadic encephalitis in the tropical regions of Asia, including Japan, China, Taiwan, Korea, Philippines, all of Southeastern Asia, and India (Solomon: 1997). Countries with proven epidemics of JE include India, Pakistan, Nepal, Sri Lanka, Burma, Laos, Vietnam, Malaysia, Singapore, Philippines, Indonesia, China, maritime Siberia, Korea, and Japan. The first outbreak of encephalitis attributed to JEV was reported in Japan in 1871. Major epidemics have been reported about every ten years; in 1924, over 6,000 cases were documented in a severe epidemic in Japan. In the past 50 years, the geographic areas affected by JEV have expanded. Epidemic activity in Northern India, Central India, and Nepal has increased since the early 1970s. During winter, mosquitoes are inactive, but huge epidemics can happen during summer and autumn. The geographical area of this disease is showing a trend towards expansion. Postulated explanations are bird migration, certain irrigation projects, animal smuggling, and global warming. Development of rice plantations is theoretically foreseeable in other regions (Pakistan, Afghanistan, Nile Valley, Madagascar, and Oriental Africa), creating a favorable environment for further vector proliferation (Diagana: 2007).

1.1 JE IN INDIA

In India, epidemics of JE are reported from many parts of the country, and it is considered a major pediatric problem. The first recognition of JE based on serological surveys was in 1955, in Tamil Nadu, India (Namachivayam: 1982). A total of approximately 65 cases were reported between 1955 and 1966 in Southern India (Carey: 1968). Subsequent surveys carried out by the National Institute of Virology of Pune indicated that approximately half of the population in Southern India has neutralizing antibodies to the virus. Since 1955, many major outbreaks in different parts of the country have been reported. Subsequently, the disease

spread to other states and caused a series of outbreaks in different parts of the country. In 1978, cases were reported from 21 states and union territories (Diagana: 2007). In Uttar Pradesh, the first major JE epidemic occurred in Gorakhpur in 1978, with 1,002 cases and 297 deaths reported. Many outbreaks were reported in Gorakhpur after the 1978 JE outbreak, with varying intensity and magnitude. Since 1978 to 2005, this encephalitis has taken more than 10,000 lives in the state (Dhillon: 2008). The 2005 epidemic surpassed all previous reported outbreaks in the country. In that year, Uttar Pradesh faced a devastating outbreak of JE, mostly confined to Gorakhpur, with 6,061 cases and 1,500 deaths; another outbreak occurred in 2006, with 2,320 cases and 528 deaths. Similarly, JE cases in Uttar Pradesh were confined predominantly to Gorakhpur during 2007, with 3,024 cases and 645 deaths, and then onwards till 2007 there have been 103,389 reported cases in India, and 33,729 deaths. Approximately 597,542,000 people in India live in JE-endemic regions, and 1,500 to 4,000 cases are reported every year (Kabilan: 2004). These figures are based on total reported cases; it is possible that many cases are unreported and hence the actual magnitude of the threat of JE may be considerably higher, both in the Indian and in the global context.

1.2 JE WEST BENGAL

A major outbreak resulting in a 42.6% fatality rate was reported in the Bankura District of West Bengal in 1973. Japanese encephalitis (JE) broke out with outbreaks in many parts of West Bengal in 2014. Bankura, Darjeeling, Jalpaiguri, Dakshin Dinajpur, Maldah, Birbhum, Bardhaman, Howrah, Hoogly and Paschim Midnapur were identified districts for the outbreak. People were not sensitized about the most key sources for this disease-Water Deposits acting as Mosquito breeding centers. Polluted water was a major hazard and the intensity of hazard led to high risk and higher degree of vulnerability, resulting in a health disaster for the community. Approximately 350 deaths were reported from government hospitals in North Bengal.

1.3 TARGET POPULATION, MORTALITY AND MORBIDITY

JE is mostly a disease of children and young adults. Rates of infection in the 3 to 15 year age group are five to ten times higher than in older individuals, because of high background immunity in older individuals. Epidemics in non-endemic regions have affected all age groups, but a bimodal age distribution (young children and elderly) has appeared, indicating an increased risk in elderly people (Burke: 2001). In endemic areas, nearly all residents have sustained infection by young adulthood. An excess of cases has been noted in males in many

outbreaks; presumably because of increased exposure in areas of rice cultivation. JE's mortality rate is approximately 25 per cent to 30 per cent. Although intensive care support can reduce the mortality rate, patients often suffer significant long-term morbidity. Some effects, such as learning difficulties and behavioral problems, can be subtle and may remain undetected for several years. Fifty per cent of those who recover suffer from neurological deficit. Over the past 60 years, it has been estimated that JEV has infected more than ten million people, of whom three million died and four million suffered long-term disabilities (Mackenzie: 2004).

1.4 CAUSES AND SYMPTOMS OF JE

1.4.1 SIGNS AND SYMPTOMS

According to World Health Organization (WHO), Most JE virus infections are mild (fever and headache) or without apparent symptoms, but approximately 1 in 250 infections results in severe disease characterized by rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and death. Major outbreaks of JE occur every 2-15 years. JE transmission intensifies during the rainy season, during which vector populations' increase. The spread of JE in new areas has been correlated with agricultural development and intensive rice cultivation supported by irrigation programmes. JE is a potentially severe disease. It usually occurs in rural or agricultural areas, often associated with rice farming. In temperate areas of Asia, transmission is seasonal, and human disease usually peaks in the summer and fall. In the subtropics and tropics, transmission can occur year-round, often with a peak during the rainy season.

1.4.2 PREVENTIVE MEASURES AND AWARENESS CAMPAIGN BY THE GOVERNMENT OF WEST BENGAL

Public Health and Engineering Department, Government of West Bengal has launched a four week awareness campaign in three subdivisions namely Alipurdwar, Siliguri and Jalpaiguri. The awareness campaign was carried out in 17 Blocks consisting of 158 Gram Panchayats. The awareness campaign included activities like IEC, on ground activity, orientation programmes, and water sample testing and sanitary surveys. The issues under IEC campaign include:

- ✓ Drink only boiled water and avoiding using stagnant water for any purposes.
- ✓ Need to avoid water accumulation in potholes or small ponds in neighborhood.

- ✓ Non-use of damaged tube wells and recommended measures for their repair soon.
- ✓ Drainage should be cleaned at regular intervals
- ✓ Neem leaf is a useful natural medicine and neam leaf smoke should be inhaled in order ward off Japanese encephalitis
- ✓ People in the community should sleep under mosquito nets to avoid from bites
- ✓ Vaccinating children at regular intervals in order to prevent Japanese encephalitis.
- ✓ If above symptoms are observed by anyone in the family or in the neighbourhood then it is advisable to visit nearby hospital and immediately get examined.
- ✓ One should wear fully covered clothes and beds should be placed far from home pets.
- ✓ Need to wash mosquioto nets in delta-metharine medicine and then reuse the mosquito nets
- ✓ Leaflets also highlighted non-usage of broken tube wells and suggest measures for their repair soon.
- ✓ Leaflets suggesting vaccinating children at regular intervals to protect them from Japanese encephalitis

Contamination of water takes place because of surroundings, which are unhygienic, toilets, which are unclean, and in broken condition. Contamination also occurs because of usage of water of small ponds, ditches, lakes, reservoirs used by animals. Animal's excreta and human excreta also contaminate the water. The leaflets communicate key point that drainage system should be maintained properly and should be cleaned regularly in order to avoid health issues.

1.5 BASIC OBJECTIVES OF HOUSEHOLD SURVEY

Household survey was one of the major components of PHED's intervention in three sub-divisions of North Bengal. Survey is an important tool for gathering information from the target audience on any issue. The broad objective of the household survey is to link knowledge, attitude and practices of the targeted audience with regards to water borne diseases, health, sanitation and water management and usage.

Some of the objectives of the study are as follows:

- To study the type of water sources are available in the region or type of water people use for the drinking purposes
- To know whether the people have tested their drinking water
- To know number of households having toilet facilities in their courtyard and to understand their use pattern
- To assess people's awareness and knowledge about Japanese Encephalitis
- To understand people's awareness about the symptoms of Japanese Encephalitis affected people
- To estimate number of people affected by Japanese Encephalitis in the locality
- To assess the rate of vaccination of the children in the locality to protect children against Japanese Encephalitis
- To know whether the people during the sleep use mosquito net as a precautionary measure against mosquito bite
- To understand the awareness level of people by going for blood and cerebral spinal fluid test in order to whether s/he is affected by Japanese Encephalitis or not.
- To understand and establish the co-relation between the usage pattern of latrine and drinking water and Japanese Encephalitis.

1.6 METHODOLOGY

The study is solely based on the primary data. However, to supplement the primary data, secondary data in the form of past literatures were also referred. Primary data mostly consists of household survey form. A structured format was developed in consultation with the Department of Public Health and Engineering, West Bengal and was administered among the selected households. For the survey purpose, households were randomly selected. Information was solicited from the respondents through Interpersonal Communication Process. For the survey, three sub-divisions of the North Bengal were chosen. ASHA workers in the locality were chosen for carrying out the survey work. Before collecting data, ASHA workers were properly trained about the objectives of the survey and the procedure for selecting the households and soliciting information from the respondents.

1.7 UNIVERSE OF THE STUDY

For the universe of the study, three sub-divisions, namely, Siliguri, Alipurduar and Jalpaiguri of North Bengal were chosen. In these sub-divisions, all the rural development blocks were

covered. In all Blocks, sincere attempt was made to visit and cover all Gram Panchayats. Following table shows the divisions and blocks covered under the study.

Table 1.1 Sample Divisions and Blocks

Divisions	Blocks
Siliguri	• Matigara • Kharibari • Naxalbari • Phansidewa
Jalpaiguri	• Jalpariguri Sadar • Mainaguri • Dhupguri • Rajganj • Mateli • Nagarkanta
Alipurduar	• Alipurduar I • Alipurduar II • Madarihat • Falakata • Kalchini • Kumargram

1.8 SAMPLE SIZE

Attempt was made to collect the representative sample in each district. A total number of 16498 households were surveyed in the sample three divisions. The table below shows the sample size of sample districts. Block wise sample have been given in the subsequent chapters.

Table 1.2 Divisions wise sample size

Divisions	Sample Size (Household Survey)
Siliguri	4958
Jalpaiguri	5065
Alipurduar	6475
Total	16498

1.9 DATA COLLECTION

A total of seven executing agencies have been involved in the entire JE awareness programme. Kolkata-based Nirman Foundation supervised these agencies in this activity at the state level. Primary sample household survey was one of the major components in the JE awareness programme in the sample divisions. Following are the agencies involved in the JE awareness campaign:

Table 1.3 Agencies involved in JE Awareness Campaign

Divisions	Agencies
Siliguri	• West Bengal Voluntary Health Association
Jalpaiguri	• Nirman Foundation • West Bengal Voluntary Health Association • Rajgunj Welfare Organisation
Alipurduar	• Natural Environment And Social Tent (NEST) • Mahila Shishu Shwastha Suchetna Organisation • Khagrabari Rural Energy Development Association • Salsala Bari Prayas Rural And Ecological Development

The above seven agencies had been involved in the execution of the Japanese Encephalitis awareness programme. Nirman Foundation of West Bengal was the nodal agency in the execution of the work. These agencies developed proper training modules for the household survey and trained ASHA workers in the region who further carried out the household survey.

