NATIONAL STRATEGY

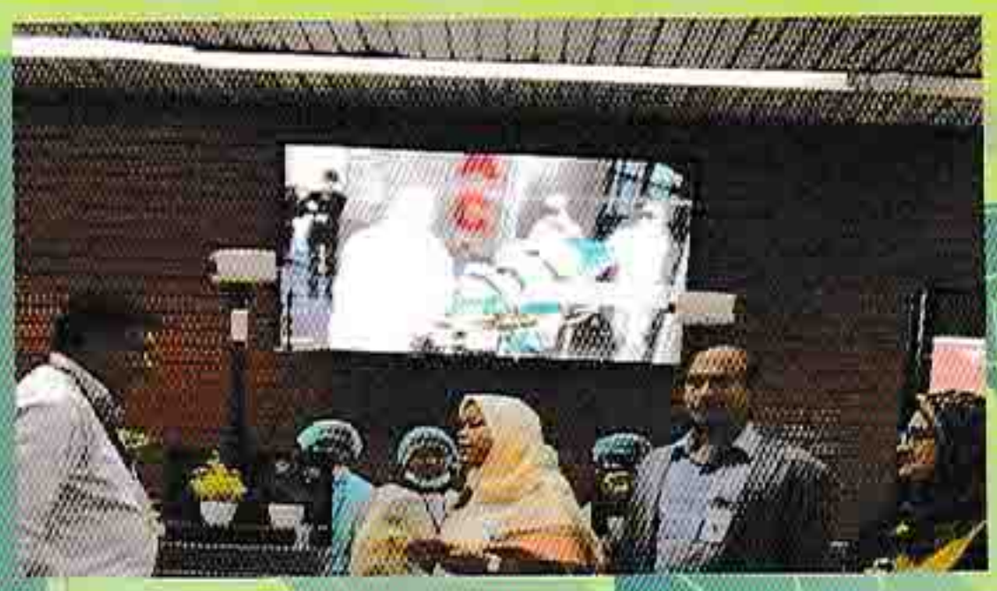
FOR PREVENTION & CONTROL

OF

ZIKA VIRUS

INFECTION IN BANGLADESH

December 2021 (2nd Edition)



DGHS, MOH&FW BANGLADESH

IEDCR

IOM THE UNITED NATIONS MIGRATION AGENCY

World Health Organization Bangladesh

IHR, Migration Health, Emerging Re-emerging Diseases Control Programme

Communicable Disease Control Divison (CDC), DGHS

Ministry of Health & Family Welfare

NATIONAL STRATEGY

FOR PREVENTION AND CONTROL
OF
ZIKA VIRUS INFECTION IN BANGLADESH

December, 2021 (2nd Edition)

National IHR Focal Point

Communicable Disease Control Division (CDC),
Directorate General of Health Services,
Ministry of Health & Family Welfare

Director

Disease Control & Line Director, CDC, DGHS
Govt. of the People's Republic of Bangladesh

DIRECTOR
DISEASE CONTROL &
LINE DIRECTOR, CDC, DGHS
AND NATIONAL FOCAL POINT IHR, BANGLADESH

Zika virus was first identified in 1947 at a monkey in the Zika forest of Uganda, and was first isolated in humans in 1952 in Uganda and the United Republic of Tanzania. It has been causing sporadic disease in Africa and Asia. Outbreaks were reported for the first time from the Pacific in 2007 and 2013 in the Yap Island (Federated States of Micronesia) and French Polynesia, respectively.

In February 2015, Brazil detected cases of fever and rash that were confirmed to be Zika virus in May 2015. The last official report received dated 1 December 2015, indicated 56,318 suspected cases of Zika virus disease in 29 States. In October 2015, both Colombia and Cape Verde, off the coast of Africa, reported their first outbreaks of the virus. As of 12 February, a total of 39 countries in multiple regions have reported autochthonous (local) circulation of Zika virus. Imported cases have been reported in the United States of America, Europe and non-endemic countries of Asia and the Pacific.

The current Zika virus outbreaks and their possible association with an increase in microcephaly, other congenital malformations, and GBS have caused increasing alarm in countries across the world, particularly in the Americas. An International Health Regulations (IHR 2005) Emergency Committee met on 01 February, 2016, and WHO declared the recent clusters of microcephaly and other neurological disorders in Brazil a Public Health Emergency of International Concern (PHEIC). The IHR Emergency Committee recommended enhanced surveillance and research, and aggressive measures to reduce infection with Zika virus, particularly amongst pregnant women and women of childbearing age.

This National strategy would provide the basis for close partnership, coordination and collaboration in addressing this crisis to ensure that national response activities are supported to the fullest extent possible.

Prof (Dr) Md. Nazmul Islam

EDITOR IN CHIEF

NATIONAL STRATEGY FOR ZIKA VIRUS WORKING GROUP & Senior Adviser

IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS

The World Health Organization (WHO) has declared the Zika virus a Public Health Emergency of International Concern (PHEIC), on 01 February, 2016, prompted by growing concern that it could cause birth defects. And as many as four million people could be infected worldwide by the end of the year. In an emergency IHR extended Technical Committee Meeting on 4 February, 2016 the current situation of Zika virus infection in Bangladesh was discussed. As per decision of the meeting, Director Disease Control, DGHS, formed a working committee to develop the National Strategy for Prevention and Control of Zika virus in Bangladesh. This National Strategy will be helpful for managers to formulate the action plan for control of Zika Virus in Bangladesh.

Zika virus disease (Zika) is a disease caused by Zika virus that is spread to people primarily through the bite of an infected Aedes species mosquito. The most common symptoms of Zika are fever, rash, joint pain, and conjunctivitis (red eyes). The illness is usually mild with symptoms lasting for several days to a week after being bitten by an infected mosquito. People usually don't get sick enough to go to the hospital, and they very rarely die of Zika. For this reason, many people might not realize they have been infected. Once a person has been infected, he or she is likely to be protected from future infections.

Zika virus was first discovered in 1947 and is named after the Zika forest in Uganda. In 1952, the first human cases of Zika were detected and since then, outbreaks of Zika have been reported in tropical Africa, Southeast Asia, and the Pacific Islands. Zika outbreaks have probably occurred in many locations. Before 2007, at least 14 cases of Zika had been documented, although other cases were likely to have occurred and were not reported. Because the symptoms of Zika are similar to those of many other diseases, many cases may not have been recognized.

In May 2015, the Pan American Health Organization (PAHO) issued an alert regarding the first confirmed Zika virus infection in Brazil. Local transmission has been reported in many other countries and territories. At present there is no Zika virus case in Bangladesh however, we should remain alert. This National Strategy will assist to originate an action plan to prevent and control Zika virus infection in Bangladesh.

Dr. Md. Nasir Ahmed Khan

PROGRAMME MANAGER

IHR, Migration Health, Emerging Re-emerging
Diseases Control & Influenza Programme
Communicable Disease Control (CDC), DGHS

Zika virus is an emerging disease that is transmitted through the bite of an infected mosquito primarily Aedes Aegypti, the same vector that transmits Chikungunya, Dengue and Yellow Fever. Zika has a similar epidemiology, clinical presentation and transmission cycle in urban environments as Chikungunya and Dengue, although it generally causes milder illness.

The most common symptoms of Zika are fever, rash, joint pain & conjunctivitis (red eye). The illness is usually mild with symptoms lasts for several days to a week. However, an estimated 80% of person infected with Zika are asymptomatic. There is no specific treatment or vaccine currently available. The best form of prevention is protection against mosquito bites.

Though, Zika is a disease of mild symptoms, the situation today is different. WHO marked it as a Public Health Emergency of International Concern (PHEIC) on 01/02/16 due to the potential for further spread, wide geographical distribution of mosquito vectors, lack of population immunity in newly affected areas, absence of vaccines, absence of specific treatment and lack of rapid diagnostic tests. In addition, the links with neurological complications and birth malformations due to Zika infections.

This National Strategy and Action Plan for Zika aims to provide support to managers and workers for building capacity to prevent & control Zika infection in Bangladesh.

Dr. Tahmina Akhter

DEPUTY PROGRAMME MANAGER

IHR, Migration Health, Emerging Re-emerging
Diseases Control & Influenza Programme
Communicable Disease Control (CDC), DGHS

Zika virus is mostly transmitted through the bite of an infected mosquito, primarily Aedes Aegypti, the same vector that transmits Chikungunya, Dengue and Yellow Fever. Aedes albopictus can also transmit the disease and further studies are in progress to better understand its role in the transmission of Zika virus. This virus may also be transmitted through sexual intercourse. Zika virus disease has a similar epidemiology, clinical presentation and transmission cycle in cities and towns as Chikungunya and Dengue although the illness is generally milder.

This National Strategy for Prevention & Control of Zika virus infection in Bangladesh was developed in December 2016 to guide the national response and joint action against Zika virus infection its complications & consequences. It will provide the basis for coordination and collaboration with partners so that national preparedness and response capacities could be supported to the fullest extent possible. This document was prepared by CDC, DGHS, in collaboration with other stakeholders in February 2016 when Zika virus microcephaly and other microbiological disorders of Zika virus was declared a Public Health Emergency of International Concern (PHEIC) on 1 February, 2016. The document will be updated regularly as and when necessary.

Dr. Mustufa Mahmud

Contents

Publication Date: 1 December, 2021

LIST OF CONTRIBUTORS

Chief Advisor : **Prof. Dr. Nazmul Islam**
Director, Disease Control & Line Director, CDC, DGHS
National IHR Focal Point, Bangladesh

Adviser : **Prof Dr. Sanya Tahmina**
Former Additional Director General (ADG)
Planning and Development, DGHS

Editor in Chief : **Dr. Md Nasir Ahmed Khan**
Senior Adviser, IHR, Migration Health,Emerging Re-emerging
Disease Control Programme, Disease Control Unit (CDC), DGHS

Co-ordinator : **Dr. Mustafa Mahmud**
Deputy Programme Manager, IHR, Migration Health
Emerging Re-emerging Disease Control Programe Communicable
Disease Control (CDC), DGHS

Editorial Board

1. Prof. Dr. Md Titu Meah, Professor of Medicine, DMCH
2. Prof. Dr. Md. Mizanur Rahman, Professor, Paed Neurology, BSMMU
3. Prof. Mohammed Hanif, Dept of Nephrology, Dhaka Shishu Hospital
4. Prof. (Dr) Md. Ziaul Islam PhD, Head of Dept of OEH, NIPSOM
5. Prof. Dr. Tahmina Shirin, Director, IEDCR
6. Dr. Mohammad Abdullah Yusuf, Asst Prof Microbiology Dept, National Institute of Neuroscience, (NINS)
7. Dr. Iffat Ara Shamsad, Associate Professor, Pediatrics, DMCH
8. Dr. Md. Motlabur Rahman, Asst Professor, Medicine, DMC
9. Dr. Mohammad Selim Shahi. Asst Prof, Neurology, National Institute of Neuroscience, (NINS)
10. Hasan Mohiuddin Ahmed, National Consultant, (DM&SIS), WHE, WHO
11. Dr. Zakir Hossain Habib, PSO, IEDCR
12. Dr. M.M. Aktaruzzaman, Deputy Program Manager, Mal & VBDC, Program Manager, BAL-MAL
13. Dr. S. M. Golam Kaisar, DPM, CDC, DGHS
14. Dr. Khondoker Mahbuba Jamil, Virologist, Virology lab, IPH
15. Dr. Mahmudul Islam, Neurologist and Registrar, National Institute of Neuroscience, (NINS)

16. Dr. Md. Ziaur Rahman, Asso Scientist, Virology lab, ICDDR,B
17. Dr. Kazi Mohammad Hassan Ameen , WHO (Training and Risk Communication)
18. Dr. Umme Rumman Siddiqi, Evaluator, Disease Control, CDC
19. Dr. AKM Muraduzzaman, MO, Virology, IEDCR
20. Md. Abdus Salam, Deputy Chief, Bureau of Health Education , DGHS
21. Dr. Farhana Haque, OIU, IEDCR
22. Dr. Monjur Hossain Khan, MO, Virology, IEDCR
23. Dr. Muhammad Zahidur Rahim, WHO
24. Dr. Md. Ahsanul Kabir, PoE Supervisor
25. Dr. Faiza Chowdhury, PoE Supervisor
26. Md. Rakibul Islam, PoE Data Manager

Organizing Editor : **Dr Tahmina Akhter**
Programme Manager
IHR, Migration Health, Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS

Dr. Mustufa Mahmud
Deputy Programme Manager,
IHR, Migration Health, Emerging Re-emerging Disease Control Programme Disease Control Unit (CDC), DGHS

Contributors of the Guideline

1. Dr. Md. Abdus Sabur, DD, CDC, DGHS
2. Dr. AKM Monjurul Haque, AD, CDC, DGHS
3. Dr. A.F.M. Akhtar Hossain, Deputy Program Manager, Kala-Azar Elimination Program
4. Dr. Md. Abdur Raquib, DD M&PDC (in charge), CDC, DGHS
5. Dr. Shah Alam Talukdar, AD, CDC, DGHS
6. Dr. Tawhidur Rahman, AD, M&PDC, CDC, DGHS
7. Dr. Swapan Kumar Tapadar, ex Deputy Director (Hosp) DGHS
8. Dr. Abu Nayem Md. Sohel, Evaluator, M & PDC, DGHS

9. Dr. Suporna Pal, MO, IPH
10. Dr. Raihan Sharif, MO, IEDCR
11. Dr. Mallick Mamun Billah, OSD, DGHS, attached to IEDCR
12. Dr. Pulak Mutsuddy, Consultant Vector Borne Disease, CDC
13. Dr. AKM Abdul Kayum , NKEP, CDC, DGHS
14. Tania Sultana, Communication for Development Specialist, UNICEF
15. Dr. Farhana Haque, IEDCR

Reviewers of the Guideline

1. Prof(Dr) Narayan Saha, Dept of Paed Neurology, NIMs
2. Dr. Rubina Yasmin, Professor, Medicine, Dhaka Dental College
3. Dr. Kabirul Bashar, Assoc Professor, Jahangir Nagar University
4. Dr. ASM Alamgir, PSO, IEDCR
5. Dr. Md. Nasir Ahmed Khan, Senior Adviser, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS
6. Dr. M Salimuzzaman, PSO (Zoonosis), IEDCR
7. Nuzhat Nasreen Banu, SO, IEDCR
8. Shirin Hussain, Communication for Development Specialist, UNICEF
9. Dr. Md. Riyad Hasan, Evaluator, CDC, DGHS

MANAGING EDITORS

1. Dr. Rubina Yasmin, Associate Professor, Medicine, Dhaka Dental College
2. Dr. Hammam El Sakka, Epidemiologist, WHO
3. Dr. Md. Kamar Rezwan, NPO-VBD, WHO

ACKNOWLEDGEMENT

The Disease Control Division of Directorate General of Health Services is gratefully acknowledging the contribution of Pediatricians, Obs and Gynaecologist, Medicine, Neurology, Nephrology, and Epidemiologists (Professors/Associate Professors/Assistant Professors) working in different Medical Colleges and Institutes of Bangladesh and Program Personnel who participated in the consultative meetings and workshops, the Ministry of Health and Family Welfare of Government of the People's Republic of Bangladesh and WHO Bangladesh in preparation and finalization of this document.

COPYRIGHT & DISCLAIMING

LIST OF ACRONYMS

BSL 3	Bio Safety Level 3
BSTI	Bangladesh Standards and Testing Institution
CDC, DGH	Communicable Disease Control, Directorate General of Health Services
DGHS	Directorate General of Health Services
DRRT	District Rapid Response Team
HEB	Health Education Bureau
HSIA	Hazrat Shahjalal International Airport
Icddr,b	International Center for Diarrheal Disease Research, Bangladesh
IEDCR	Institute of Epidemiology, Disease Control and Research
IHR	International Health Regulations (2005)
IHR NFP	National Focal Point for International Health Regulation 2005 (Director, DC, DGHS)
IPC	Infection Prevention and Control
IPH	Institute of Public Health
IPHN	Institute of Public Health Nutrition
LD CDC	Line Director, Communicable Disease Control
NIPSOM	National Institute of Preventive and Social Medicine
NNS	National Nutrition Services
NRRT	National Rapid Response Team
OIE	Office International des Epizooties (World Organization for Animal Health)
PHEIC	Public Health Emergency of International Concern
PoE	Points of Entry
RRT	Rapid Response Team
SOP	Standard Operating Procedure
URRT	Upazila Rapid Response Team
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization
WHA	World Health Assembly
ZIKAV	Zika Virus

EXECUTIVE SUMMARY

Zika virus is an emerging mosquito-borne virus that was first identified in Uganda in 1947 in Rhesus monkeys through a monitoring network of sylvatic yellow fever. It was subsequently identified in human in 1952 in Uganda and the United Republic of Tanzania. Recent outbreaks of Zika virus disease have been recorded in Africa, the Americas, Asia and the Pacific. The incubation period of Zika virus disease is likely to be a few days (3-14 days). Zika virus is transmitted to people through the bite of an infected Aedes mosquito mainly in tropical regions. This is the same mosquito that transmits Dengue and Chikungunya in our country, and Yellow fever in other countries. There are also case reports of sexual and vertical transmission of Zika. The symptoms are similar to Dengue and Chikungunya include fever, skin rashes, conjunctivitis, muscle and joint pain, malaise, and headache. The symptoms are usually mild and last for 2-7 days. Zika virus is diagnosed through PCR and isolated from human blood sample. There is no specific treatment, only symptomatic managements.

During large outbreaks in French Polynesia and Brazil in 2013 and 2015 respectively, national health authorities reported potential neurological and auto-immune complications of Zika virus disease. Recently in Brazil, local health authorities have observed an increase in Zika virus infections in the general population. There is also an increase incidence of microcephaly in newborn babies in northeast Brazil. Prevention and Control totally rely on reducing vector mosquitoes through Integrated Vector Management (IVM) based on enhanced entomological surveillance.

Bangladesh as a member State of WHO is committed to develop sustainable strategy to prevent and control Zika virus as per IHR 2005. Considering the present global and regional situation , Communicable Disease Control (CDC) unit of DGHS developed this National Strategy which will provide guidance on the national response to prevent ZIKA transmission.

CHAPTER-1

INTRODUCTION

Zika virus disease is an emerging viral disease caused by Zika virus that is transmitted through the bite of an infected mosquito. Primarily it is transmitted by Aedes aegypti, the same vector that transmits Chikungunya, Dengue and Yellow Fever. This virus was first identified in Uganda in 1947 in a monkey at the Zika forest of Uganda, and was first isolated in humans in 1952 in Uganda and the United Republic of Tanzania. Since 2015, Zika virus disease has continued to spread globally. World Health Organization declared Zika virus disease to be a Public Health Emergency of International Concern (PHEIC) on 21st February, 2016, based on the temporal association of Zika virus infection with Microcephaly (a condition where newborn baby's head is smaller than expected) and other neurological syndromes (Guillain-Barre Syndrome).

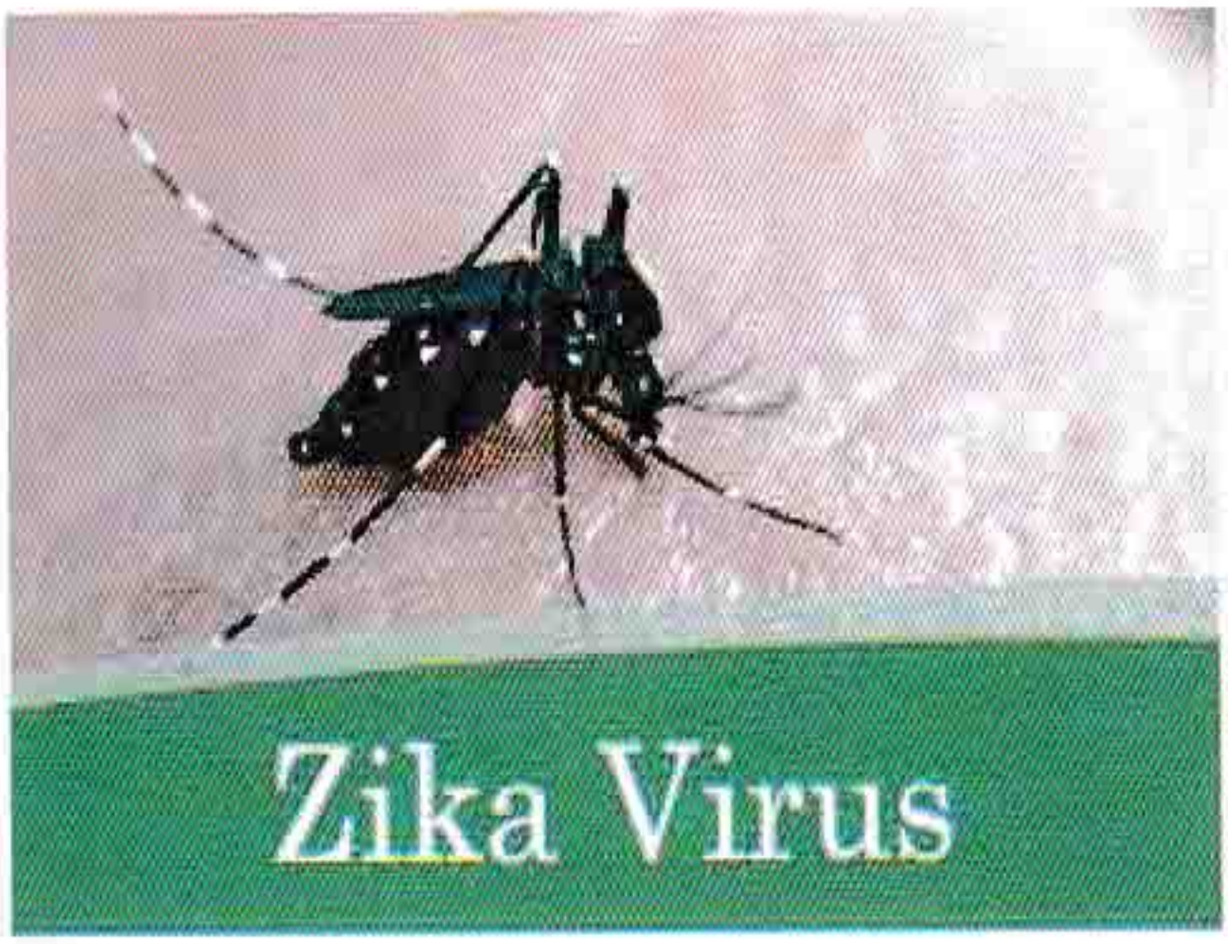
As of July 2019, a total of 87 countries and territories have had evidence of autochthonous mosquito-borne transmission of Zika virus (ZIKV), distributed across four of the six WHO Regions (African Region, Region of the Americas, South-East Asian Region, and Western Pacific Region). Incidence of ZIKV infection in the Americas peaked in 2016 and declined subsequently throughout 2017 and 2018. Globally, 61 countries and territories in six WHO regions have evidence of established competent Aedes aegypti vectors but have not yet documented ZIKV transmission. Therefore, there is still the potential risk for ZIKV to spread to additional countries.

It is also possible that some of these countries have or have had transmission that has not yet been detected or reported. All areas with prior reports of ZIKV transmission have the potential for re-emergence or re-introduction. Infection with ZIKV continues to carry the risk of Guillain-Barre Syndrome and adverse pregnancy outcomes including increased risk of preterm birth, foetal death and stillbirth, and congenital malformations collectively characterized as Congenital Zika Syndrome (CZS), including microcephaly, abnormal brain development, limb contractures, eye abnormalities, brain calcifications, and other neurological manifestations. The provision of long-term care for affected children and families remain a substantial need of healthcare systems and community-based programs. Two major lineages of ZIKV, known as the Asian and African lineages, have been identified.

The Asian lineage was first identified in Asia and subsequently spread to the Pacific Islands and then to the Americas. The 2015-16 epidemic in the Americas was caused by

a strain of the Asian lineage commonly referred to as the American strain. The differences in the epidemic potential and pathogenicity of these viral lineages and strains are not fully understood. The 2018 ZIKV outbreak in India was due to the Asian lineage-Asian strain, demonstrating the epidemic potential of this older Asian strain.[1]

Case of Congenital Zika Syndrome, microcephaly, and foetal death have been confirmed in women infected with Asian lineage virus, both the American and Asian strains, providing new evidence that adverse birth outcomes are not limited to the strains that caused the epidemic in the Americas[2,3]. Studies have demonstrated that ZIKV has circulated in Africa for decades, but no case reports or human studies have yet investigated effects of the African lineage on pregnancy and birth outcomes. Studies of the African lineage in-vitro and in animal models suggest the potential for increased pathogenesis in pregnancy compared with the Asian lineage, causing foetal loss rather than birth defects[4,5]. The effects of Zika African lineage viruses on birth outcomes remain unknown. Accurate and up-to-date epidemiological data on ZIKV are limited in many areas of the world. The majority of ZIKV infections are asymptomatic, and when disease occurs, symptoms are generally mild and non-specific, and therefore may not be detected or reported. In the absence of large outbreaks, available information is often based on clinical case reports, traveler cases, and research studies. Even in settings with laboratory capacity, case detection and surveillance systems are challenging due to limitations of available diagnostic tests[6,7,8]. Lack of detection or reporting of ZIKV transmission, therefore, cannot necessarily be equated with evidence that transmission is not occurring, particularly in areas with low levels of transmission. Decisions to guide family planning or travel to countries with a history of ZIKV transmission, particularly for pregnant women, women who may become pregnant, and their male partners, should be based on an assessment of information provided by country's public health departments and consultation with the individual's health care provider.



RISK ASSESSMENT OF ZIKA INFECTION IN BANGLADESH

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 Bangladesh, however, the mosquito which transmits Zika virus, namely Aedes aegypti, also transmits Dengue and Chikungunya virus is

widely prevalent in Bangladesh. 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 pain etc. Based on the available information of previous outbreaks, severe forms of disease of requiring hospitalization are uncommon and fatalities are rare.

However, if the disease becomes endemic in Bangladesh, there could be possibility of a cohort of persons with microcephaly and/other neurological disorders that would require long term rehabilitation/psychosocial care.

It is anticipated and WHO warned that Zika virus will continue to spread and can reach all countries and territories where Aedes aegypti mosquitoes are found. Other Aedes mosquitoes are also believed to be competent vectors for Zika virus and to have a much farther geographical spread. For example, Aedes albopictus is found in rural areas of Bangladesh. Furthermore, the Zika outbreak is likely to have a more negative impact on poor and marginalized communities, not only due to poor living conditions and infrastructure (e.g. breeding sites in stagnant water, lack of vector control program in rural areas), but also insufficient access to information, and resources for prevention and care.