1.10 DATA ANALYSIS AND REPORT WRITING

The filled up schedules were properly coded and decoded and different values were assigned to different questions in the schedule. Software package like Statistical Package for Social Sciences (SPSS), the only package was used for the data entry, cross checking, data cleaning, and table and charts generation purposes. The report was presented and analyzed based on the tables / charts generated from the data. The entire data entry and report writing was entrusted to BRB Research Analysis and Development Private Limited, a professional research agency.

2.0 STUDY AREA PROFILE

2.1 STUDY AREA BACKGROUND

Jalpaiguri, Siliguri and Alipurduar are the three divisions of the North Bengal. The region is predominantly rural. These districts are predominantly characterized by Scheduled Caste and Scheduled Tribe Population. The available statistics indicate that with reference to the three main civic amenities i.e. electricity, safe drinking water and sanitation facilities, the districts of North Bengal were poorly placed in comparison to the State of West Bengal. Being predominantly rural the access to the infrastructure is even more limited. Similar situation exists in terms of human development indicators. Districts under North Bengal were characterized by lower literacy levels compared to the rest of Bengal. In addition to low levels of literacy there is also marked gender disparity. The educational composition of main workers in the districts of North Bengal reveals the large preponderance of illiterate workers in comparison to the State as a whole. The relative proportion of educated (matriculate and above) in the districts of North Bengal was far below the State average. In comparison to the State as a whole, the level of industrialization in North Bengal is very low. The services sector is gradually picking up. As per the income estimates, the per capita income in all the districts of North Bengal was far below the State average. The lack of basic amenities along with water logging was the major reasons for the spread of Japanese Encephalitis in the region.

2.2 DIVISION WISE HOUSEHOLDS

The table below shows the number and percentage households covered in the three divisions of North Bengal. Highest number of households were covered from Alipurdwar division (6475) followed by Jalpaiguri (5065).

Table 2.1 Division wise sample households

Divisions	Numbers	Per Cent
Jalpaiguri	5065	30.7
Siliguri	4958	30.1
Alipurduar	6475	39.2
Total	16498	100

2.3 BLOCK WISE HOUSEHOLDS

A total number of 16 blocks spreading in three sample divisions were covered. Six blocks each were covered in Jalpaiguri and Alipurduar divisions and four blocks were covered from Siliguri division. Highest percentage of households were covered from Alipurduar II (9.2%) whereas lowest percentage households were covered from Dhupguri Block (3.9%). The table below shows block wise households covered under the study.

Table 2.2 Block wise sample households

Blocks	Number	Per cent
Sadar	761	4.6
Mainaguri	681	4.1
Dhupguri	647	3.9
Rajganj	1055	6.4
Matali	1028	6.2
Nagarkata	896	5.4
Matigara	1250	7.6
Kharibari	1282	7.8
Naxalbari	1169	7.1
Pharsideva	1255	7.6
Falakata	1418	8.6
Alipurduar-II	1518	9.2
Alipurduar-I	636	3.9
Madaschat	1068	6.5
Kalchuni	773	4.7
kumargram	1061	6.4
Total	16498	100

2.4 FAMILY SIZE

The family size was mostly in the group of 1 to 3 members' family, 3 to 6 members and 6 and above members of family. The chart below shows the type of family in the three sample divisions. 62% households have the membership between 3 to 6 members followed by 1 to 3 members (24%). 14% households in the region have the family size of 6 to above members. In all the three divisions, more than three-fourth households have the family size between 3 to

six members. Around one-fourth households in Siliguri division have family size of 6 or more members which shows the existence of the extended family. For the detail, please see chart 2.1 and table 2.3. For the block wise size of the family, please refer to **table 1** in the annexure.

Chart 2.1 Family Size

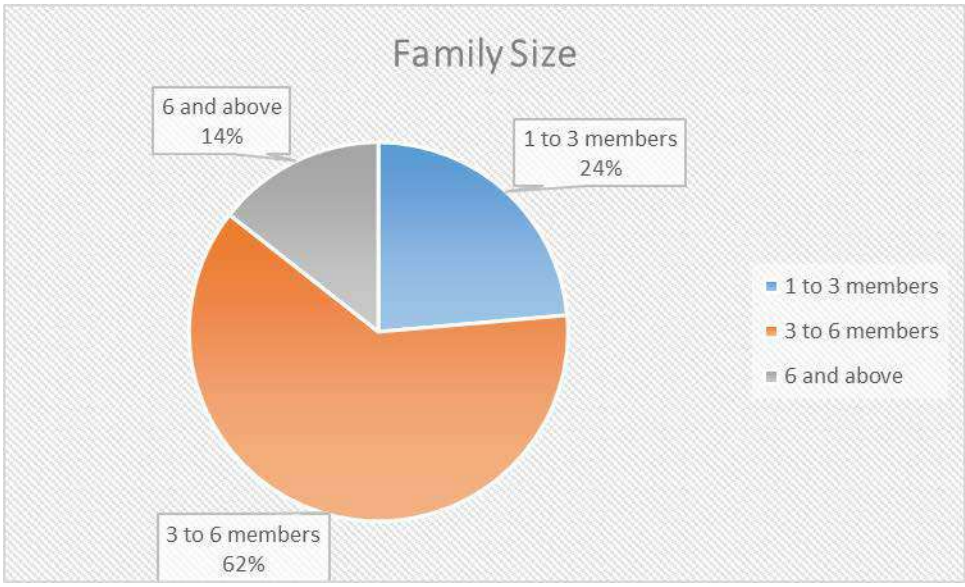


Table 2.3 Division wise Family Size

Family Size in Division wise					
Divisions	Number/%	1 to 3 members	3 to 6 members	6 and above	Total
Jalpaiguri	Number	1103	3190	772	5065
	%	21.8	63.0	15.2	100
Siliguri	Number	807	3155	996	4958
	%	16.3	63.6	20.1	100
Alipurduar	Number	1988	3887	600	6475
	%	30.7	60.0	9.3	100
Total	Number	3898	10232	2368	16498
	%	23.6	62.0	14.4	100

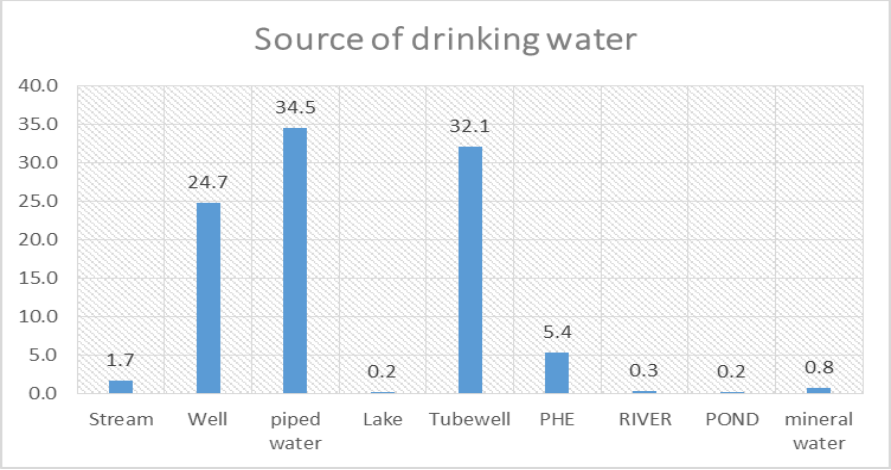
3.0 WATER

Majority of the population lives in the rural areas and it is a huge challenge to provide them safe drinking water. The health burden of poor water quality is enormous. Due to poor water quality, millions of Indians are affected by water borne diseases like diarrhea. The provision of clean drinking water has been given priority in the Constitution of India, with Article 47 conferring the duty of providing clean drinking water and improving public health standards to the State. The government has undertaken various programmes since independence to provide safe drinking water to the rural masses. Use of safe drinking water is one of the major component in JE awareness programme in the study area.

3.1 SOURCE OF DRINKING WATER

The chart 3.1 below shows the different sources of water available in the region. Among the water sources, the most common of them are Tubewell, piped water, well, river, stream. In all the sample divisions, around one-third of households use piped water as the main source of drinking water followed by Tubewell (32.1%). Around one-fourth of the households use water from the Well. Around five per cent households have the facility of PHED (Public Health and Engineering Department) water supply. Remaining sample households in the region use other sources of water like stream (1.78%), mineral water (0.8%), River, Pond and lake. See the table 2 in annexure for the number of households and their percentage in the use of different type of water.

Chart 3.1 Source of Drinking Water



3.1.1 SOURCE OF DRINKING WATER IN SAMPLE DIVISIONS

The table 3.1 below shows availability different type of water sources in division wise in North Bengal. In all the three divisions, the most common source of drinking water is piped water followed by tubewell. Near about half of the households in Alipurduar division use piped water as main source of drinking water followed by Tubewell (37.5%), Well (6.5%), PHE (5.4%). In Jalpaiguri, more than one-third of the households use Well as the source of drinking water and around a quarter of the households use piped water and the same number of households also use water from tubewell as drinking water. Around 9 per cent households have the PHED water supply facility in Jalpaiguri. Water from well is the most common source of drinking water in Siliguri (37.2%) followed by tubewell (32.7%). More than a quarter of households in Siliguri Divison have the facility of piped water. A section of households in both siliguri and Jalpaiguri divisions use stream water.

Table 3.1 Division wise Source of Drinking Water

Source of Drinking water in district wise										
District	Stream	well	piped water	Lake	Tubewell	PHE	RIVER	POND	Mineral water	Total
Jalpaiguri	4.2	35.9	24.5	0.0	24.5	9.1	0.6	0.1	1.1	100
Siliguri	1.3	37.2	26.5	0.6	32.7	1.6	0.0	0.0	0.1	100
Alipurduar	0.1	6.5	48.4	0.1	37.5	5.4	0.4	0.5	1.1	100
Total	1.7	24.7	34.5	0.2	32.1	5.4	0.3	0.2	0.8	100

3.1.2 SOURCE OF DRINKING WATER IN SAMPLE BLOCKS

The table 3.1.1 below shows the different types of availability of water sources in different sample blocks. For example, around 92.5% households in Falakata Blocks have the facility of piped water compared to 6% households each in Nagarkata and Rajganj blocks of Jalpaiguri division. In Jalpaiguri Sadar blcoks, piped water is the most common source (49%) followed by Well (27%). Around 9% households in the Sadar Block use stream water (highest among all the sample blocks). In Mainaguri Block, Tubewell is the most common source of water (41%) followed by Well (29%). Two-third households in Dhupguri block use piped water followed by PHE water supply (17.5%). Near about two-third households use water from Well followed by tubewell (17.1%) Rajganj Block. In Matali Block, around half of the

households use water from Well and a quarter of households use piped water. In Nagarkata, more than majority of the households use water from tubewell followed by slightly less than a quarter of households use water from Well. Around 17% households have the PHE water supply facility in the Nagarkata Block. In Matigara Block, different types of water are used by the people and the most common of them are water from Well, tubewell, and piped water. In Khairibari Block, majority of the households use water from Well followed by tubewell (26.8%). In Naxalbari block, more than a quarter of people each use tubewell and piped water and a quarter of people use water from Well. In Pharsideva Block, people use the traditional sources of water like Tubewell and Well. In both Alipurduar Blcok II and Alipurduar Block I, more than majority of the people use water from tubewell. More than majority households use piped water as the main source of drinking water followed by a quarter of households use water from tubewell in Madaschat Block. Piped water and tubewell is the most popular source of drinking water in Kalchini Block. Near about majority households use water from tubewell followed by more than a quarter of households use piped water in Kumargram Blocks.