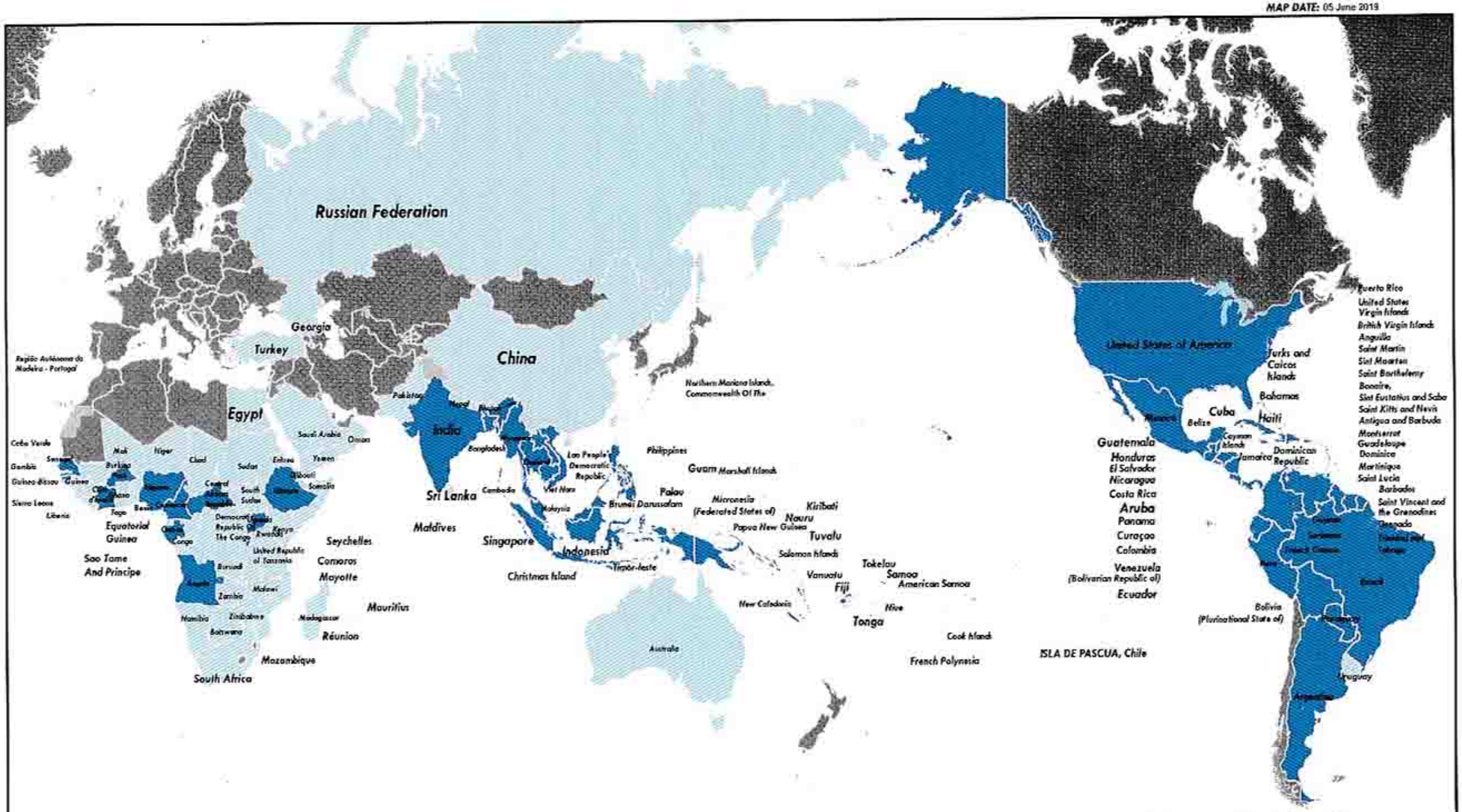
Purpose of document

A series of actions need to be in place to prevent and control of the Zika virus disease. The strategy would depend upon the efficiency with which the virus is transmitted among our community. The purpose of this document is to provide strategic action plan for early detection of human cluster of Zika virus disease, appropriate case management and to institute public health measures that would ensure containment/control of the outbreak. The action plan also deliberates actions that need to be taken if the disease becomes endemic in Bangladesh

Zika virus (ZIKV) infection is a mosquito-borne illness that is mostly mild and resolves without treatment. Major epidemics of Zika virus disease may occur worldwide since environments where mosquitoes can live and breed are increasing due to recent trends including climate change, rapid urbanization and globalization. The first outbreak documented in Brazil in early 2015. Since then, ZIKV infection has spread rapidly to 87 countries and territories. The World Health Organization (WHO) has concluded that ZIKV is a causative agent of congenital malformations and neurological complications. Much has been learned about Zika virus infection from current outbreaks, how it spreads, the consequences of infection, and priorities for its control. Experts believe that if the virus is capable of causing such severe abnormalities as microcephaly, it is likely to cause additional neurological problems that will become apparent as children develop.

Accordingly, risk assessments and preparedness activities are required and Bangladesh developed a National Strategy on Zika Prevention Control.

MAP DATE: 05 June 2019



Countries and territories with current or previous Zika virus transmission

Countries and territories with established competent vector, but no known cases of Zika virus infection

Countries and territories with no known cases of Zika virus infection and no established competent vector

Not Applicable

Areas are classified according to country, territory, or subnational area.
Data as of November 16,2017.
Zika virus country classification tables available at:
http://www.who.int/emergencies/zika-virus/classification-tables/en/
Zika virus country classification schema available at:
http://apps.who.int/iris/bitstream/10665/254619/1/WHO-ZIKV-SUR-17.1-eng.pdf

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

BACKGROUND

The Zika virus, transmitted by the aggressive aedes aegypti mosquito, has now spread to at least 87 countries and territories. These vectors also transmit Dengue and Chikungunya virus and are found throughout much of the Americas, including parts of the United States. Zika virus belongs to Genre: Flavivirus and the vector of which is aedes mosquitoes (which usually bite during the morning and late afternoon/evening hours) but the reservoir is unknown. In 2007, the first documented outbreak of Zika virus disease occurred in the Pacific. Since 2013, cases and outbreaks of the disease have been reported from the Western Pacific, the Americas and Africa. Given the expansion of environments where mosquitoes can live and breed, facilitated by urbanization and globalization, there is a potential for major urban epidemics of Zika virus disease to occur globally.

During the first outbreak of Zika from 2013 - 2014 in French Polynesia, which also coincided with an ongoing outbreak of dengue, national health authorities reported an unusual increase in Guillain-Barre Syndrome (GBS). Retrospective investigations into this effect are ongoing, including the potential role of Zika virus and other possible factors. A similar observation of increased GBS was also made in 2015 in the context of the first Zika virus outbreak in Brazil.

Incidence of ZIKV infection in the Americas peaked in 2016 and declined substantially throughout 2017 and 2018[2]. Zika virus transmission has been found in all countries in the Region of the Americas except mainland Chile, Uruguay, and Canada[3]. Recent studies have provided new information on the incidence, prevalence, and patterns of

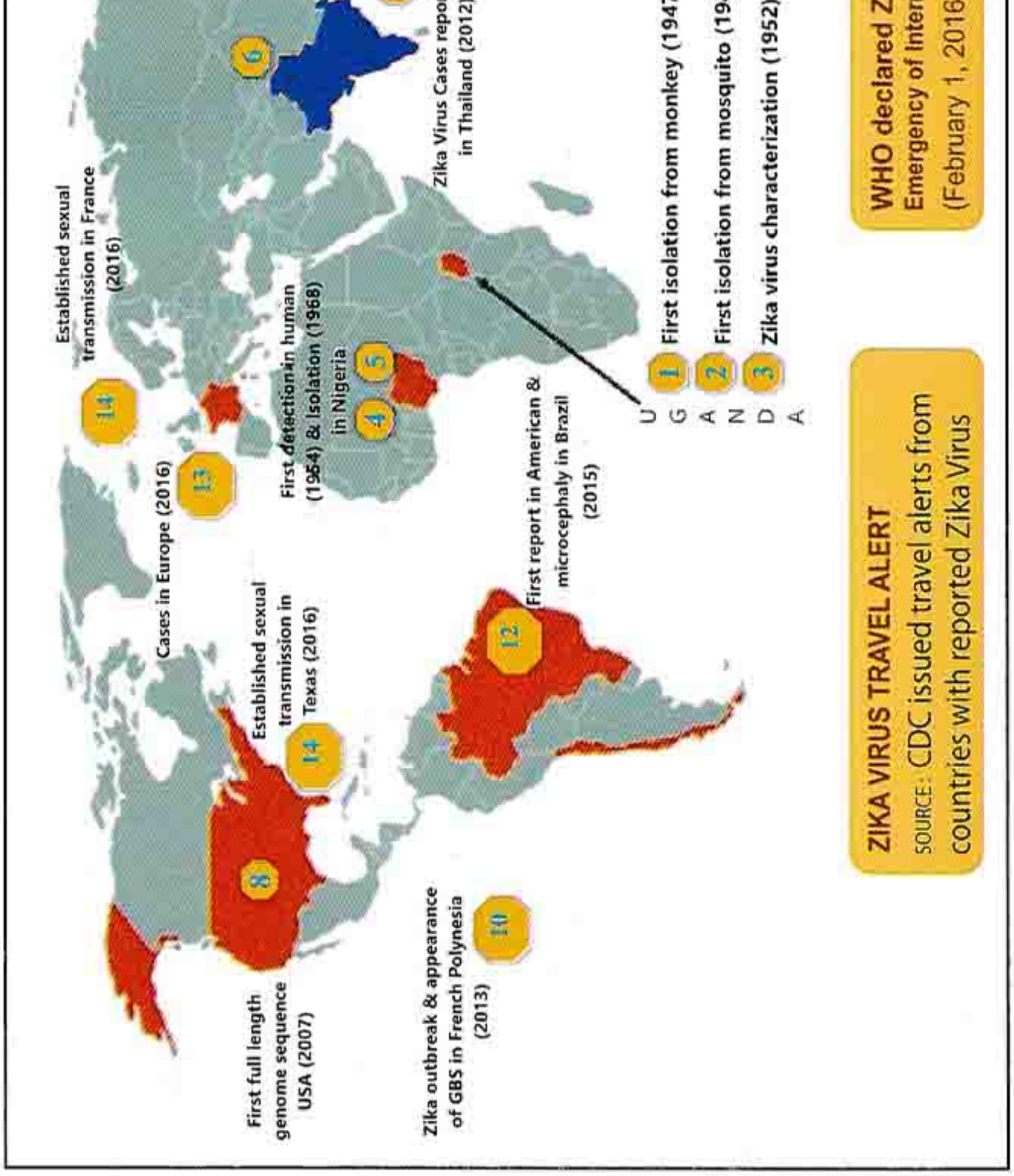
ZIKV transmission world wide. For example, in Indonesia, a retrospective population-based sero survey found approximately 9% of the children had evidence of prior ZIKV infection by the age of 5 years[4]. In Lao People's Republic, evaluation of specimens from asymptomatic adult blood donors in 2015 found nearly 10% had evidence of prior ZIKV infection[5]. All areas with prior reports of ZIKV transmission have the potential for re-emergence or re-introduction. Infection with ZIKV continues to carry the risk of Guillain-Barre Syndrome and adverse pregnancy outcomes including increased risk of preterm birth, foetal death and stillbirth, and congenital malformations collectively characterized as Congenital Zika Syndrome (CZS), including microcephaly, abnormal brain development, limb contractures, eye abnormalities, brain calcifications, and other neurologic manifestations. The provision of long-term care for affected children and families remains a substantial need of healthcare systems and community-based programs. India reported a ZIKV outbreak in Rajasthan State in 2018[6]. New evidence identified that the ZIKV strain found in the Americas had spread to Angola and was associated with a cluster of microcephaly in 2017-2018[7,8,9]. Cases of Zika-associated congenital malformations, microcephaly, and foetal death have been identified in countries in Asia[10,11,12].

Two lineages were first identified in Asia and subsequently spread to the Pacific Islands and then to the Americas. The 2015-16 epidemic in the Americas was caused by a strain of the Asian lineage commonly referred to as the American strain. The 2018 ZIKV outbreak in India was due to the Asian lineage-Asian strain, demonstrating the epidemic potential of this older Asian strain[13-18]. Cases of Congenital Zika Syndrome(CZS), microcephaly, and foetal death have been confirmed in women infected with Asian lineage virus, both the American and Asian strains, providing new evidence that adverse birth outcomes are not limited to the strains that caused the epidemic in the Americas[11,12]. Studies have demonstrated that ZIKV has circulated in Africa for decades, but no case reports or human studies have yet investigated effects of the African lineage on pregnancy and birth outcomes. Studies of the African lineage in-vitro and in animal models suggest the potential for increased pathogenesis in pregnancy compared to the Asian lineage, causing foetal loss rather than birth defects[19,20] The majority of ZIKV infections are asymptomatic, and when disease occurs, symptoms are generally mild and non-specific, and therefore may not be detected or reported. Many countries lack or have limited systems for routine surveillance, case detection and reporting. In the absence of large outbreaks, available information is often based on clinical case reports, traveler cases, and research studies. Even in settings with laboratory capacity, case detection and surveillance systems are challenging due to limitations of available diagnostic tests[21,22,23]. Lack of detection or reporting of ZIKV transmission, therefore, cannot necessarily be equated with evidence that transmission is not occurring, particularly in areas with low levels of transmission. Decisions to guide family planning or travel to countries with a history of ZIKV transmission, particularly for pregnant women, women who may become pregnant, and their male partners, should be based on an assessment of information provided by country's public health departments and consultation with the individual's health care provider.

THE STRATEGIC RESPONSE FRAMEWORK

ZIKA VIRUS

FIG. 1: HISTORICAL TIMELINE MAP (1947 - 2016)



Zika: Timeline of spread

The following timeline summarizes the spread of Zika infection, country by country, from the earliest discovery in 1947 to the latest information as of 7 February, 2016. Zika virus infection appears to have changed in character while expanding its geographical range.

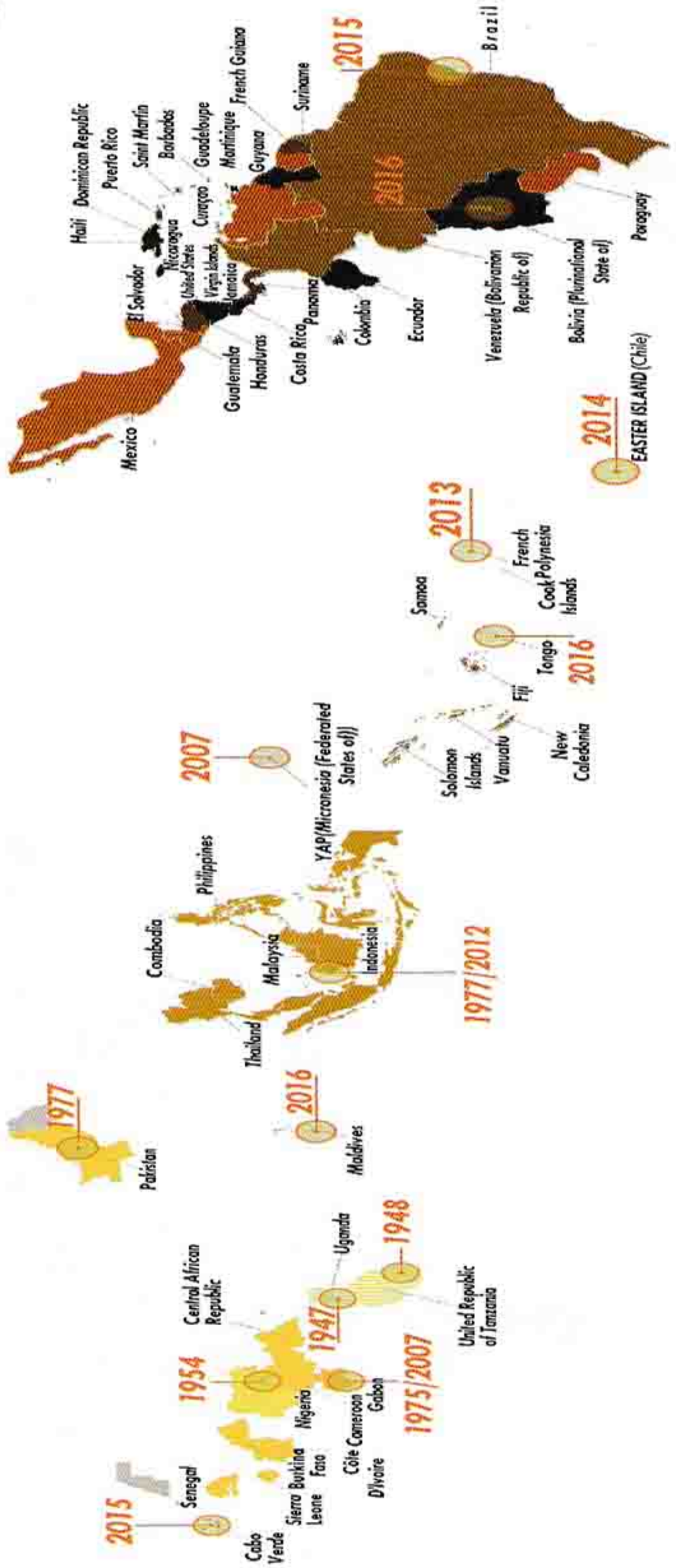
The change is from an endemic, mosquito-borne infection causing mild illness across equatorial Africa and Asia, to an infection causing, from 2007 onwards, large outbreaks, and from 2013 onwards, outbreaks linked with neurological disorders including Guillain-Barre Syndrome and microcephaly across the Pacific Region and the Americas.

Increase in Neurological Syndromes

National Health Authorities have reported an observed increase of Guillain-Barre Syndrome (GBS)[1] in Brazil and El Salvador which coincided with the Zika virus outbreaks. During the French Polynesia outbreak in 2013/2014, National Authorities also reported an observed increase in neurological syndromes in the context of co-circulating Dengue virus and Zika virus. Seventy-four patients presented with neurological or auto-immune syndromes after the manifestation of symptoms consistent with Zika virus infection. Of these, 42 were classified as GBS.

TIMELINE OF COUNT

The Origin and Spread of Zika Virus



Source : World health Organization
https://www.who.int/news-room/feature-stories/detail/the-history-of-zika-virus

On January 22, Brazil reported an increase of GBS at the national level. A total of 1,708 GBS cases were registered between January and November 2015. Most of Brazil's states have Zika, Chikungunya and Dengue virus circulation.

Increase in congenital malformations

On 27 January 2016, Brazil reported that of 4,180 suspected cases of microcephaly, 270 were confirmed, 462 were discarded and 3,448 are still under investigation. This compares to an average of 163 microcephaly cases recorded nationwide per year. Only six of the 270 confirmed cases of microcephaly had evidence of Zika infection. According to the US Centers for Disease Control and Prevention (US CDC) and Ministry of Health Brazil, the results of two specimens taken during autopsy from the brain tissues of microcephalic patients, indicated infection with Zika virus. A placenta was also evaluated and found to be PCR positive for Zika. Although the microcephaly cases in Brazil are spatio-temporally associated with the Zika virus outbreak, health authorities and agencies are investigating and conducting comprehensive research to confirm a causal link.

Following the Zika outbreak in French Polynesian, health authorities reported an unusual increase in the number of congenital malformations in babies born between March 2014 and May 2015. Eighteen cases were reported, nine of which were diagnosed as microcephaly.

Other countries with current outbreaks (Cape Verde, Colombia, El Salvador and Panama) have not reported an increase in microcephaly.

1 Guillain-Barre Syndrome is a rare condition in which a person's immune system attacks His/her peripheral nervous system. The syndrome can affect the nerves that control muscle movement as well as those that transmit feelings of pain, temperature and touch. This can result in muscle weakness and loss of sensation in the legs and/or arms. The cause of Guillain-Barré cannot always be determined, but it is often triggered by an infection (such as HIV, dengue, or influenza) and less commonly by immunization, surgery, or trauma.

CHAPTER-2

GOAL

Develop an integrated and sustainable program so that ZIKA will not be a major public health problem in Bangladesh by 2023.

NATIONAL STRATEGIES

BANGLADESH CONTEXT

All countries are not affected similarly by Zika Virus. The virus circulation, aedes mosquito population, the current cluster of microcephaly and other neurological complications that could be linked to Zika virus infection, all affected countries differently and the response strategy will be different for different countries.

The response strategies outlined here is applicable for Bangladesh context as per WHO Guidelines (Table 1).

In countries where there is spread of Zika virus and increased congenital malformations / neurological syndromes, a full range of response activities will be applied. These include enhanced surveillance and outbreak response, community engagement, vector control and personal protective measures, care for people and families with potential complications, field investigations and public health research towards better understanding risk and mitigation measures.

However, for countries like Bangladesh where viral transmission is not yet established, Surveillance, Vector management, Monitoring & Coordination and Risk communications for the public regarding trade and travel will be the main line of engagement, as well as reducing fear and misconceptions of the virus for those that are imported.

Table 1 .Preparedness activities according to country context (WHO Guideline)

RESPONSE STRATEGY	Countries with competent vectors	Other countries
Coordination	√	√
Emergency Risk communications and community engagement	√	√
Laboratory	√	√
Surveillance and case management	√	√
Health and social systems and service strengthening	√	
Integrated vector management	√	

CHAPTER-3

STRATEGIC OBJECTIVES

The IHR program of CDC, as the focal agency for implementation of IHR in Bangladesh as well as to prevent and control IHR related diseases, will harness the participation from relevant Government ministries, departments, non government agencies, civil societies, academia etc.

Other relevant stakeholders to undertake a comprehensive and holistic approach in implementing the National Strategy for Prevention and Control of Zika virus infection in Bangladesh by ensuring multi agency cooperation and both government and non government-stakeholders. The comparative advantages of each participating agency may be harnessed to ensure a wide coverage service provision and interventions as proposed by the National Strategy for Prevention and Control of Zika virus infection in Bangladesh.

Surveillance: Primary focus will be on improved understanding of the distribution, spread and nature of Zika virus infection, and trends in microcephaly and GBS. Uniform case definitions, clinical and data collection protocols will be established to improve monitoring of Zika virus infections and its potential complications. Existing facility-based surveillance for detecting suspected cases will be strengthened and expanded in areas of high Aedes vector's density. All efforts will be taken to identify index case through event-based surveillance. National and local health authorities must be on alert for the emergence of clusters of fever with rash of unknown etiology (in which dengue, chikungunya measles, rubella, and parvovirus B19 have been ruled out), and test for Zika virus infection should be ensured. Existing vector surveillance systems will be enhanced to track, detect and monitor the Zika virus.

OBJECTIVES

A. Human Surveillance for Zika

B. Laboratory Diagnosis

C. Risk Communication

D. Coordination

E. Care and Support

F. Vector Surveillance and Vector Control

CHAPTER-4
STRATEGIC OBJECTIVE 01
HUMAN SURVEILLANCE FOR ZIKA

Background

Although Bangladesh is not currently having any in country's active transmission of Zika virus infection, there is a threat present regarding possible transmission as the disease already affected the neighboring countries. Moreover, the country's economy and foreign remittance depends upon its huge number of workers who work in the foreign countries. Along with these workers, some travelers frequently visit the country, which make Bangladesh vulnerable to spread of Zika virus. Most of the Zika virus infection is asymptomatic and self-limiting, requires no treatment. Although rare, the deadliest part of Zika is that, it has association with microcephaly, congenital abnormalities and some neurological disease. As a limited resource country, surveillance for Zika in Bangladesh needs to focus on the early detection and prevention of Zika associated microcephaly and congenital malformation cases.

Objective:

1. Country wide notification of couples willing to have baby.
2. Risk assessment of Zika virus infection among the women willing to have pregnancy
3. Counseling of couples willing to have baby regarding prevention related to Zika associated microcephaly and congenital malformation.
4. Laboratory diagnosis of Zika among the couples willing to have baby and meet the suspected case definition of Zika from a sentinel site.
5. Early diagnosis of Zika associated microcephaly and congenital malformation.
6. Diagnosis of Zika from patient with neurological disorder like Guillain-Barre Syndrome
7. Diagnosis and containment of travelers having Zika like symptoms.

Case definitions:

Suspected Case of Zika virus Disease

Any person resides in, or recently traveled to, an area where there are vectors for the Zika virus; or has had unprotected sex with someone who resides in, or recently traveled to an area of circulation of vectors for the Zika virus and has:

Rash* with two or more of the following signs or symptoms:

1. Fever, usually >38.5 ° C
2. Conjunctivitis (non-purulent/hyperemic)
3. Arthralgia
4. Myalgia
5. Peri-articular edema

*usually pruritic and maculopapular

Probable Case of Zika virus Disease

Patient who meets the criteria of a suspected case AND has Zika IgM antibodies, with no evidence of infection with other flaviviruses.

Confirmed Case of Zika virus Disease

Patient who meets the criteria for a suspected case AND has laboratory confirmation of recent Zika virus infection, i.e.:

- RNA or Zika virus antigen in any specimen (serum, urine, saliva, tissue or whole blood); OR
- Positive Zika IgM antibodies AND Plaque reduction neutralization (PRNT90) for Zika virus titers = 20 and four or more times greater than the titers for other flaviviruses; AND exclusion of other flavivirus; OR
- In autopsy specimens, detection of the viral genome (in fresh or paraffin tissue) by molecular techniques, or detection by immunohistochemistry.

Guillain-Barre Syndrome (GBS) associated with Zika virus

Suspected case of Zika-virus-associated GBS

Patient who

- Resides in, or recently traveled to, an area where there are vectors for the Zika virus; OR
- Has had unprotected sex with someone who resides in, or recently traveled to an area of circulation of vectors for the Zika virus;

AND

Presents the following signs and symptoms (level 3 Brighton criteria):

- Bilateral and flaccid weakness of the limbs; AND
- Decreased or absent deep tendon reflexes in weak limbs; AND
- Monophasic illness pattern; and interval between onset and weakness between 12 hours and 28 days; and subsequent clinical plateau; AND

- Absence of identified alternative diagnosis for weakness confirmed case of Zika-virus-associated GBS;
- Patient meeting the criteria for suspected Zika-virus-associated GBS with laboratory confirmation of recent infection with the Zika virus.

Confirmed Case of Zika-virus-associated GBS

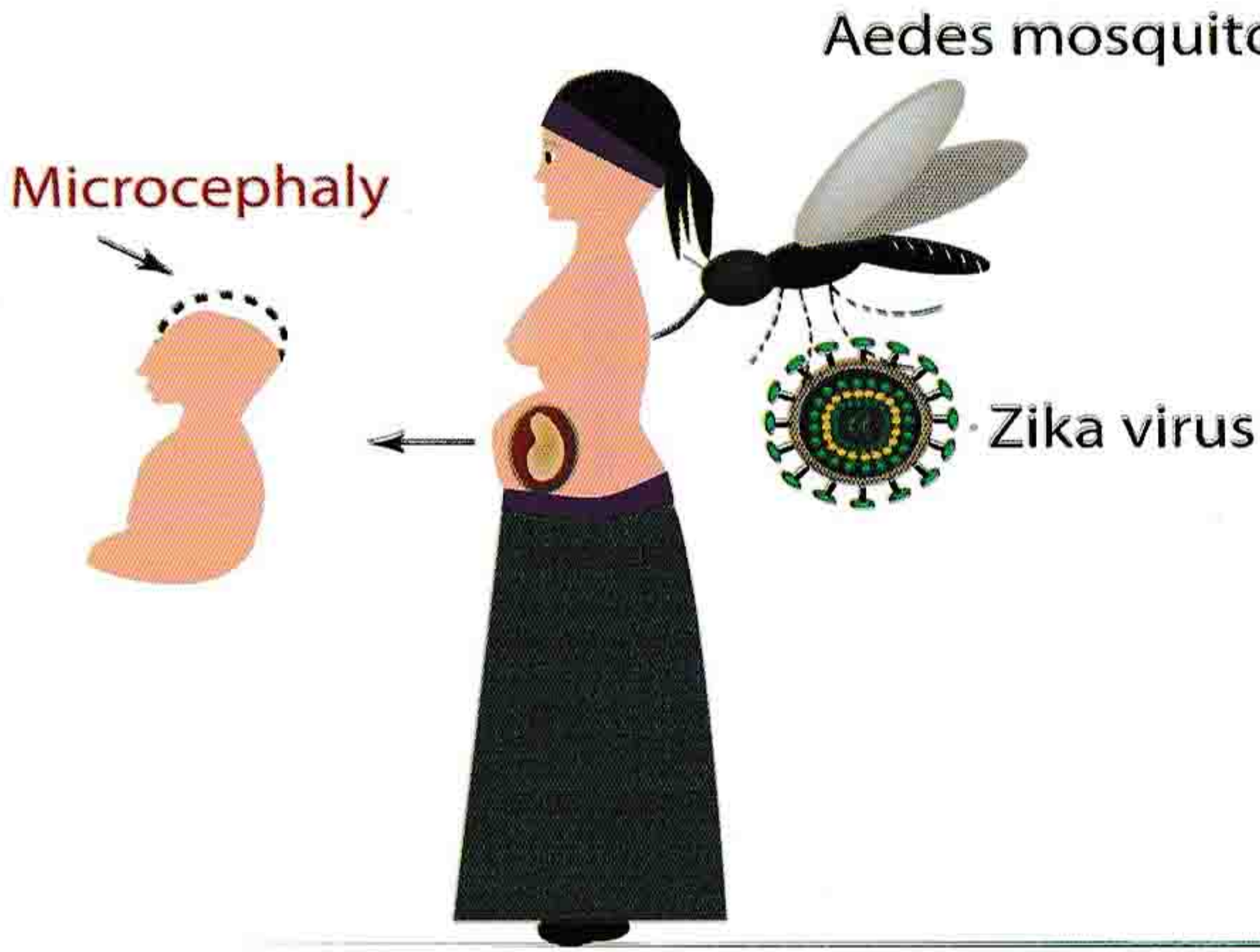
- Patient meeting the criteria for suspected Zika-virus-associated GBS with laboratory confirmation of recent infection with the Zika virus.

Congenital Syndrome associated with Zika virus infection

Suspected Case of Congenital Syndrome associated with Zika virus

Live newborn who presents with:

- Microcephaly: head circumference below -2 standard deviations for gestational age and sex, measured at 24 hours post-partum according to the standardized reference; OR
- Other congenital malformation of the central nervous system;



AND whose mother:

- traveled to, or resided in, an area where Zika virus vectors were present during her pregnancy; OR
- had unprotected sex during pregnancy with a partner who resided in, or traveled to an area with the presence of Zika virus vectors.