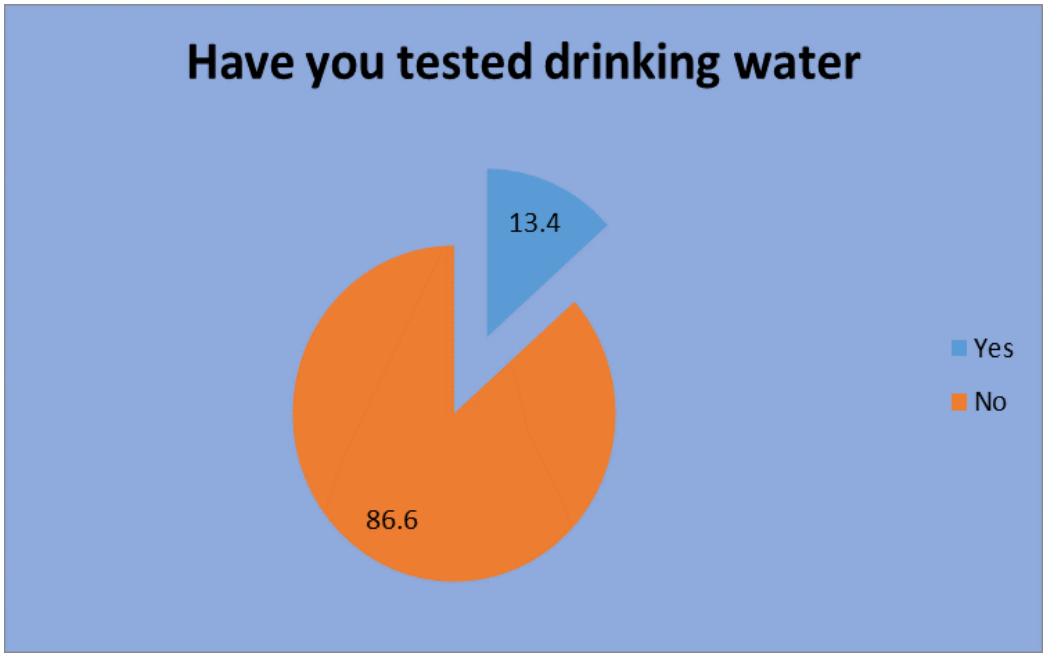
Table 3.1.1 Block wise Source of Drinking Water

Source of Drinking Water in Block wise										
Block	Stream	Well	Piped Water	Lake	Tubewell	PHE	River	Pond	Mineral water	Total
Sadar	8.9	27.1	48.6	0.0	3.4	4.7	3.7	0.0	3.5	100
Mainaguri	0.0	28.8	11.5	0.1	41.0	15.1	0.0	0.9	2.6	100
Dhupguri	3.6	4.2	65.4	0.0	9.4	17.5	0.0	0.0	0.0	100
Rajganj	5.8	64.7	6.1	0.0	17.1	5.5	0.0	0.0	0.9	100
Matali	3.7	48.7	24.9	0.0	22.7	0.0	0.0	0.0	0.0	100
Nagarkata	2.7	22.5	6.0	0.1	51.9	16.7	0.0	0.0	0.0	100
Matigara	0.3	34.2	27.2	0.2	31.7	6.3	0.0	0.0	0.0	100
Kharibari	3.9	50.2	17.1	2.0	26.8	0.0	0.0	0.0	0.2	100
Naxalbari	0.3	25.9	35.3	0.2	37.6	0.1	0.2	0.0	0.3	100
Pharsideva	0.4	37.6	26.9	0.0	35.1	0.0	0.0	0.0	0.0	100
Falakata	0.0	1.3	92.5	0.1	3.7	2.3	0.0	0.1	0.0	100
Alipurduar-ii	0.2	1.6	34.8	0.0	60.5	0.4	0.0	0.0	2.4	100
Alipurduar-i	0.2	5.8	6.9	0.2	54.9	32.1	0.0	0.0	0.0	100
Madaschat	0.0	4.0	55.8	0.4	26.6	9.7	0.8	0.0	2.6	100
Kalchuni	0.0	0.9	49.9	0.1	42.6	0.5	1.8	4.0	0.1	100
kumargram	0.2	27.4	25.2	0.1	46.6	0.0	0.0	0.1	0.5	100
Total	1.7	24.7	34.5	0.2	32.1	5.4	0.3	0.2	0.8	100

3.2 WATER TESTING AND ITS USE

Before use of the water for drinking purposes, water should be tested at regular intervals. The JE awareness campaign also stressed the importance of the water testing through its leaflets, banners, etc. The JE awareness campaign stressed that water might have high level of harmful substances which could cause high amount of infection in body. In order to prevent from infections, water samples should be submitted at water testing labs. The leaflets also stressed that if there is no water testing labs, Gram Panchayat or Public Health and Engineering Department should be consulted. The household survey which was conducted during the JE awareness campaign, it was found that out of sample 16498 households, only 2207 have tested their water recently which merely forms 13%. The remaining 87% households have not tested their water. See chart 3.2 below for the details.

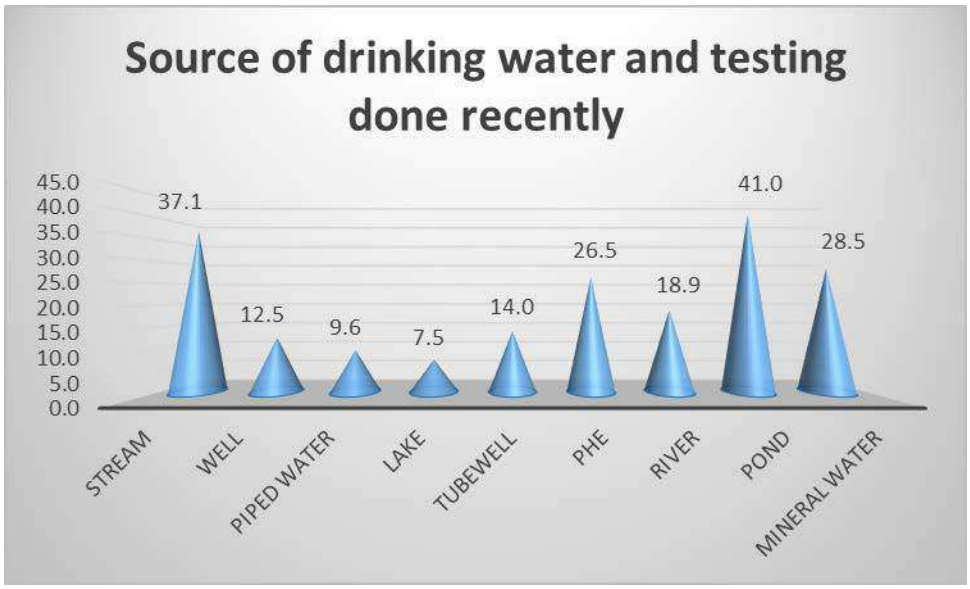
Chart 3.2 Testing of Drinking Water



3.2.1 WATER TESTING AND SOURCES OF WATER

Among the water sources which have been tested recently, water from pond forms the highest percentage (41%) followed by Stream Water (37.1%). The lowest rate of water testing has been done in case of water from lake (7.5%) followed by piped water (9.6%). See chart for details of sources of water and their testing. See chart 3.2.1.

Chart 3.2.1 Source of Testing of Drinking Water



3.3 DIVISION WISE TESTING OF WATER

The chart below shows that the highest percentage of households (19.4%) in Jalpaiguri divisions has tested their water followed by Alipurduar (11.6%). Around one-tenth of households in Siliguri districts have tested their water. People in Jalpaiguri are more aware about the health consequences of the use of untested water. The table below shows that around 60% households those who use stream water in Siliguri division have tested their water followed by less-than one-third households in Jalpaiguri division. Around 46% households in Alipurduar those who use pond water have tested their water recently. See the chart 3.3 & table 3.3 below for further details.

Chart 3.3 Division wise Testing of Drinking Water

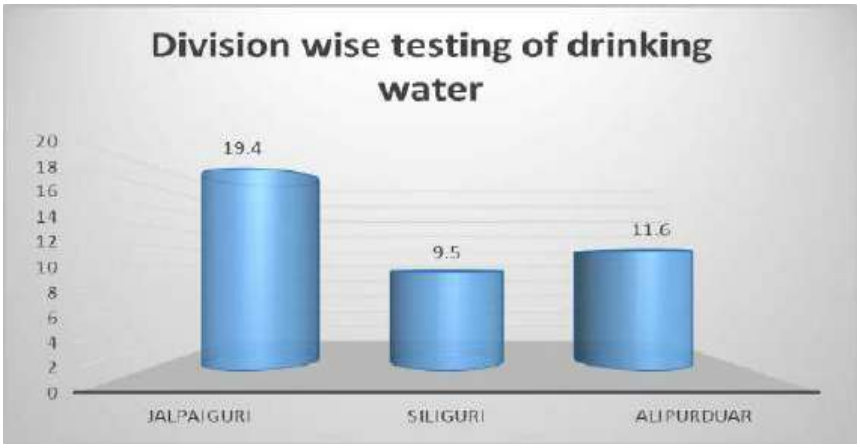


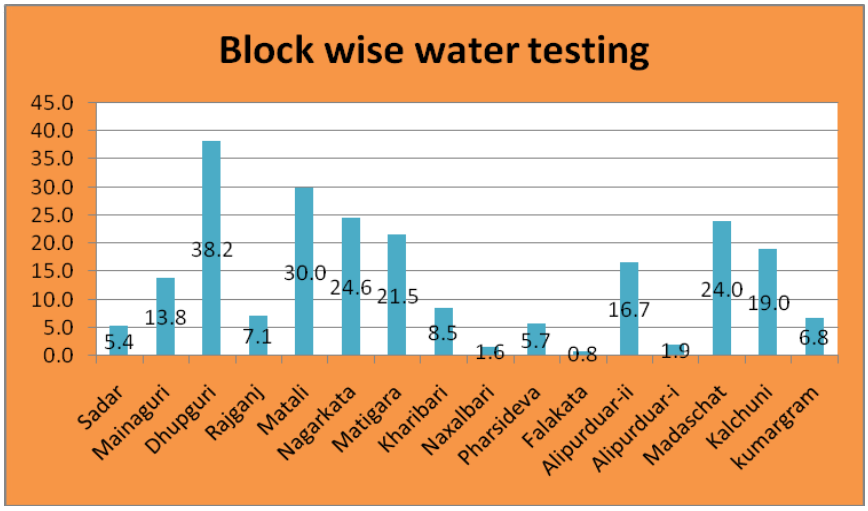
Table 3.3 Division wise Source of Drinking Water and Testing

Division wise source of water and testing			
Source of Water and Testing	Jalpaiguri	Siliguri	Alipurduar
Stream	31.3	60.3	0.0
well	20.3	5.9	8.3
piped water	16.3	10.4	6.6
Lake	0.0	0.0	37.5
Tubewell	17.0	11.4	14.2
PHE	27.6	0.0	31.1
RIVER	7.1	0.0	34.8
POND	16.7	0.0	45.5
mineral water	11.1	33.3	41.4

3.4 BLOCK WISE WATER TESTING

The Block wise analysis as seen from the chart below that around 38% households in Dhupguri Block of Jalpaiguri division have done their water testing which is highest among all the Blocks. Less than a per cent of households in Falkata Block have done their water testing recently and lowest testing is done in this block compared to other blocks is that above 90% households use piped water. The rate of testing is lowest in Naxalbari and Alipurduar I despite using water from the wells and tubewells. See the chart 3.4 below for Block wise testing of the water.