Probable Case of Congenital Syndrome associated with Zika virus

Live newborn who meets the criteria for a suspected case of congenital syndrome associated with Zika virus AND

- who has intracranial morphological alterations detected by any imaging method, and not explained by other known causes; OR
- whose mother had rash during pregnancy.

Confirmed Case of Congenital Syndrome associated with Zika virus

Live newborn who meets the criteria for a suspected case of congenital syndrome associated with Zika virus AND Zika virus infection was detected in specimens of the newborn, regardless of detection of other pathogens.

Zika-virus-associated abortion or stillbirth

Suspected Zika-virus-associated abortion or stillbirth

Abortion or stillbirth in a woman, who during her pregnancy

- presented rash; AND
- resided in or traveled to an area where Zika virus vectors were present; OR had unprotected sex during pregnancy with a partner who resided in or traveled to an area where Zika virus vectors were present.

Confirmed Zika-virus-associated abortion or stillbirth

Suspected case in which specimens from either the mother (blood or urine) or the abortion/ stillbirth are laboratory-positive for Zika virus.

Vertical Transmission (without congenital syndrome)

Suspected Vertical Transmission (without congenital syndrome)

Live newborn of any gestational age who has not met the criteria for a suspected case of congenital syndrome associated with Zika virus AND whose mother had a suspected, probable or confirmed case of Zika infection during pregnancy.

Probable Case of Vertical Transmission (without congenital syndrome)

Live newborn who meets the criteria for suspected vertical transmission in whom Zika IgM antibodies are detected by ELISA or virus RNA is detected by RT-PCR in a umbilical cord blood sample.

Confirmed Case of Vertical Transmission (without congenital syndrome)

Live newborn who meets the criteria for suspected vertical transmission in whom anti-Zika IgM* is detected by ELISA in a serum sample of the newborn.

Notification and Risk assessment of the couples willing to have baby

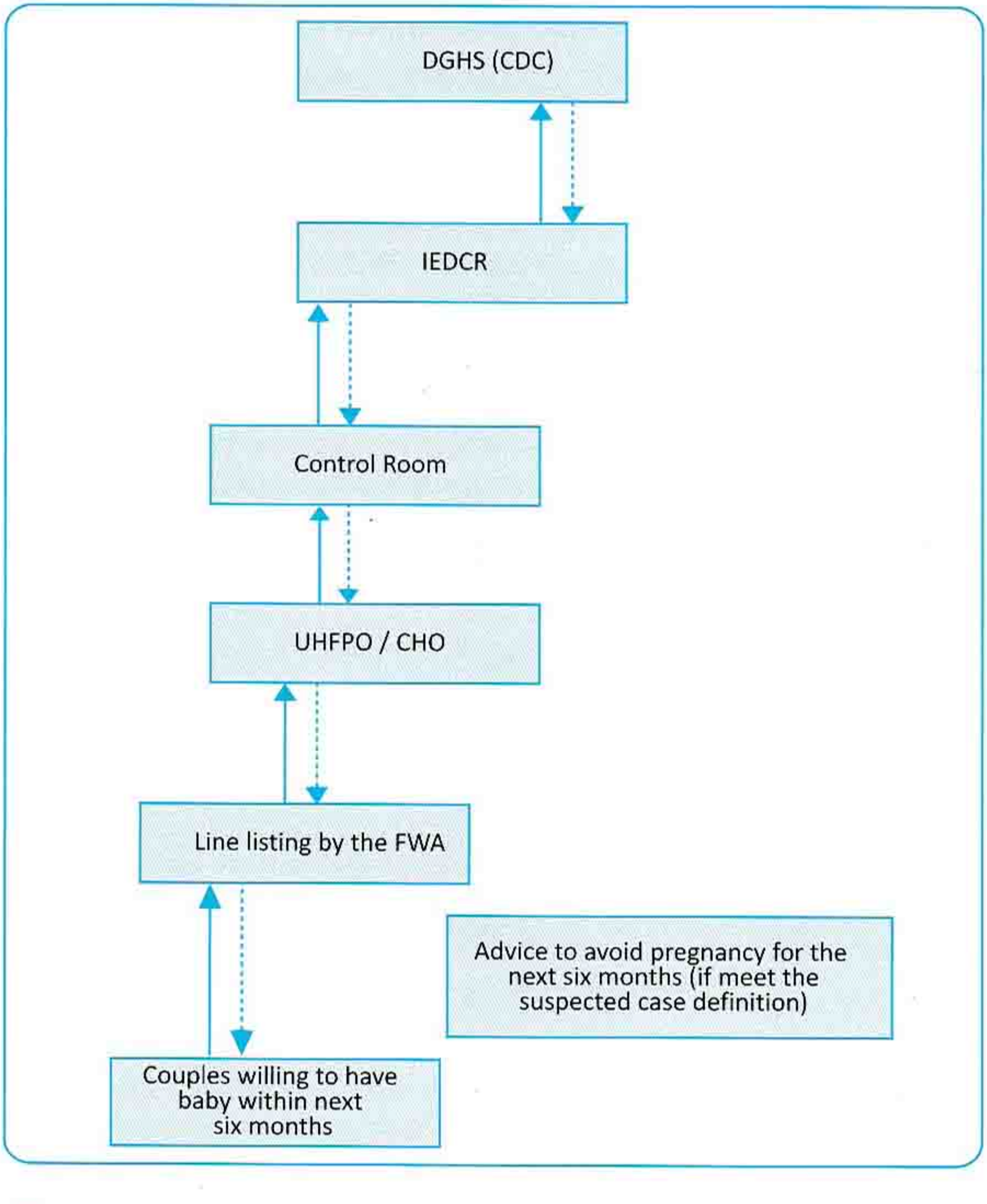
All couples willing to have baby need to notify by the health department and data need to be collected to assess the risk of Zika virus infection. Any couple either of the partner meets the suspected case definition of Zika virus infection needs to be enrolled and advised to avoid the pregnancy for the next six months. Any couple willing to have pregnancy and visit the Zika affected countries should be advised to postpone the visit during pregnancy.

* When only PCR is available and it is positive, follow-up serology is advised, because the viral detection could be from perinatal rather than vertical transmission.

Family welfare assistant needs to notify all the couples willing to have baby in recent days and prepares a line list to submit biweekly to DGHS Control Room through the Upazila Health and Family Planning Officer (UHFPO) or Chief Scientific Officer (CHO). The list needs to update biweekly (Figure 1). The line list needs to include the following information:

1. Name and address of couples
2. Age
3. Years of marriage
4. Occupation of earning member
5. Any partner living outside country and Name of the country
6. Date of last visit outside Bangladesh
7. Have symptoms like Zika (Suspected case definition)

Figure 1: Notification and Risk Assessment of couples willing to have pregnancy.

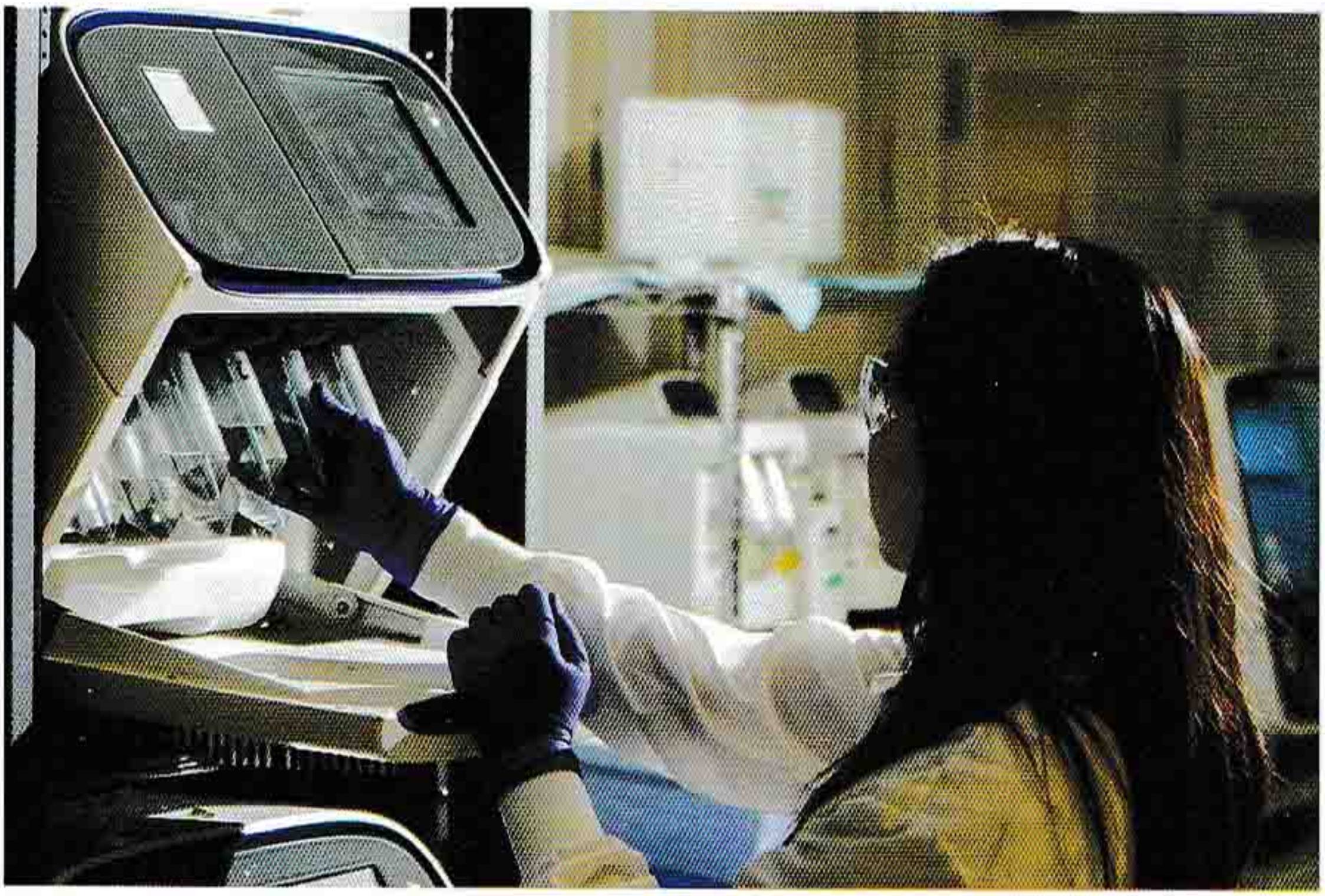


CHAPTER-5

STRATEGIC OBJECTIVE-02

ENHANCE LABORATORY DIAGNOSIS

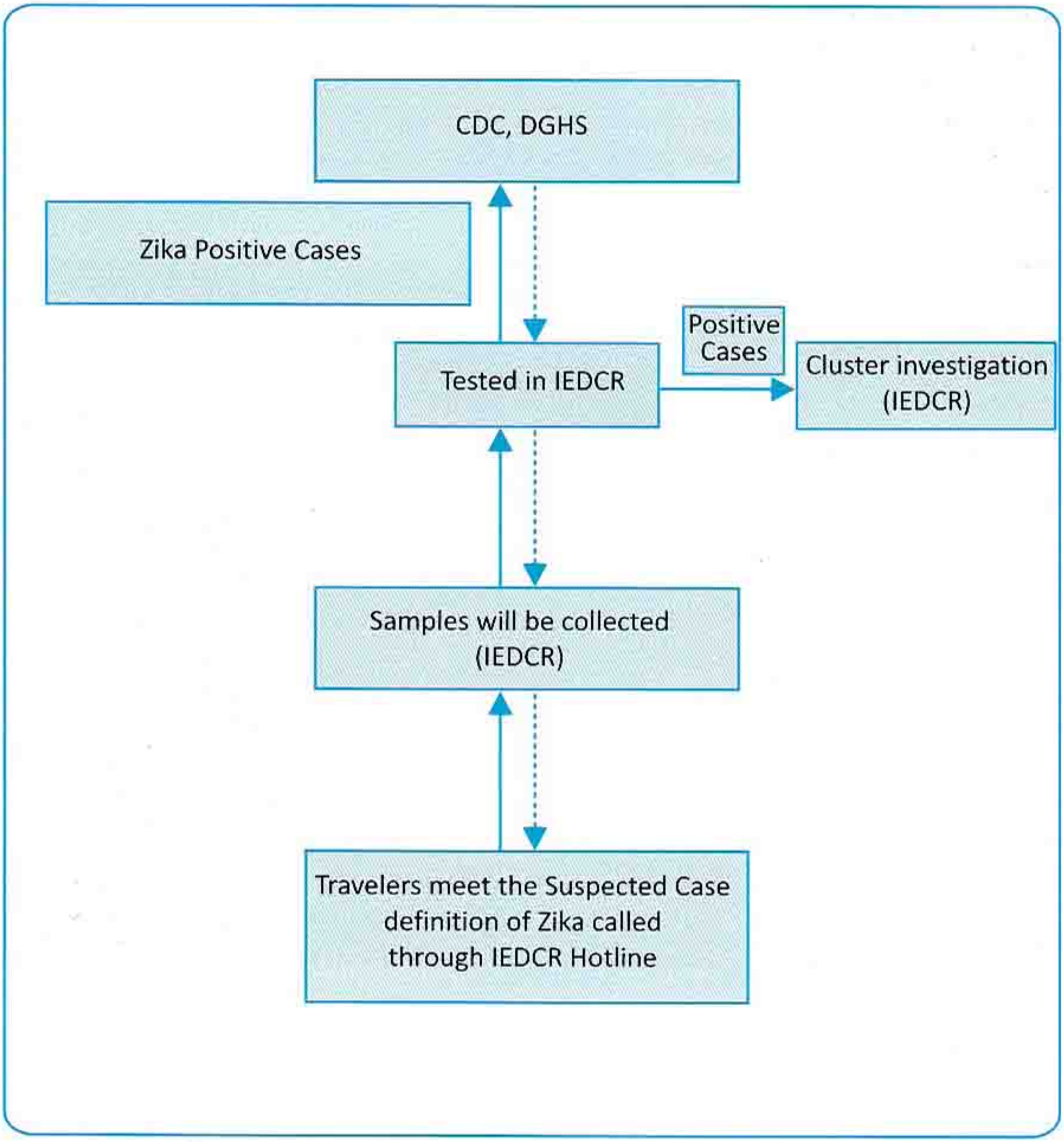
Laboratories and diagnostics: Laboratory capacity to test for Zika virus infection will be expanded and other diseases relevant to their national context will be ensured. This includes upgrading existing laboratory capacities, and enabling them to access and use Polymerase Chain Reaction (RT-PCR) tests in particular, and other diagnostic tools. Virus sharing between countries will be encouraged. Serological diagnostics to detect evidence of past infection will be improved, expanded and developed. A diagnostic algorithm will be developed for Zika virus to differentiate between other relevant diseases present in the context of the country (e.g. dengue, chikungunya, yellow fever). Timely sharing of data using existing networks (e.g. dengue) will also be ensured.