Chart 3.4 Block Wise Water Testing



4.0 SANITATION

The Millennium Development Goals (MDGs) have firmly established the issues of "water, sanitation, and hygiene" on the global agenda (WHO/UNICEF, 2012:34). Neglect of hygiene goes a long way in explaining why water and sanitation programmes have often not brought the expected benefits. Public health importance of hand washing as well as its importance in reduction of communicable diseases such as diarrhea and Acute Respiratory Infections (ARI) has been proved time and again. In setting up Swachh Bharat Campaign, Hon'ble Prime Minister of India Shri Narendra Damodor Modi said around 60 per cent people are defecating in open space due to lack of latrines. According to recent UNICEF report, around three-fourth of the people practice open defecation and 60% of them belong to India. Open defecation has many health hazards and are the sole reason of many water borne diseases like Cholera. Effective sanitation prevents fecal matter from contaminating waterways, groundwater and drinking water supplies. Sanitary survey was of the major component of the household survey in JE awareness campaign. Questions were framed in a very structured manner to elicit information about the sanitary behavior and practices among the people in three sample divisions.

4.1 SANITARY FACILITY AND ITS USE PATTERN

The chart 4.1 below shows the sanitary facility at home in the study areas. Out of total sample of 16498, two-third households (11141 numbers of households) have the sanitary facility in the form of pucca / kachha latrines in their courtyard and remaining 32.5% households do not have latrine facility at their home. 67% people use toilet regularly and the remaining 33% practices open defecation or use toilet irregularly. Among those who have toilet facility at their home (11141), 98% people use toilet regularly and remaining two per cent either use irregularly or still practices open defecation. See chart below 4.1.1 for sanitary practices in the study area.

Chart 4.1 Toilets at Home

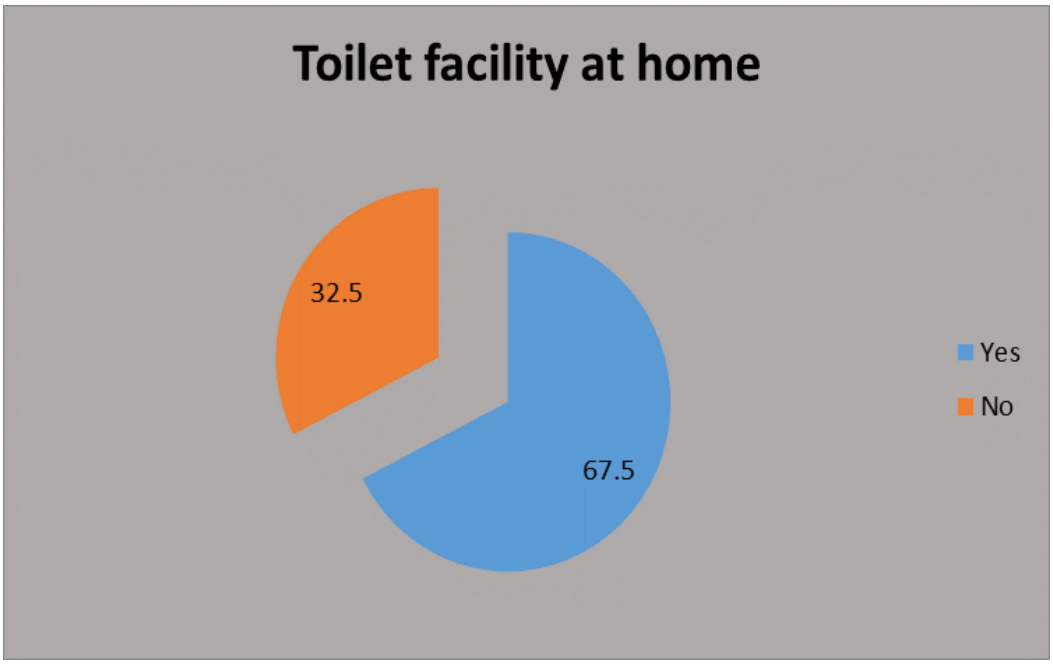
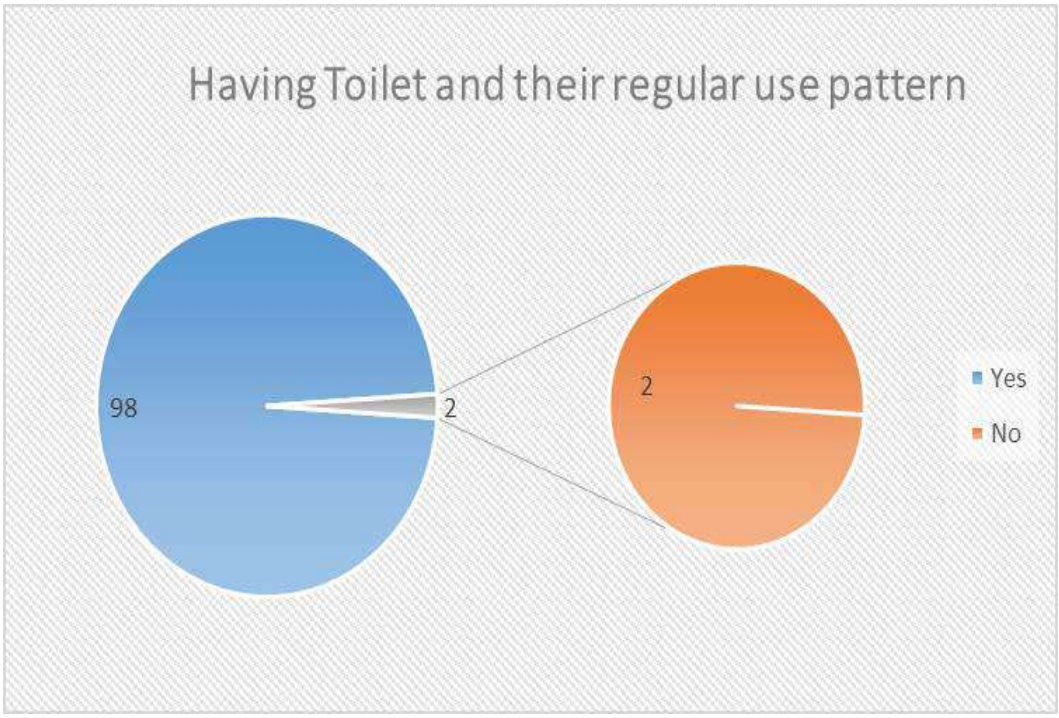


Chart 4.1.1 Toilet use practices



4.2 DIVISION WISE SANITARY FACILITY AND THEIR USE PATTERN

In all the three sample divisions, more than two-third households have latrines at their home. Among them, Alipurduar have the highest percentage of households (70%) having the latrines at their home followed by 67.6% in Jalpaiguri. Around 64.3% households in Siliguri have the latrine facility at their home. Similarly, the latrine use pattern is higher among the households in Alipurduar (69.2%) followed by 66.8% in Jalpaiguri. Around 64.4% households in Siliguri use the latrines regularly. See charts 4.2 & 4.2.1 below for further details.

Chart 4.2 Toilet facility at home in division wise

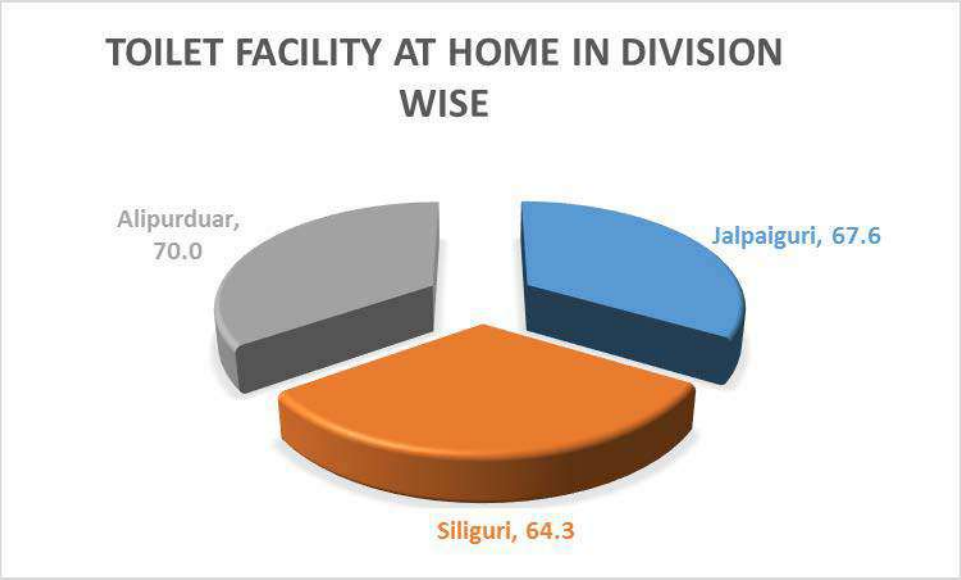


Chart 4.2.1 Toilet use practices in division wise

4.3 BLOCK WISE SANITARY FACILITY AND THEIR USE PATTERN

The table 4.1 below shows Block wise toilet facility at home and their use pattern. Around 89% households have the toilet facility at home in Matigara Block (highest among all the sample blocks) compared to less than fifty per cent households in Khairibari Blocks. Besides Khaibari, all the remaining sample blocks have either majority or more than majority households have toilet facilities. Similarly the regular use of toilet is highest among the households in Matigara Block (89%) compared to 49% in Khairibari Blocks. The table below shows that almost all households having toilet facility at home use regularly toilet. Open defecation among them is very minimal compared to the households those who do not have the toilet facility at home. The survey data shows that to stop open defecation, households should have the toilet facility at their home.