Diagnosis and containment of travelers have Zika like symptoms

Any traveler recently traveled Zika affected country and meets the suspected case definition of Zika virus infection and informed through IEDCR hotline, IEDCR will collect samples and perform cluster investigation if needed (Figure 2).

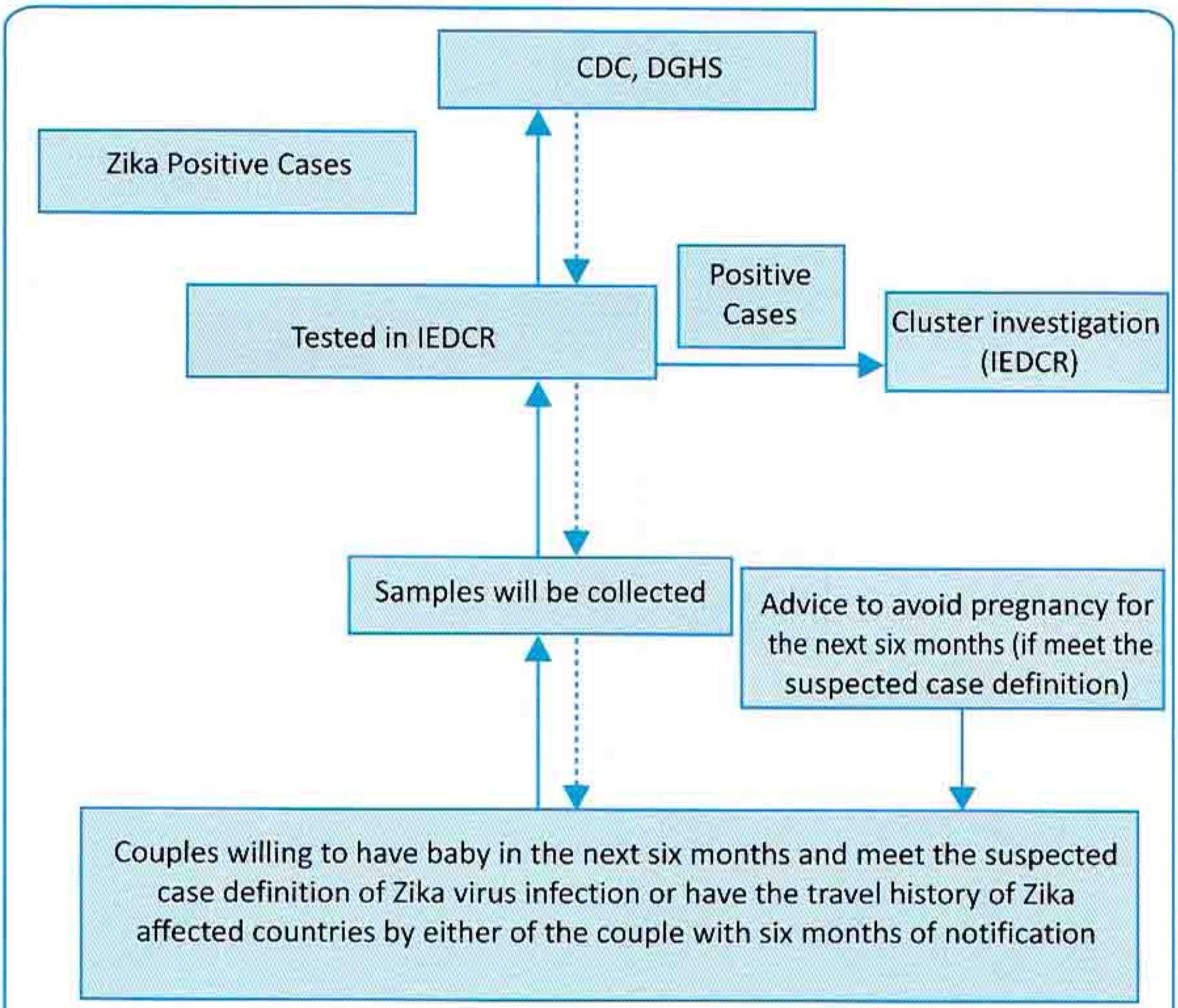
Figure 2: Laboratory screening of travelers meet the criteria for Zika



Sentinel Surveillance: Laboratory diagnosis of Zika among the couples willing to have baby and meet the suspected case definition:

One urban and one rural maternity clinics will be selected for sentinel sites. From the catchment areas, samples need to be collected from all couples willing to have baby in the next six months and meet the suspected case definition of Zika virus infection or have the travel history of Zika affected countries by either of the couple with six months of notification. Samples will be tested in IEDCR laboratory for Zika. If any sample is positive proper counselling of the couples and cluster investigations will be done (Figure 3).

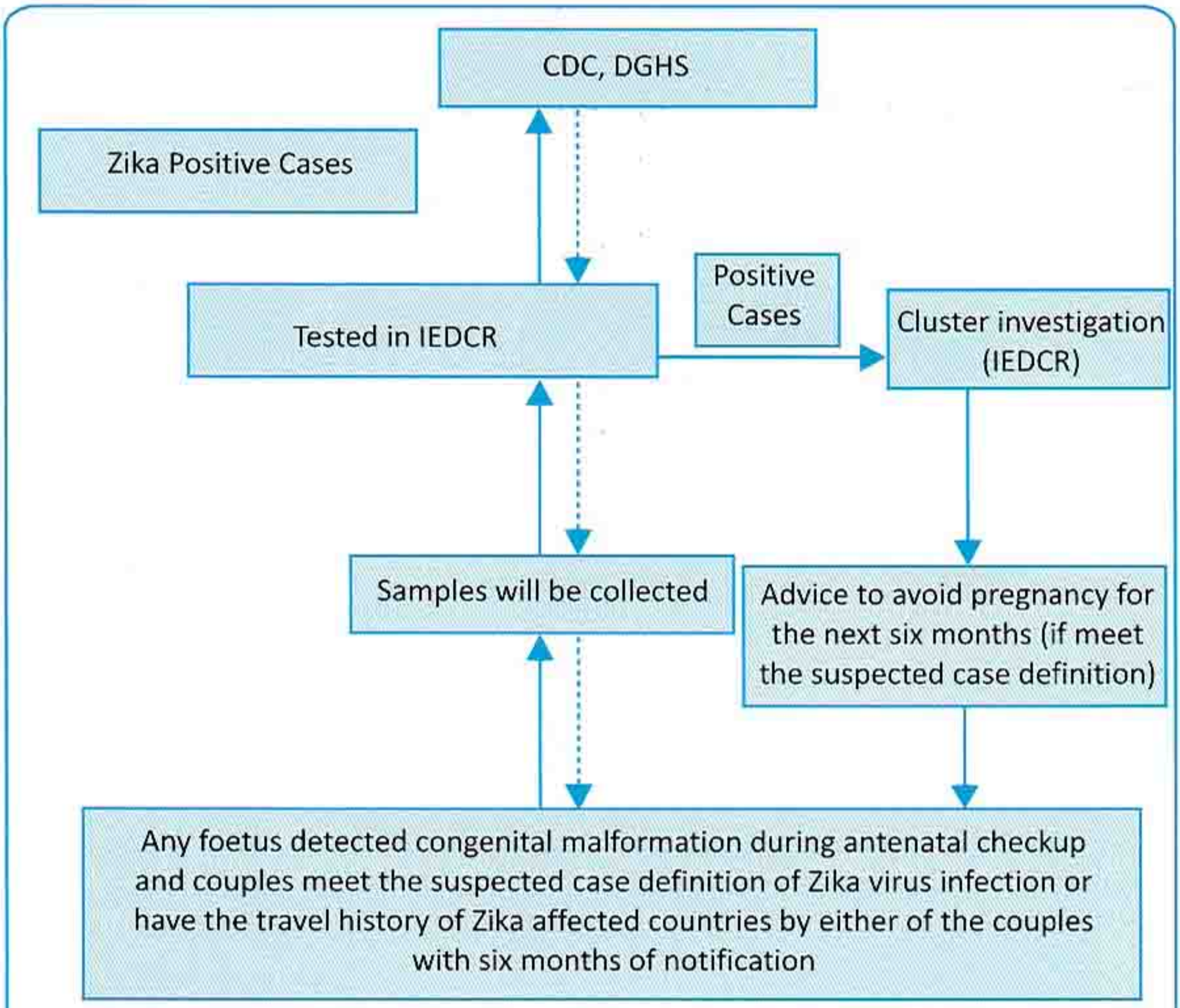
Figure 3: Laboratory screening of the couples willing to have pregnancy and meet the criteria for Zika from Sentinel Surveillance



Sentinel Surveillance: Early diagnosis to Zika associated microcephaly and congenital malformation

One urban and one rural maternity clinics will be selected for sentinel sites. During antenatal checkup all women need to be checked for congenital malformations. If any foetus have congenital malformations (including microcephaly) and either of the couples meets the suspected case definition of Zika or only have the history of travel to Zika affected countries, samples will be collected from the mother for Zika testing in IEDCR (Figure 4).

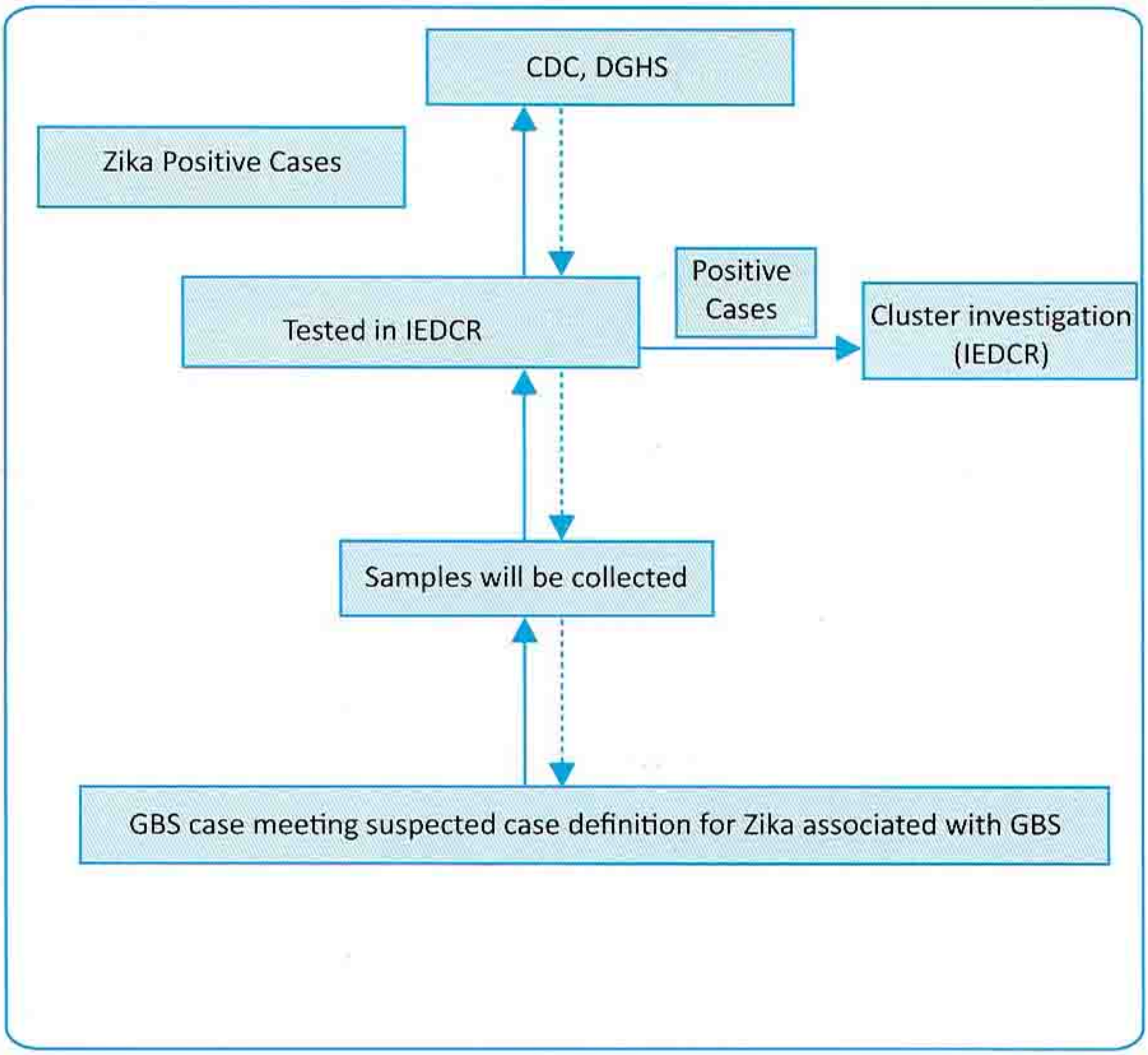
Figure 4: Laboratory screening of the couples willing to have pregnancy and meet the criteria for Zika from Sentinel Surveillance



Sentinel Surveillance: Diagnosis of Zika from patient with neurological disorder like Guillain-Barre Syndrome from a sentinel site

Few medical college hospitals or national neurological institutes will be selected as a sentinel site. Samples will be collected from all GBS case metting suspected case definition for Zika associated with GBS and the samples will be tested in IEDCR. In case of positive case proper notification will be done and cluster investigation will be conducted (Figure 5).