Table 4.1 Toilet facility at home and their use in Block Wise

Blocks	Toilet Facility at Home	Use of Toilet regular basis
Sadar	82.3	81.9
Mainaguri	72.0	71.7
Dhupguri	81.6	81.3
Rajganj	58.3	59.0
Matali	66.3	63.1
Nagarkata	53.7	53.3
Matigara	88.5	89.1
Kharibari	49.1	49.3
Naxalbari	59.8	60.3
Pharsideva	59.9	59.0
Falakata	82.9	79.9
Alipurduar-ii	81.9	81.5
Alipurduar-i	62.9	64.0
Madaschat	53.4	52.2
Kalchuni	57.6	57.4
kumargram	65.9	66.4

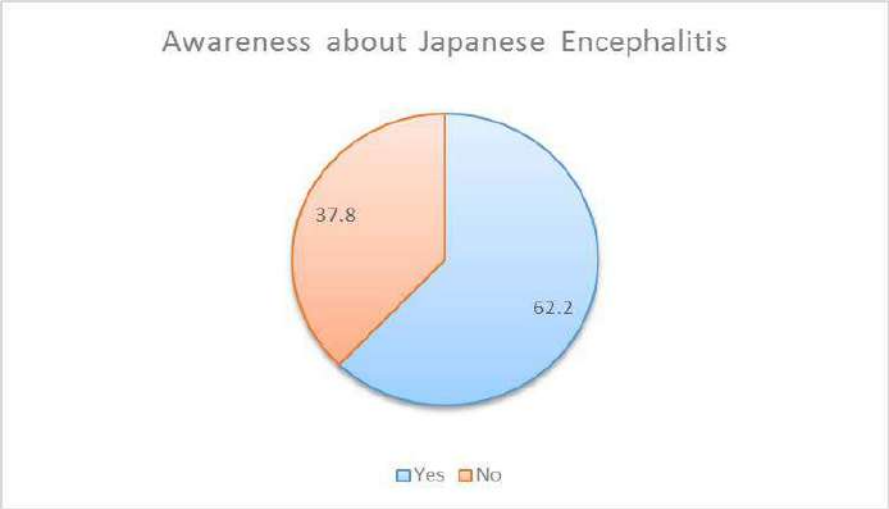
5.0 JAPANESE ENCEPHALITIS

Japanese encephalitis (JE) is a mosquito-borne flavivirus infection which is considered a disease of major public health importance because of its high epidemic potential, high case-fatality rate, and severity of sequelae among survivors. JE occurs in much of Asia including India, Southeast Asia, and China. Children living in endemic areas are at risk of contracting the disease. The natural reservoir for JE virus is typically pigs and wading birds, and the virus can be passed to humans living in proximity to these animals by culicine mosquitoes. The disease is typically an acute neurological illness that has a high fatality rate and a high prevalence of neurological sequelae in survivors. The polluted environment, storage of water for long time and paddy fields are some of the reasons for the spread of JE virus. The North Bengal in India in recent years witnessed JE related diseases and deaths. Public Health and Engineering Department has started a JE awareness programme in the three sample divisions as precautionary measures to stop JE from spreading. PHED, West Bengal with its partner organisaitons initiated various awareness campaign programmes in the region to make people aware about the origin and growth of the JE virus. Household survey was one of the most important components in the JE awareness campaign to assess people knowledge and awareness about the JE virus.

5.1 AWARENESS ABOUT JAPANESE ENCEPHALITIS

Out of the total sample survey of 16,498 households, 10263 respondents are aware about the JE and its consequences. Around 62.2% respondents are aware about the virus and also know the causes and its health consequences. See chart 5.1 for the further details about the Japanese Encephalitis virus.

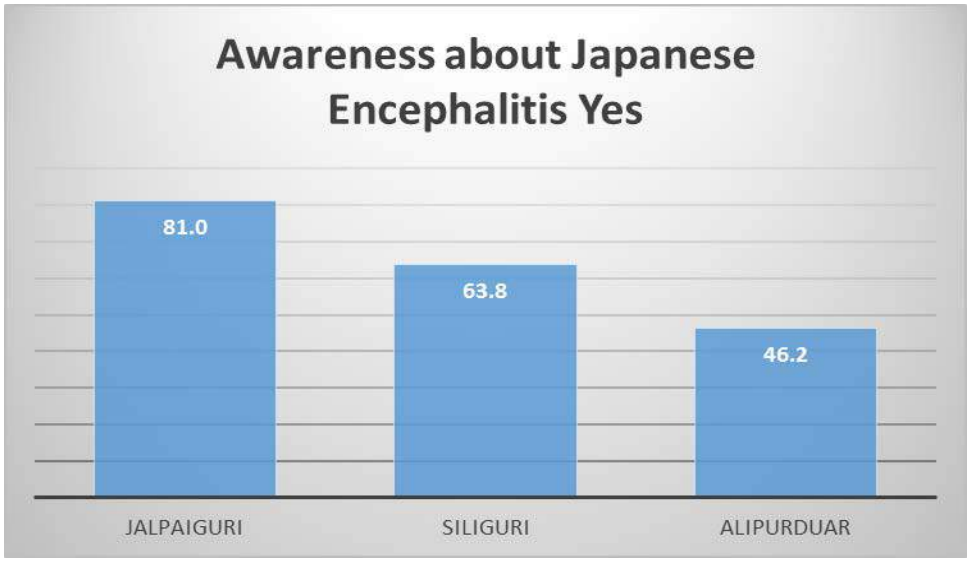
Chart 5.1 Awareness about JE



5.1.1 JE AWARENESS LEVEL AT DIVISION LEVEL

Although around 62% people are aware about the JE virus and its causes and consequences in the entire study area, but the awareness level is below fifty per cent in Alipurduar division compared to around 81% in Jalpaiguri division. Around 64% people in the Siliguri division are aware about the JE virus and its health related consequences. For the details, see chart 5.1.1 below. For block level awareness level, please see table 7 in the annexure.

Chart 5.1.1 Awareness about JE in Division wise



5.2 REASONS AND SYMPTOMS OF JE

Those who know about the JE, were asked to explain about the disease during the household survey. Different respondents have given different opinions about the causes and consequences of JE. Some respondents cited the reasons for JE while other explained about the consequences of the JE. The health consequences cited by the respondents are as follows: fever, high fever, headache, vomiting tendency, neck and back bone pain, senseless, irritation, red eye, vein and head damage, affect one to 15 year children, and death. About the causes, respondents believed that it is a virus, it causes due to water and environment pollution, its related to birds, pigs and mosquito. Around 30% respondents knew that JE is related to Mosquito and Pig. Around 16% respondents said that its symptoms are fever (15.6%), Headache (12.7%), High Fever (11.6%) and vomiting tendency (6.5%). Around 2.6% respondents believe that it causes death. 3% households believe that it is a virus related and it generally affects children from one to 15 years (5.2%). Please see the table 5.2 below for detailed causes and consequences of JE virus.

Table 5.2 Reasons and Symptoms of JE

Reasons and symptoms for JE	Number	Percentage
Fever	1604	15.6
Headache	1305	12.7
Virus related	304	3.0
Vomiting tendency	670	6.5
Neck and back bone pain	107	1.0
Semi senseless	47	0.5
Red eye	60	0.6
Complete senseless	33	0.3
Vein and Head damage	250	2.4
Water pollution related	43	0.4
Affects 1 to 15 years children	530	5.2
High Fever	1193	11.6
Irritation	546	5.3
Pig and Mosquito	3037	29.6
Causes Death	269	2.6
Birds related	237	2.3
Environment related	28	0.3
Total	10263	100

5.2.1 CAUSES AND EFFECTS OF JE IN DIVISION WISE

The table below shows the division wise causes and consequences of JE virus. Three-fourth people in Siliguri division believe red eye is the symptom of Japanese Encephalitis and near about three-fourth people in Jalpaiguri believe high fever is the symptom of Japanese encephalitis. Near about 59% people each in Alipurduar division believe JE causes death and

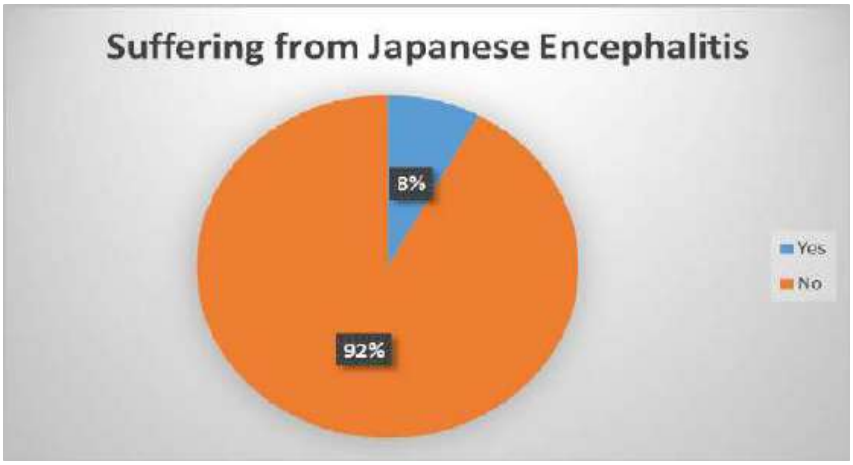
it is related to polluted environment. For other causes and symptoms, please refer to the table 5.2.1 below and for block wise, refer to table 8 in the annexure.

Table 5.2.1 Reasons and Symptoms of JE in Division wise

Causes and Effects of JE in Division wise				
Causes / Effects	**Jalpaiguri**	**Siliguri**	**Alipurduar**	**Total**
Fever	40.8	36.3	22.9	100
Headache	49.0	32.2	18.9	100
Viral/Virus	35.5	26.3	38.2	100
Vomiting tendency	36.0	32.2	31.8	100
Neck and back bone pain	42.1	31.8	26.2	100
Semi senseless	19.1	38.3	42.6	100
Red eye	5.0	75.0	20.0	100
Complete senseless	30.3	66.7	3.0	100
Vein and Head damage	35.2	22.4	42.4	100
water pollution related	46.5	18.6	34.9	100
affects 1 to 15 years children	16.2	42.3	41.5	100
High fever	63.5	17.4	19.1	100
irritation	35.2	21.6	43.2	100
Pig and mosquito	38.0	32.8	29.2	100
death causes	22.3	19.0	58.7	100
Birds related	10.5	30.8	58.6	100
Environment related	37.5	62.5	0.0	100
Total	40.0	30.9	29.2	100

5.3 SUFFERING FROM JAPANESE ENCEPHALITIS

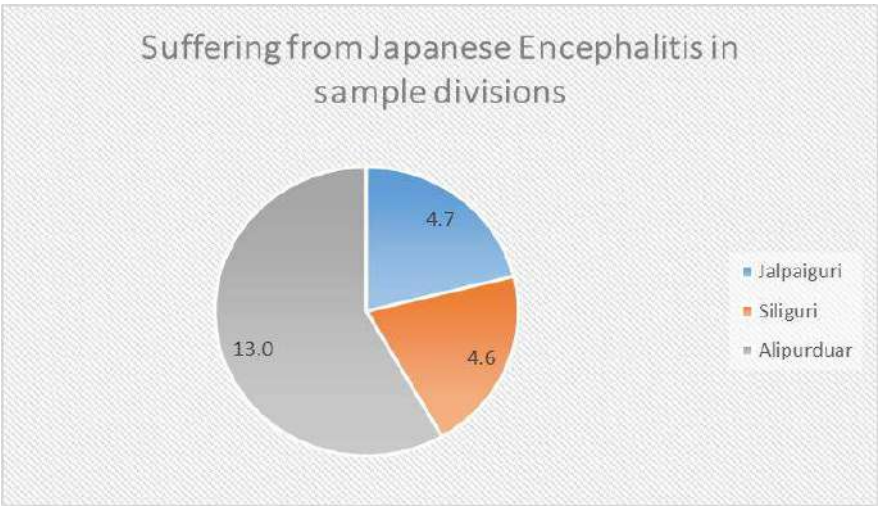
The sample divisions recently witnessed the spread of JE virus. Questions were asked to the household respondents about suffering from Japanese Encephalitis in their home or in their neighbourhood. Around 8% households reported that people are suffering from JE either in their home or in their neighbourhood. Remaining more than 92% replied no. See Chart 5.3.***Chart 5.3 Suffering from JE***



5.3.1 SUFFERING FROM JE IN DIVISION WISE

Among the entire sample population, near about 8% population suffer from Japanese Encephalitis. The highest around 13% population suffers from Japanese Encephalitis virus in Alipurduar compared to Jalpaiguri (4.7%) and Siliguri (4.6%). Lack of awareness level is one of the major reasons in Alipurduar for suffering from Japanese Encephalitis. For the details see chart 5.3.1 below and for block wise details, see table 7 in the annexure.

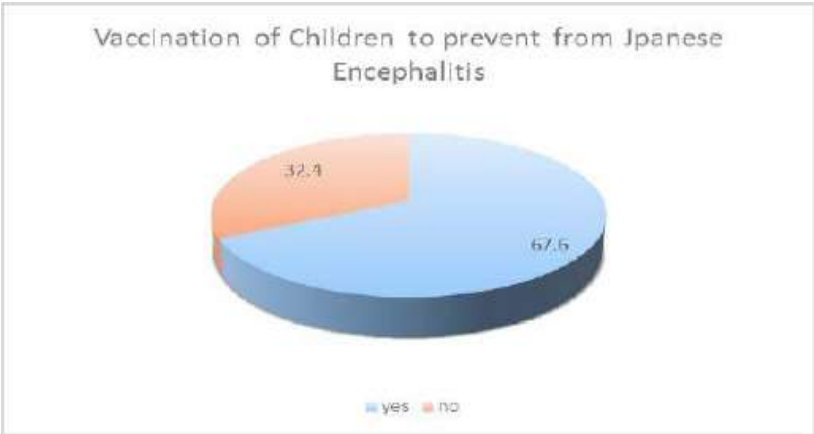
Chart 5.3.1 Suffering from JE in Sample Divisions



5.4 VACCINATION OF CHILDREN AGAINST JE VIRUS

Children in the age group of one to 15 years are more susceptible to get affected by the JE virus because of their weak immune system. Vaccination of children in these age groups is very important. This aspect was one of the major components in the household survey of JE awareness campaign of the PHED, West Bengal. Near about 68 per cent households have vaccinated their children against the Japanese Encephalitis virus and remaining 32% have either not vaccinated or nor they have children. See chart 5.4

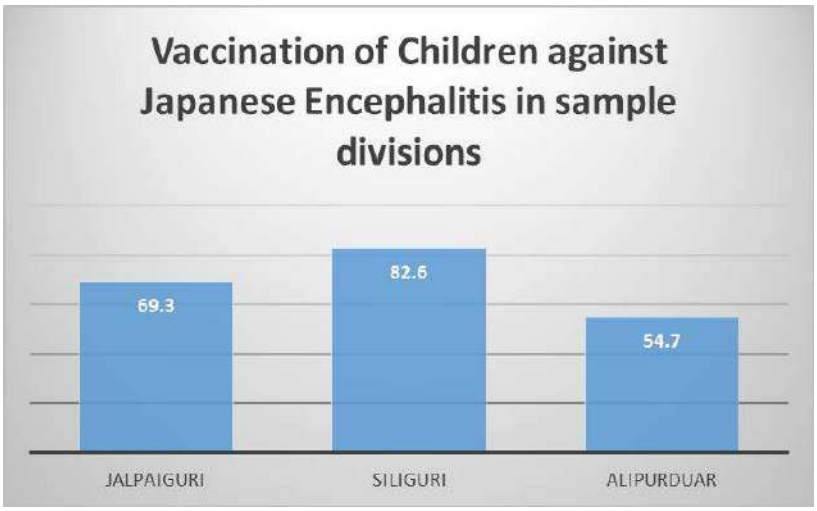
Chart 5.4 Vaccinations of Children against JE



5.4.1 VACCINATION OF CHILDREN AGAINST JE VIRUS IN DIVISION WISE

Near about 68% households have vaccinated their children against the Japanese Encephalitis virus but compared to the study area average of children vaccination, only around 55% children in Alipurduar Divisions have been vaccinated. The highest (around 83%) children have been vaccinated in Siliguri division and 69% in Jalpaiguri division. See chart 5.4.1.

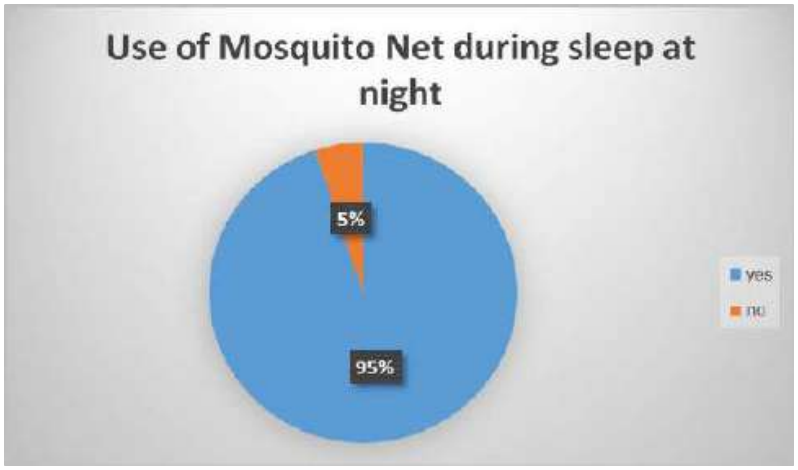
Chart 5.4.1 Vaccination of Children against JE in Division wise



5.5 USE OF MOSQUITO NET DURING SLEEP

Using mosquito net is one of the important preventive measures against Japanese Encephalitis. During the JE awareness campaign in the region, PHED along with its partner organizations emphasized the need of using mosquito net and washing of mosquito net regularly to get rid of JE. In the study area, it was found that 95% households use mosquito net regularly before sleep and remaining households do not use mosquito net. See chart 5.5

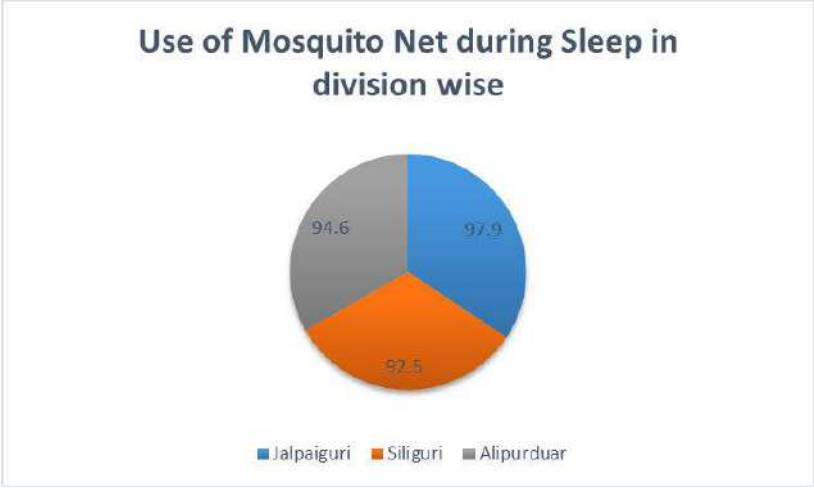
Chart 5.5 Use of Mosquito Net at Night



5.5.1 USE OF MOSQUITO NET DURING SLEEP IN DIVISION WISE

Use of mosquito net during sleep at night is very popular among all the households in the entire sample area. Around 95% households use mosquito net before sleep and highest among Jalpaiguri households (around 98%) and lowest in Siliguri division (around 93%) and in Alipuraduar, it is around 95%. See chart 5.5.1 below and for block wise trends, see table 7 in the annexure.

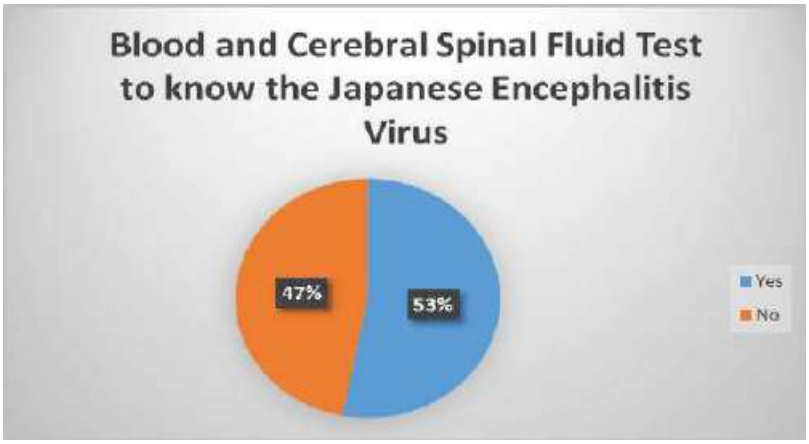
Chart 5.5.1 Use of Mosquito Net at Night in Division wise



5.6 BLOOD AND CEREBRAL SPINAL FLUID TEST TO KNOW THE JAPANESE ENCEPHALITIS VIRUS

In order to know whether a patient has been affected by the Japanese Encephalitis virus or not, it is necessary to get the test of blood and spinal fluid test. JE awareness campaign emphasized the testing of blood and spinal fluid samples if they find any symptoms with the patient. JE awareness campaign highlighted the symptoms of the JE virus. During the household survey, it was found that more than majority of the households in the region have done the blood and spinal fluid test. See chart 5.6.