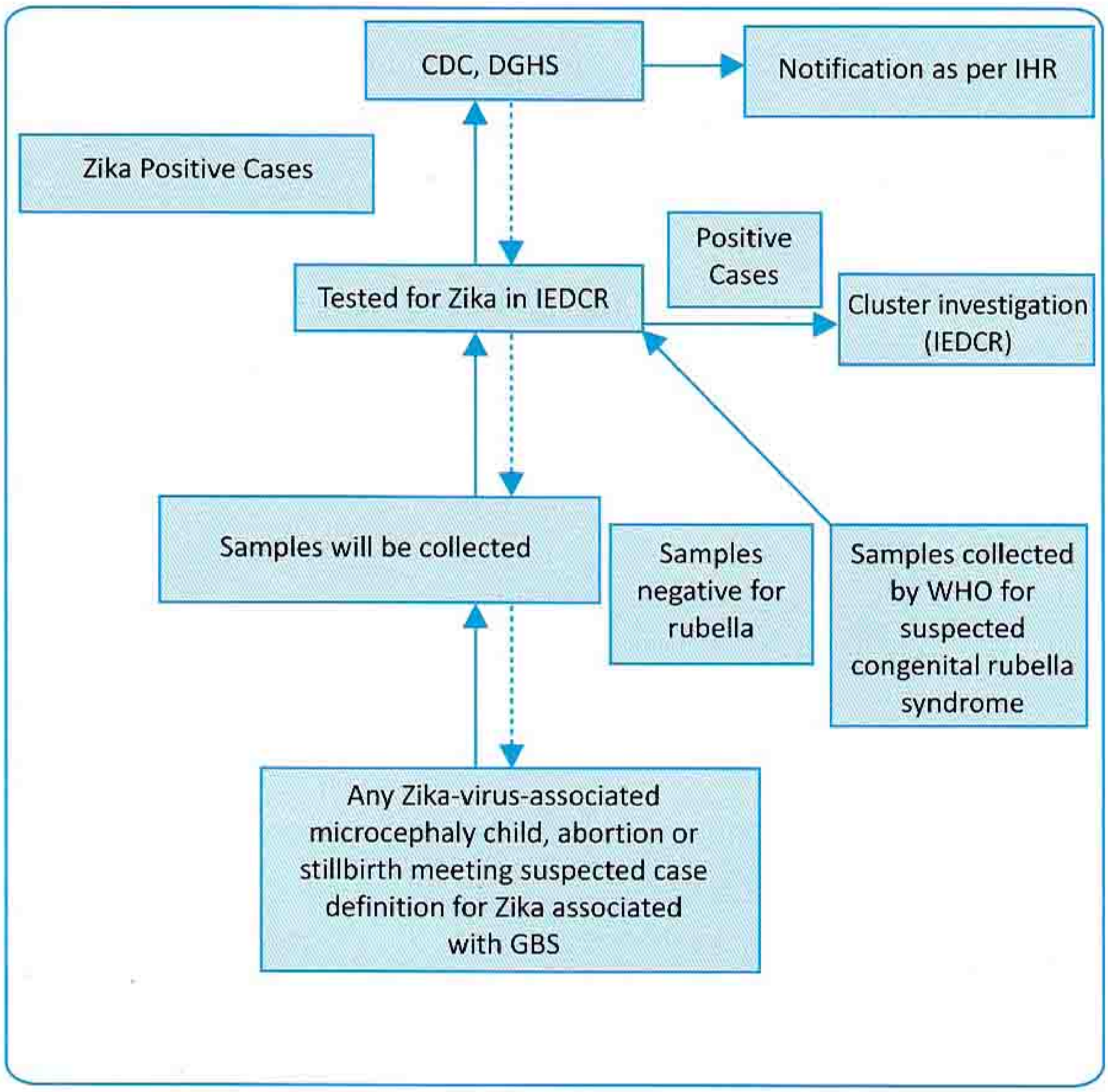
Figure 5: Laboratory screening of GBS patients meets the criteria for Zika from Sentinel Surveillance



Sentinel Surveillance: Zika-virus-associated microcephaly, abortion or stillbirth

Any newborn with microcephaly or abortion or stillbirth and if the couples meet the suspected case definition of Zika Virus infection from the sentinel site, samples will be collected for laboratory testing of Zika Virus by IEDCR. World Health Organization (WHO) is currently conducting surveillance for congenital rubella syndrome surveillance and collecting samples for all suspected congenital malformation cases. The samples negative for the rubella can be tested in IEDCR laboratory (Figure 6).

Figure 6: Laboratory diagnosis meets the criteria for Zika-virus-associated microcephaly, abortion or stillbirth



- Number of Pregnant Travelers;
- Estimated number of women planning to be pregnant from high risk areas;
- Estimated number of planning of pregnancy prior to, during or shortly after travel;
- Estimated number of men whose partner are pregnant , planning a pregnancy or at risk of getting pregnant;
- Estimated number of Zika patients expected at OPD;
- Radiologist /Sonologist: Country capacity; and
- Resource Mobilization: Scope of funding, donors etc.

RISK ASSESSMENT REPORT TO AUTHORITY

Risk assessment findings will be disseminated in a workshop with experts and policy makers and a final report with detail immediate activities with possible sources of funding will be submitted to Ministry.

CHAPTER-6
STRATEGIC OBJECTIVE-03
RISK COMMUNICATION

Engage communities to communicate the risks associated with Zika virus disease and promote healthy behaviours, reduce anxiety, address stigma, dispel rumours and resolve cultural misperceptions and engage in response activities

Public health risk communication: Information will be provided to key stakeholders in affected and non-affected populations, government, media, travelers and partners through systematically updated information related to the Zika virus and its complications in a format they can use and trust news and social media channels will be monitored and analyzed to identify audience concerns, knowledge gaps, rumours and misinformation. Messages will be tailored to specific audiences to ensure comprehensive guidance with special efforts made to reach excluded and the most at risk populations. Rumours and misinformation will be proactively identified and addressed.

Risk Communication and Coordination

Objectives of Risk Communication

- Aware individuals, family members and communities on risk related to Ades mosquito through increasing knowledge; and
- Promote risk preventive behaviours to practice.

Programme areas for risk communication

- Dengue prone and Dengue affected areas such as Divisional Head Quarters and Chittagong Hill Tracts.

Participants audience

There will be three types of participants audience; primary, secondary and tertiary.

Primary participant: Primary participants will be addressed directly to change behaviour and practices. They are

- Pregnant women
- All family members

Secondary participants: Secondary participants will disseminate messages, do counselling for prevention of Dengue, ZIKV, Chikungunya, Guillain Barre Syndrome through vector control. They are ;

- Front line workers of H&FW ministry;
- Community clinic health care providers;
- Community support groups;
- Religious leaders;
- Teachers; and
- NGOs.

Tertiary participants: Tertiary participants will support implementation and monitoring of the risk communication. Tertiary participants are;

- Union parishad;
- Upazila parishad; and
- Upazila and district level health officials and health education officers.

Message development:

- A rapid assessment needs to be done on knowledge, attitude and practices of community people on planned intervention areas and messages will be developed based on the findings.
- Broader areas of messages may be; (i) name and risks of diseases those spread through Aedes mosquito (ii) How diseases spread? (iii) How to prevent?

Interventions

- Capacity strengthening of gynaecologist (public and private practitioners), front line health family welfare workers, community clinic health care providers, and NGO sector health workers;
- Counselling at health facilities (community, union, upazila, district hospitals, private and NGO clinics);
- Counselling at communities by frontline workers; and
- Disseminate messages to travelers at airport, landport and sea port

Channel of communication

- Community radio
- Mass media: TV (public and private), Radio (public and private),
- Inter personal communication
- Local Media: Interactive Theatre, interactive film show, folk songs
- Outdoor media: bill board, poster, leaflet.

CHAPTER: 7
STRATEGIC OBJECTIVE- 04
COORDINATION

To establish multisectoral collaboration for planning, coordination and implementation of ZIKV prevention and control program, a coordinated response of partners across sectors and services at the global, regional and national levels is required.

As the scale of the epidemic grows to include new divisions and districts and the range of response activities increases - additional coordination mechanisms will be required. These mechanisms will need to cover a range of international and national response activities, including other partners and stakeholders such as the WHO, UNICEF, UN agencies, public health research partners, national and international NGOs. CDC will work closely with all partners and the UN agencies and NGOs to ensure coordination mechanisms with existing response systems. To ensure effective coordination between partners and stakeholders at national and international level, CDC will work in collaboration with DGHS and Ministry of Health and Family Welfare Committees at the National Divisional, District and Upazila level, as required. These commenrates ensure regular communication among themselves and different levels and close ratio coordination with partners across all sectors and services at all levels.

NATIONAL COMMITTEES

Existing National Committees to response against Public Health Emergency of International Concern (PHEIC) for ZIKA as per IHR 2005. Prevention and Control of ZIKV infection requires integrated and well-coordinated efforts among stakeholders at different levels in both public and private sectors. WHO declared PHEIC on 1st February, 2016 due to spreading Zika infection and its relation with neurological conditions and birth anomalies. For planning and coordination of activities, committees which were formed for IHR implementation will act as default lead of ZIKV Prevention and Control program. The committees with their respective terms of reference (TOR) are given below:

A. IHR National Coordination Committee:

Members (Not according to warrant of precedence):

1. Secretary, Ministry of Health and Family Welfare (MoH&FW), Chairperson
2. Director General of Health Services, Co- Chairperson
3. Director General, DLS
4. Director General, BLRI
5. Director General, Dept. of Environment
6. Director General, Dept. of Agriculture Extension
7. Chairman, Bangladesh Atomic Energy Commission (BAEC)
8. Chairman, BCSIR
9. Chairman, Civil Aviation Authority
10. Joint Secretary (PH and WHO), MoH&FW
11. Joint Secretary (Livestock and Administration), Ministry of Livestock and Fisheries
12. Joint Secretary (Concern), Ministry of Agriculture
13. Joint Secretary (Concern), Ministry of Shipping
14. Joint Secretary (Concern), Ministry of Forest and Environment
15. Joint Secretary (Concern), Ministry of Defense
16. Joint Secretary (Concern), Ministry of Home Affairs
17. Joint Secretary (Concern), Ministry of Civil Aviation
18. Joint Secretary (Concern), Ministry of Science and Technology
19. Joint Secretary (Concern), Ministry of Law and Parliamentary Affairs
20. Joint Secretary (Concern), Ministry of Communication
21. Joint Secretary (Concern), Ministry of Information
22. Joint Secretary (Concern), Ministry of Foreign Affairs
23. Joint Secretary (Concern), Ministry of Finance
24. Director, Bangladesh Standard Testing Institute (BSTI)

25. Director, Institute of Epidemiology, Disease Control and Research (IEDCR)
26. WHO IHR Focal Point
27. Representative of FAO
28. Director (Disaster Control) and Line Director, CDC, DGHS, National Focal Point-IHR, Bangladesh, Member-Secretary

Terms of reference:

1. Approval of the Strategy, Action Plan And Guideline for implementation of IHR (2005)
2. Decision on proposals sent by IHR National Technical Committee
3. Monitoring and evaluation of implementation status of IHR (2005)
4. Meeting in every six months and at shorter intervals when required
5. Co-opt member(s) if and when necessary

B. IHR National Technical Committee:

Members (Not according to warrant of precedence):

1. Director General of Health Service, Chairperson
2. Director, Disease Control and National Focal Point, IHR (2005), DGHS, Co-Chairperson
3. Director, IECDR
4. CVO/ Director (Animal Health and Administration), DLS
5. Director, IPH
6. Chief, Health Education Bureau, DGHS
7. Chief Health Officer, Dhaka City Corporation
8. DMS, Director General Medical Services, Ministry of Defense
9. Director, Dept. of Environment
10. Director, Dept. of Agriculture
11. Director, Civil Aviation
12. Director, Dept. of Shipping
13. Director, Immigration and Passport
14. Director, BAEC
15. Director, BSTI
16. Director/ Lab in-charge, NRL-AI, BLRI, Savar, Dhaka
17. Chief Scientific Officer, Virology, IEDCR
18. Airport Health Officer, Hazrat Shahjalal International Airport, Dhaka
19. Representative, Red Crescent Society, Bangladesh
20. Representative, FAO
21. NPO (Epidemiology) and IHR Focal Point, WHO
22. Senior National Consultant (IHR), WHO
23. Program Manager, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS

24. Deputy Program Manager, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS
25. Senior Advisor, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS

Terms of Reference:

1. Review of Action Plans, Strategy, Guidelines for Implementation of IHR (2005) and send for approval to IHR National Coordination Committee
2. Implementation of respective section of the Action Plan
3. Review and approve budgets for the different activities outlined in Action Plan needed for implementation of IHR (2005)
4. Coordinate with other directorates and sectors involved in the Action Plan
5. Monitor and evaluate implementation status of IHR 2005
6. Meet every 6 months and when the country situation requires
7. Co-opt member(s) if and when necessary

C. IHR Core Committee at DGHS:

Members (Not according to warrant of precedence):

1. Director, Disease Control, DGHS, National Focal Point, IHR (2005) - Chairperson
2. Director, IEDCR - Co Chairperson
3. Deputy Director, CDC, DGHS
4. Assistant Director (Animal Health and Administration), DLS
5. Chief Scientific Officer, Epidemiology, IEDCR
6. Chief Scientific Officer, Virology, IEDCR
7. Chief Scientific Officer, Epidemiology, IEDCR
8. Principal Scientific Officer, Medical Social Science, IEDCR
9. Assigned Health Officer for PoEs (AHO/PHO/UHFPO of adjacent UHC)
10. In-charge, Control Room, DGHS
11. NPO (Epidemiology) and IHR Focal Point, WHO
12. Deputy Program Manager, IM, DM Advisor, Member Secretary
13. Program Manager, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS
14. Deputy Program Manager, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS
15. Senior Advisor, IHR, Migration Health & Emerging Re-emerging Disease Control Programme, Disease Control Unit (CDC), DGHS

Terms of Reference:

1. Develop Action Plans, Strategy, Guidelines for implementation of IHR (2005)
2. Prepare budgets for the different activities outlined in Action Plan needed for implementation of IHR (2005)
3. Coordinate with other Directorates and sectors involved in the Action Plan
4. Meet quarterly and when required
5. Co-opt member(s) if and when necessary.