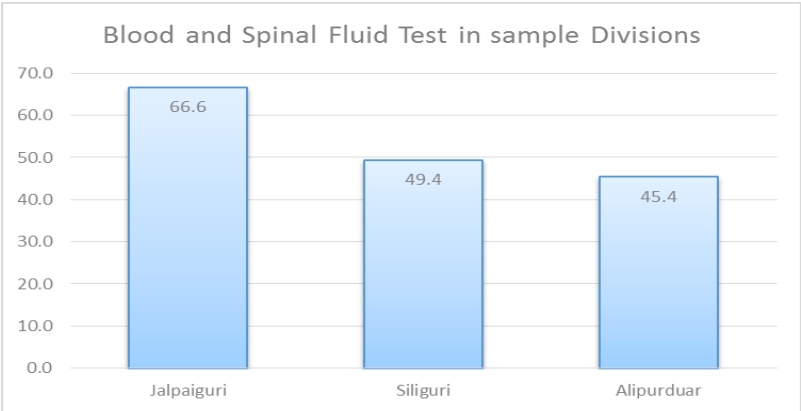
Chart 5.6 Blood and Cerebral Spinal Fluid Test



5.6.1 BLOOD AND CEREBRAL SPINAL FLUID TEST TO KNOW THE JAPANESE ENCEPHALITIS VIRUS

Blood and Cerebral spinal fluid test is necessary to detect whether the person is affected by JE virus or not. Among the sample households, it was found that more than majority households in the entire study area have done the blood and cerebral spinal fluid test and the highest percentage of test was conducted in Jalpaiguri Division (around 67%). But both in Siliguri (49.4%) and Alipurduar (45.4%), less than fifty per cent households have done the same test. For detail, see chart 5.6.1 below and table 7 in the annexure for block wise details.

Chart 5.6.1 Blood and Cerebral Spinal Fluid Test in Division wise



6.0 COORELATION BETWEEN HYGIENE PRACTICES AND JAPANESE ENCEPHALITIS

6.1 PRECAUTIONARY MEASURES AGAINST JAPANESE ENCEPHALITIS

Various research studies have proved the unhygienic practices particularly open defecation, storage of water, improper damage system are some of the important sources of the spreading JE virus. Open defecation and unhygienic practices are the most common problem in India. Around 60% people still practice open defecation and open defecation practice continues due to insufficient availability of latrines at every household. In consequences, people get affected by various water borne and mosquito bite diseases. JE is a mosquito bite disease and open defecation is one of the main reasons for getting affected by the JE virus. Regular use of toilet, use of drinking water after testing, vaccinating children regularly against JE virus, using mosquito net during sleep at night, blood and cerebral spinal fluid test are some of the precautionary practices to ward off JE virus. To make people aware about the water and sanitation related diseases, PHED conducted a household survey to find out the relation between sanitary behavior of the people and getting affected by JE virus.

6.2 TOILET FACILITY, ITS USE AND JAPANESE ENCEPHALITIS

The survey based on the sample household does not prove the existence of the relation between open defecation and getting affected by Japanese Encephalitis. As the data shows, those who are having the toilet facility at home, around 10% of them are suffered from JE whereas among those who do not have toilet facility at home, 3.6% have suffered from Japanese Encephalitis. Similar trend is also found in the regular toilet use and Japanese Encephalitis. For details, see tables 6.2 & 6.2.1 below.

Table 6.2 Correlation between toilet facility and JE

Toilet facility and Japanese Encephalitis			
Toilet facility at home	**Suffering from Japanese Encephalitis**		
	Yes	**No**	**Total**
Yes	10.0	90.0	100
No	3.6	96.4	100
Total	7.9	92.1	100

Table 6.2.1 Correlation between use of toilet and JE

Regular Toilet use and Japanese Encephalitis			
Toilet use in regular basis	**Suffering from Japanese Encephalitis**		
	yes	**no**	**Total**
Yes	10.0	90.0	100
No	3.7	96.3	100
Total	7.9	92.1	100

6.3 SOURCE AND TESTING OF DRINKING WATER AND JAPANESE ENCEPHALITIS

The tables 6.3 & 6.3.1 below show that there is no particular trend between the sources of drinking water and Japanese Encephalitis. Highest percentage of getting infected by JE is the user of PHE supply water (25.4%) followed by River (15.1%). Cent per cent household those who use water from pond have not suffered from Japanese Encephalitis. Around 11% population suffered from JE of those who use piped water. It is difficult to establish the trend between the source of drinking water and Japanese Encephalitis as PHE water, piped water, and mineral water are the safe and clean drinking water whereas the pond water is the most unclean water and all the users of the pond water have not suffered from Japanese Encephalitis. Compared to the sources of water, there is slightly a reverse trend as far as water testing and its relation with Japanese Encephalitis virus is concerned. Around 8% people have suffered from Japanese Encephalitis those who have not done the water testing compared to 6% of those who have tested their water.

Table 6.3 Correlation between Source of Drinking Water and JE

Correlation between Sources of Drinking Water and Japanese Encephalitis			
Source of drinking water	**Suffering from Japanese Encephalitis**		
	Yes	**No**	**Total**
Stream	1.4	98.6	100
Well	4.7	95.3	100
Piped water	11.7	88.3	100
Lake	2.5	97.5	100
Tubewell	3.7	96.3	100
PHE	25.4	74.6	100
RIVER	15.1	84.9	100
POND	0.0	100.0	100
Mineral Water	10.8	89.2	100
Total	7.9	92.1	100

Table 6.3.1 Correlation between testing of water source and JE

Correlation between testing of water source and suffering from Japanese Encephalitis			
Water testing done	**Suffering from Japanese Encephalitis**		
	Yes	**No**	**Total**
Yes	6.3	93.7	100
No	8.2	91.8	100
Total	7.9	92.1	100

6.4 VACCINATION OF CHILDREN AGAINST JE VIRUS AND JAPANESE ENCEPHALITIS

The data below (table 6.4) shows the vaccination does not totally prevent children from getting infected by Japanese Encephalitis. Vaccination required at regular intervals as precautionary measures to get rid of mosquito born Japanese Encephalitis virus. But by vaccinating children means less chance of getting infected by the Japanese Encephalitis. As the table below shows, around 7.7% children have been affected by the JE after having vaccination compared to 8.4% of those children who have not vaccinated have suffered from JE.

Table 6.4 Correlation between Child Vaccination and JE

Correlation between vaccination of Children and Japanese Encephalitis			
Children vaccinated against JE	**In your neighborhood in anybody suffering from Japanese Encephalitis**		
	Yes	No	Total
Yes	7.7	92.3	100
No	8.4	91.6	100
Total	7.9	92.1	100

6.5 USING MOSQUITO NET AND JAPANESE ENCEPHALITIS

There is slightly difference between using mosquito net and not using during sleep and getting affected by the Japanese Encephalitis. Near about 8% of people those who use mosquito net during sleep have got affected by the Japanese Encephalitis compared to 9% affected of those who have not used mosquito net. See table 6.5 for the details

Table 6.5 Correlation between use of mosquito net and JE

Correlation between using mosquito net and Japanese Encephalitis			
Use of Mosquito Net during sleep	**Suffering from Japanese Encephalitis**		
	Yes	**No**	**Total**
Yes	7.8	92.2	100
No	9.1	90.9	100
Total	7.9	92.1	100

6.6 BLOOD AND CEREBRAL SPINAL FLUID TEST AND JAPANESE ENCEPHALITIS

Among those who have suffered from Japanese Encephalitis, around 8.3% have done blood and spinal fluid test and around 7.5% of those who suffered from Japanese Encephalitis have not done blood and spinal fluid test. See table 6.6 for the further details.

Table 6.6 Correlation between Blood and Cerebral Spinal Fluid Test and JE

Correlation between Blood & Cerebral Spinal Fluid Test and Japanese Encephalitis			
Blood and Spinal Fluid Test Done	**Suffering from Japanese Encephalitis**		
	Yes	**No**	**Total**
Yes	8.3	91.7	100
No	7.5	92.5	100
Total	7.9	92.1	100

6.7 AWARENESS LEVEL AND JAPANESE ENCEPHALITIS

Awareness level or knowledge about certain causes and their consequences protects people getting affected by diseases. But in case of Japanese Encephalitis, the trend is reverse and that is because of the nature of the disease. Near about 11% people those who are aware about the causes and consequences of JE virus have got affected by the JE whereas near about 4% ignorant people about JE have got affected by the disease. See table 6.7 for the details.

Table 6.7 Correlation between Awareness level of JE and JE

Correlation between Blood & Cerebral Spinal Fluid Test and Japanese Encephalitis			
	In your neighborhood in anybody suffering from Japanese Encephalitis		
Do you know about Japanese Encephalitis	**Yes**	**No**	**Total**
Yes	10.6	89.4	100
No	3.5	96.5	100
Total	7.9	92.1	100

7.0 CONCLUSIONS

Public Health and Engineering Department, Government of West Bengal carried out a Japanese Encephalitis Programme in three divisions, namely, Jalpaiguri, Siliguri and Alipurduar of North Bengal. The basic objective of the awareness campaign is to make people aware about the Japanese Encephalitis virus. The awareness campaign emphasized how the proper sanitary practices can keep people away from the water borne diseases as well as from deadly virus like JE. During the awareness campaign, sample household survey was conducted in three divisions by the trained ASHA workers. In the household survey, sincere attempt was made to collect the information regarding type of water that the household use, whether they have tested their water source recently, what is their sanitary practices, their knowledge about the JE and its health consequences, vaccination of their children against the JE, blood and cerebral spinal fluid test and use of mosquito net at night.

ASHA workers of the locality collected household information on the structured format. The family size of the region is not so big or not too small. Majority of the family constitute 3 to six members. The main source of water in the region piped water (34.5%) followed by water from Tubewell (32.1%). The other important water sources in the region are mineral water, water from river, PHE water supply, water from ring well and water from stream. Near about majority of the households in Alipurduar division has piped water facility whereas around a quarter of the households in other two divisions have the same facility. In Siliguri, water from ring well (37.2%) and tubewell (32.75) are the most commonly available water sources and in Jalpaiguri, water from ring well followed by piped and tubewell are the most common source of water.

As per the policy of World Health Organisation, government of India and state governments, households should test their water periodically before use, but near about nine-tenth of households have not tested their water quality recently. Even less than one-tenth households in siliguri division have tested their water and near about two-tenth households in Jalpaiguri have tested their water. 41% pond water users have tested the water recently and more three-fourth users of stream water have done the same.

Open defecation is the common practice in India and according to some report; around 60% who practices open defecation belong to India. It is a very common and grave problem in India. Government of India, state government along with international and national agencies

is trying to provide cheap latrines to all households. From the present study it was found that those who have latrine facilities, almost all of them are regularly using latrines. Open defecation is practiced by the people those who do not have accessibility to the latrine system. In the region, three-fourth households have the toilet facility and 70% households in the Alipurduar have the toilet facility, the highest among the three divisions. Around 98% households those who have toilet facility use toilet regularly.

JE is a deadly virus and it causes lot of health hazards including death. Children in the age group of 3 to 15 years are more vulnerable to the JE virus because of their weak immune system. Majority of the people in the region are aware about the JE and also know the causes and symptoms of the JE. Most common symptoms of JE is the high fever, fever, headache, backbone pain, vomiting tendency and most impartment causes according to the sample population is mosquito and pig related, birds related, polluted water and environment. Awareness level about the JE virus is highest among Jalpaiguri inhabitants (81%) compared to lowest among Alipurduar (46.2%).

The study findings shows that near about 8% population believe that somebody in either their family or in their neighbourhood have suffer from JE. As far as suffering of JE is concerned, there is no correlation between awareness level among the people and people suffer from JE virus. No significant relation was found between the types of water use for drinking purposes and affected by JE. There is also no significant relation between sanitary practices and JE.

Majority of the households have vaccinated their children against JE virus and the highest vaccination was done in Siliguri division (around 83%) and the lowest in Alipurduar (around 55%). As far as correlation between vaccination and suffering from JE is concerned, there are no significant differences between vaccinated children and non-vaccinated children and getting infected by JE virus.

But using mosquito net at night to some extent reduces the chances of getting affected by JE virus. Putting mosquito net before sleep protects children against the mosquito bite which subsequently protects of not getting affected JE virus. Around 95% households in the region use mosquito net and the highest among them is in Jalpaiguri (around 98%) and the lowest among them is Siliguri (around 93%). Majority of the people in the study area have done the blood and cerebral spinal fluid test in order to know whether the JE virus has affected them or

not. The highest test was done in Jalpaiguri (around 67%) and the lowest in Siliguri (around 50%).

As far as correlation between Water and Sanitary practices and JE virus is concerned, no significant relationship was found from sample household study. But the past studies have proved to some extent that unhygienic practices are one of the important causes of getting affected by JE virus. Further survey needs to be done to establish the link between water and sanitary practices and JE virus. Although majority of the households practice using mosquito net at night, vaccination of children against JE, but it is still not cent per cent. All people in the study area needs to be encouraged of the benefits of using mosquito net and vaccination of their children and how it protects their children of getting infected by JE virus. Attempt may be made on part of all stakeholders in providing latrine for each household and safe drinking water to all households. More arrangement like setting up mobile water testing labs needs to be made in all the villages or the villages in the remote areas those who do not have easy accessibility to the water testing lab.

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Table 1 Family Size in Block Wise

Family Size in Block Wise					
Block	Number/%	1 to 3 members	3 to 6 members	6 and above	Total
Sadar	Number	241	461	59	761
	%	31.7	60.6	7.8	100
Mainaguri	Number	138	428	115	681
	%	20.3	62.8	16.9	100
Dhupguri	Number	106	390	151	647
	%	16.4	60.3	23.3	100
Rajganj	Number	134	686	235	1055
	%	12.7	65.0	22.3	100
Matali	Number	308	612	108	1028
	%	30.0	59.5	10.5	100
Nagarkata	Number	176	615	105	896
	%	19.6	68.6	11.7	100
Matigara	Number	187	786	277	1250
	%	15.0	62.9	22.2	100
Kharibari	Number	226	842	214	1282
	%	17.6	65.7	16.7	100
Naxalbari	Number	197	712	260	1169
	%	16.9	60.9	22.2	100
Pharsideva	Number	198	812	245	1255
	%	15.8	64.7	19.5	100
Falakata	Number	411	890	117	1418
	%	29.0	62.8	8.3	100
Alipurduar-ii	Number	561	902	55	1518
	%	37.0	59.4	3.6	100
Alipurduar-i	Number	241	350	45	636
	%	37.9	55.0	7.1	100
Madaschat	Number	227	664	177	1068
	%	21.3	62.2	16.6	100
Kalchuni	Number	156	472	145	773
	%	20.2	61.1	18.8	100
kumargram	Number	391	610	60	1061
	%	36.9	57.5	5.7	100
Total	Number	3898	10232	2368	16498
	%	23.6	62.0	14.4	100

Table 2 Source of drinking water and their use

Drinking Water Source	Numbers	Percent
Stream	283	1.7
Well	4083	24.7
piped water	5688	34.5
Lake	40	0.2
Tube well	5291	32.1
PHE	891	5.4
RIVER	53	0.3
POND	39	0.2
Mineral water	130	0.8
Total	16498	100

Table – 3 Toilet Facility

Do you have toilet facility at your home	**Numbers**	**Percent**
Yes	11141	67.5
No	5358	32.5
Total	16498	100

Table – 4 Regular use of toilet

Do you use your toilet in regular basis	**Frequency**	**Valid Percent**
yes	11060	67.0
no	5438	33.0
Total	16498	100

Table – 5 Knowledge about JE

Do you know about Japanese Encephalitis	**Number**	**Per cent**
Yes	10263	62.2
No	6235	37.8
Total	16498	100

Table – 6 Knowledge about JE in division wise

Awareness about Japanese Encephalitis			
Division	**Yes**	**no**	**Total**
Jalpaiguri	81.0	19.0	100
Siliguri	63.8	36.2	100
Alipurduar	46.2	53.8	100
Total	62.2	37.8	100

Table 7 JE Details in Block Wise

Block	**Suffering from Japanese Encephalitis**	**Awareness about Japanese Encephalitis**	**Vaccination of Children against Japanese Encephalitis Virus**	**Use of Mosquito Net during sleep**	**Blood and Cerebral Spinal Fluid Test**
Sadar	23.5	92.8	68.5	98.4	77.4
Mainaguri	0.4	80.6	77.8	98.5	61.4
Dhupguri	0.8	71.3	81.3	99.5	52.2
Rajganj	1.4	62.3	71.4	98.2	46
Matali	1.9	92.2	68.7	99.3	72.7
Nagarkata	1.8	87.6	53.2	93.8	89.3
Matigara	2.3	78.9	88	95.3	74.6
Kharibari	3	57.1	83.2	93.7	37.1
Naxalbari	4.5	47.2	77.9	87.8	33.4
Pharsideva	8.4	71.2	81	92.8	51.6
Falakata	30.7	58.7	55.1	99.2	39.8
Alipurduar-ii	1.9	46.6	59.5	98.6	53.8
Alipurduar-i	40.4	63.2	32.9	91.8	15.1
Madaschat	9.1	28.3	65.6	78.9	77.2
Kalchuni	2.3	43.5	59	96.5	48.6
kumargram	0.3	39	46.1	99	24.7
Total	7.9	62.2	67.6	95	53.1

JE Awareness Level at Block Level

Causes / Effects	Sadar	Mainaguri	Dhupguri	Rajganj	Matali	Nagarkata	Matigara	Kharibari	Naxalbari	Pharsideva	Falakata	Alipurduar-ii	Alipurduar-i	Madaschat	Kalchuni	kumargram	Total
Fever	12.4	2.7	4.1	2.4	7.2	12.0	12.7	8.2	8.1	7.4	0.9	6.0	5.4	1.4	2.4	6.8	100
Headache	2.8	4.8	7.2	5.1	16.1	13.0	8.7	5.4	6.4	11.6	3.6	3.8	3.6	4.1	1.3	2.5	100
Viral/Virus	2.6	9.2	7.2	10.2	1.3	4.9	3.6	8.6	2.0	12.2	28.3	2.6	0.7	2.0	1.3	3.3	100
Vomiting tendency	1.6	3.1	8.2	7.2	5.5	10.3	10.3	5.2	3.6	13.1	9.0	5.8	11.0	4.6	0.6	0.7	100
Neck and back bone pain	4.7	3.7	15.9	10.3	1.9	5.6	13.1	4.7	7.5	6.5	15.9	0.0	0.9	1.9	0.0	7.5	100
Semi senseless	0.0	4.3	4.3	4.3	2.1	4.3	23.4	8.5	0.0	6.4	10.6	12.8	4.3	10.6	0.0	4.3	100
Red eye	1.7	0.0	1.7	1.7	0.0	0.0	70.0	5.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	100
Complete senseless	3.0	9.1	3.0	0.0	9.1	6.1	24.2	3.0	3.0	36.4	0.0	0.0	0.0	0.0	0.0	3.0	100
Vein and Head damage	0.0	3.6	8.0	19.2	0.0	4.8	8.0	2.0	4.4	7.6	3.2	18.0	4.0	4.0	0.0	13.2	100
water pollution related	4.7	14.0	4.7	18.6	0.0	4.7	14.0	4.7	0.0	0.0	18.6	16.3	0.0	0.0	0.0	0.0	100
affects 1 to 15 years children	0.9	8.1	0.8	0.8	4.0	1.7	19.6	10.4	9.2	3.0	21.1	2.6	0.0	4.0	9.8	4.0	100
High fever	14.8	4.6	5.2	15.2	9.1	14.8	2.0	2.7	6.0	6.7	3.8	6.0	4.2	2.3	1.4	1.3	100
irritation	0.0	4.0	1.1	20.7	0.5	8.8	12.8	2.6	1.5	4.8	6.0	7.1	20.5	0.5	0.0	9.0	100
Pig and mosquito	8.1	7.4	3.4	3.5	13.1	2.6	8.1	9.7	5.1	9.8	8.6	7.0	0.5	3.3	6.4	3.5	100
death causes	4.8	5.9	0.7	0.0	10.4	0.4	3.3	5.9	0.7	8.9	8.6	40.5	0.0	1.9	2.6	5.2	100
Birds related	1.3	4.2	0.8	0.0	3.4	0.8	16.5	8.4	0.8	5.1	48.1	4.2	0.4	1.7	0.4	3.8	100
Environment related	0.0	0.0	3.1	0.0	34.4	0.0	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100
Total	6.9	5.3	4.5	6.4	9.2	7.6	9.6	7.2	5.4	8.7	8.1	6.9	3.9	2.9	3.3	4.0	100

Table 9 Suffering from JE

Suffering from Japanese Encephalitis	Numbers	Percent
Yes	1305	7.9
No	15193	92.1
Total	16498	100

Table 10 Suffering from JE in division wise

Suffering from Japanese Encephalitis			
Division	yes	no	Total
Jalpaiguri	4.7	95.3	100
Siliguri	4.6	95.4	100
Alipurduar	13.0	87.0	100
Total	7.9	92.1	100

Table 11 Vaccination of Children against JE

Vaccination of Children to prevent from Japanese Encephalitis	Number	Per cent
yes	11145	67.6
no	5353	32.4
Total	16498	100

Table 12 vaccination of children against JE in division wise

Vaccination of Children against Japanese Encephalitis			
Division	yes	no	Total
Jalpaiguri	69.3	30.7	100
Siliguri	82.6	17.4	100
Alipurduar	54.7	45.3	100
Total	67.6	32.4	100

Table 13 Use of Mosquito Net at Night

Use of Mosquito Net during sleep at night	Number	Per cent
Yes	15670	95.0
No	828	5.0
Total	16498	100

Table 14 Use of Mosquito net at night division wise

Use of Mosquito Net during Sleep			
Division	**yes**	**no**	**Total**
Jalpaiguri	97.9	2.1	100
Siliguri	92.5	7.5	100
Alipurduar	94.6	5.4	100
Total	95.0	5.0	100

Table 15 Blood and Cerebral Spinal Fluid Test

Blood and Cerebral Spinal Fluid Test to know the Japanese Encephalitis Virus	Number	Per cent
Yes	8764	53.1
No	7734	46.9
Total	16498	100

Table 16 Blood and Cerebral Spinal Fluid Test division wise

Blood and Cerebral Spinal Fluid Test			
Division	**yes**	**no**	**Total**
Jalpaiguri	66.6	33.4	100
Siliguri	49.4	50.6	100
Alipurduar	45.4	54.6	100
Total	53.1	46.9	100

Program Executed by

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Water & Sanitation Support Organisation
Public Health Engineering Department
Government of West Bengal