D. Rapid Respons Team (RRT):

A. National Rapid Response Team (NRRT)

B. District Rapid Response Team (DRRT)

C. Upazila Rapid Response Team (URRT)

A) National Rapid Response Team (NRRT) : Health Members (not according to warrant of procedure): The NRRT consists of members from different departments of IEDCR and partner institutes with Director of IEDCR as Convener and one senior officer of IEDCR as Member Secretary. Director, IEDCR (Convener)

CEO, Epidemiology, IEDCR (Member Secretary)

Members

1. PSO, Epidemiology, IEDCR
2. PSO, Microbiology, IEDCR
3. PSO, Virology, IEDCR
4. PSO, Parasitology, IEDCR
5. PSO, Entomology, IEDCR
6. PSO, Medical Sociology, IEDCR
7. PSO, Biostatistics, IEDCR
8. PSO, Zoonosis, IEDCR
9. Clinician (Medicine, Pediatrics, and Psychiatry)/relevant personnel from other partner institutions/sectors (when and where needed).
10. DPM IHR, CDC, DGHS
11. In-charge, Control Room, DGHS

Terms of References:

1. Surveillance for Zika virus
2. Conduct outbreak investigation of Zika virus
3. Surveillance of high risk group
4. Send specimen to reference laboratories when necessary
5. Undertake risk communication strategy and dissemination
6. Conduct research related to outbreak
7. Provide technical support to National Technical Committee
8. Co-opt members when necessary

B). District Rapid Response Team (DRRT) Health

1. Civil Surgeon (Convener)
2. Director/ Superintendent of other government hospital (if present)
3. Deputy Civil Surgeon
4. Medical Officer, CS office
5. RMO
6. Medicine Consultant
7. Paediatric Consultant
8. Pathology Consultant
9. Upazila Health & Family Planning Officer (Sadar)
10. Surveillance Medical Officer
11. District Immunization Medical Officer (DIMO)
12. Public Health Nurse
13. Chief Laboratory Technician

Term of Reference:

1. Investigation for suspected Zika virus
2. Monitoring of high risk group surveillance
3. Prepare district hospital for patient management
4. Provide technical support to District multisectoral Coordination Committee

C) Upazila Rapid Response Team (URRT)

1. Upazila Health & Family Planning Officer (UHFPO) (Convener)
2. Resident Medical Officer (RMO)

3. Medical Officer Disease Control (member secretary)
4. Consultant, Medicine
5. Consultant, Pediatrics
6. Nursing Supervisor

Terms of Reference:

1. Investigation for suspected Avian Influenza patient
2. Monitoring the High Risk group surveillance
3. Provide technical support to Upazila Multisectoral Coordination Committee

CHAPTER-8
STRATEGIC OBJECTIVE-05
CARE AND SUPPORT

Strengthen health and social systems and other relevant stakeholders at the national and community levels to provide appropriate services and support to individuals, families and communities affected by Zika. Recent pandemic of Corona virus (COVID-19) have highlighted that Health Systems when on acute outbreak can have devastating effects at both the local and global levels. As the world battles the pandemic, the importance of preparedness and strengthening health system's response to Zika and future outbreaks becomes even more critical.

CLINICAL MANIFESTATIONS OF ZIKA INFECTION :

Zika Virus Disease (ZVD) is a mosquito-borne (Aedes) viral disease caused by Zika virus (ZIKV). It presents as mild fever, rash (mostly maculopapular), headache, arthralgia, myalgia, asthenia, and non-purulent conjunctivitis, occurring about two to seven days after the bite of the infected mosquito. About 80% of the persons who are infected with Zika virus are asymptomatic. The illness is usually mild ,may last between 2-7 days; symptoms resolve within two to seven days. Immunity to reinfection occurs following primary infection. Severe disease requiring hospitalization is uncommon, and case fatality rates are low. Its clinical manifestation is often similar to Dengue and Chikungunya fever, also spread by the same vector.

Symptoms and Signs

Adults-

Symptoms and signs of Zika virus infection typically include acute onset of low-grade fever (37.8 to 38.5°C), macular or papular rash (90% of patients), rash is generally pruritic. Arthritis (65%) or arthralgia (notably the small joints of hands and feet), nonpurulent conjunctivitis (55%), myalgia (48%), headache (45%), retro-orbital pain (39%), edema (19%), and vomiting (10%). Other symptoms that have been noted in association with acute infection include hematospermia, swelling of the hands and ankles, and subcutaneous bleeding. Less commonly observed symptoms and signs include abdominal pain, nausea, diarrhea, and mucous membrane ulcerations. Thrombocytopenia, facial puffiness, palatal petechiae, uveitis, and desquamating rash of the palms and soles have been described in case reports.

Children - The range of Zika virus infection in children includes intrauterine infection (vertical transmission during pregnancy), intrapartum infection (vertical transmission at the time of delivery), and postnatal infection (transmission via mosquito bites). Clinical manifestations in infants and children with postnatal infection are similar to the findings seen in adults with Zika virus infection. Arthralgia is difficult to detect in infants and young children and may manifest as irritability, walking with a limp, difficulty moving or refusing to move an extremity, pain on palpation, or pain with active or passive movement of the affected joint. Thus far, no developmental complications have been observed in otherwise healthy children with postnatal Zika virus infection.

Suspect Zika virus infection in those who have any of the following symptoms and relevant travel history:

- Low grade fever
- Arthralgia
- Maculopapular rash (sometimes itchy)
- Conjunctivitis
- Headache
- Myalgia
- Eye pain

Congenital Zika Virus Syndrome:

Depending on the timing of insult, microcephaly may be present at birth (congenital) or may develop postnatally (acquired).

In addition to congenital microcephaly, a range of manifestations including craniofacial disproportion, spasticity, seizures, irritability, brainstem dysfunction such as swallowing problems, limb contractures, hearing and ocular abnormalities, and brain anomalies detected by neuroimaging have been reported among neonates where there has been in utero exposure to Zika virus.

The risk of Zika virus infection to a developing fetus is not fully understood. The recent rise in such infections has coincided with an apparent increase in birth defects predominantly microcephaly but also ventriculomegaly, cell migration abnormalities, congenital contractures, stillbirth, and neonatal death.

DIFFERENTIAL DIAGNOSIS:

The differential diagnosis of Zika virus infection includes:

- **Dengue fever**- Dengue virus and Zika virus infections have similar clinical manifestations and are transmitted by the same mosquito vector. However, dengue infection usually presents with high fever, severe muscle pain, and headache and may also be associated with hemorrhage; unlike Zika infection, dengue is typically not associated with conjunctivitis. Coinfection with Zika, Chikungunya, and Dengue viruses has been described.
- **Chikungunya virus and Zika virus-** cause similar symptoms and signs and are transmitted by the same mosquito vector. However, Chikungunya usually presents with high fever and intense joint pain affecting the hands, feet, knees, and back; unlike Zika infection, Chikungunya is typically not associated with conjunctivitis. Chikungunya infection can be disabling, causing patients to bend over such that they cannot walk, and infected individuals may be unable to perform simple manual tasks. Coinfection with Zika, Chikungunya, and Dengue viruses has been described.
- **Parvovirus-** Parvovirus infection can present with acute and symmetric arthritis or arthralgia, most frequently involving the small joints of the hands, wrists, knees, and feet. Rash may or may not be present.

- **Rubella-** Clinical manifestations of rubella include low-grade fever and coryza. Macular rash begins on the face and spreads to the trunk, and arthritis and lymphadenopathy may be present.
- **Measles-** Clinical manifestations of measles include fever, cough, sore throat, coryza, conjunctivitis, and lymphadenitis. Koplik's spots may precede the generalized rash. The diagnosis is established via serology.
- **Leptospirosis-** Leptospirosis is characterized by fever, rigors, myalgia, conjunctival suffusion, and headache. Less common symptoms and signs include cough, nausea, vomiting, diarrhea, abdominal pain, and arthralgia. It may be distinguished from Zika virus infection by the presence of jaundice.
- **Malaria-** Malaria is characterized by fever, malaise, nausea, vomiting, abdominal pain, diarrhea, myalgia, and anemia.
- **Rickettsial infection-** Rickettsial infection with similar manifestations as Zika virus infection and is characterized by headache, fever, myalgia, solitary or multiple eschars with regional lymphadenopathy, and generalized rash.
- **Group A Streptococcus-** Clinical manifestations of Group A Streptococcus infection include fever, myalgia, cutaneous manifestations (cellulitis, fasciitis), pharyngitis, and shock.

DIAGNOSIS :

The diagnosis of Zika virus infection should be suspected in individuals with typical clinical manifestations and relevant epidemidogical exposure (residence in or travel to an area where mosquito-borne transmission of Zika virus infection has been reported, or unprotected sexual contact with a person who meets these criteria).

The Pan American Health Organization of WHO has issued a provisional case definition for suspected acute Zika virus infection, intended for use in countries with ongoing local transmission.

Case Definition :

Suspected Case

A person presenting with rash and/or fever and at least one of the following signs or symptoms:

- arthralgia; or
- arthritis; or
- conjunctivitis (non-purulent/hyperaemic).

Probable Case:

A suspected case with presence of IgM antibody against Zika virus and an epidemiological link.

Confirmed case:

A person with laboratory confirmation of recent Zika virus infection by:

presence of Zika virus RNA or antigen in serum or other samples (e.g. saliva, tissues, urine, whole blood); or

IgM antibody against ZIKV positive and PRNT90 for ZIKV with titer 20 and ZIKV PRNT 90 titer ratio 4 compared to other flaviviruses; and exclusion of other flaviviruses.

Complicated Zika virus infection:

Epidemiological link plus any one of the complications as mentioned below :

1. Epidemiological link as suggested by:
    a. travelling within the previous 2 weeks to an area with ongoing transmission; or
    b. living in an area with ongoing transmission.
2. Developed complications like
    a. GBS
    b. ADEM
    c. Other neurological / non-neurological manifestations

MANAGEMENT

Management of case:

- Symptomatic :

ZVD is usually relatively mild and requires no specific treatment. Supportive treatments are:

Get plenty of rest,

Drink plenty of fluids,

Receive symptomatic treatment with paracetamol for pain and fever,

Antihistamin for pruritic rash.

Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDS) should be avoided until dengue infection has been ruled out, to reduce the risk of hemorrhage. Aspirin should not be used in children with acute viral illness because of its association with Reye's Syndrome.

Psychosocial support for patients and families affected by Zika virus infection and associated.

If symptoms worsen, they should seek medical care and advice :

- Monitoring of treatment for early detection of complications like GBS; and
- Personal protection

Management of pregnant women:

All mothers should be asked about clinical signs and symptoms suggestive of Zika virus infection and/or laboratory confirmation of Zika virus infection during pregnancy, including when the possible infection occurred (first, mid or final trimester).

Management of neonate and infant:

- Neonates should have their head circumference measured in the first 24 hours of life. WHO Child Growth Standards for size at birth should be used to interpret measurements.
- In neonates with congenital microcephaly or in whom the head appears disproportionately small relative to the face(craniofacial disproportion), a full history, physical and neurological examination, including assessment of hearing and vision, should be performed in order to detect additional abnormalities potentially associated with Zika virus infection.
- In neonates with head circumference < -3 SD neuroimaging study like CT / MRI brain should be performed if there is no strong indication from clinical examination of a genetic or environmental cause of microcephaly. If CT or MRI are not available, cranial ultrasound can be performed if the anterior fontanelle is of adequate size.
- Serological testing for TORCH infections should be performed (unless excluded in the mother in pregnancy):

a. in neonates with congenital microcephaly, or

b. where the head is disproportionately small relative to the face, or

c. where Zika virus infection is suspected in the mother during pregnancy, or

d. any neurological signs or symptoms are present.

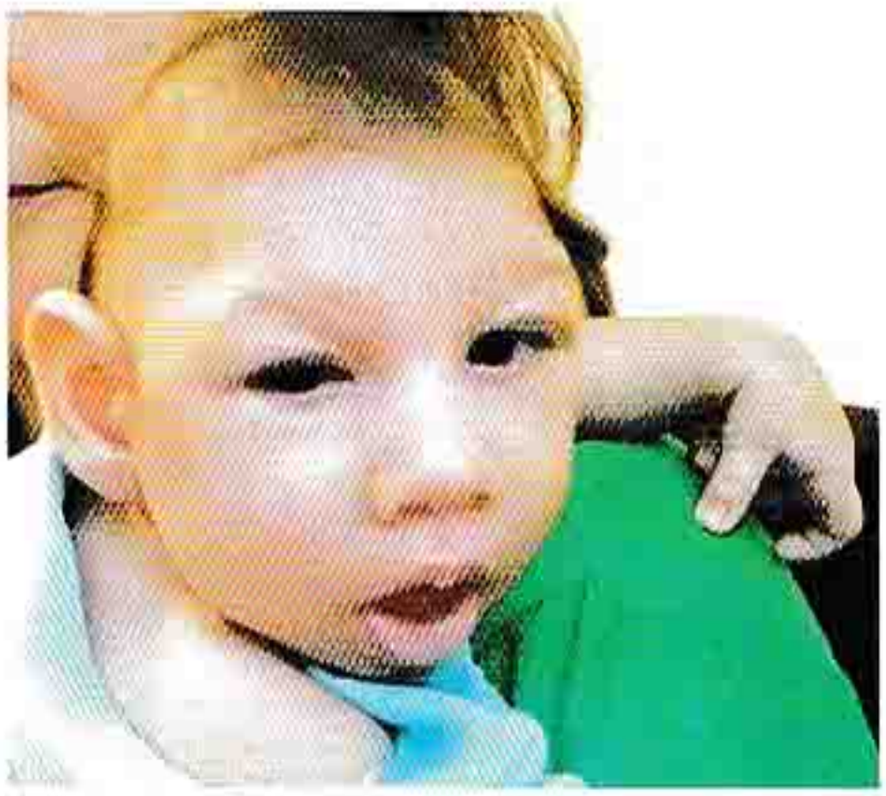
- Families of neonates with congenital Zika Syndrome should be informed about the diagnosis, and advised regarding management and prognosis.
- Psychosocial support and advice should be provided to families.

Infants with Congenital Zika Virus Syndrome

- Should receive a comprehensive neurodevelopmental assessment, and supportive therapy should be put in place for any difficulties noted. Multidisciplinary approaches should be adopted to provide early interventions and support to promote neurodevelopment, prevent contractures and manage early complications as outlined in WHO community-based rehabilitation guidelines.
- Infants with Congenital Zika Virus Syndrome should be followed-up at 1 month, 3 months, 6 months, 9 months, 12 months, 18 months and 24 months of age. Further follow-up beyond 24 months of age will be required depending on the child's condition and needs.
- At each visit, head circumference should be measured in order to monitor postnatal brain growth. Developmental and neurological assessments should be performed with the full engagement of caregivers to identify developmental delays and other neurological abnormalities including epilepsy and disorders of movement, posture and swallowing.

- Hearing should be screened in the first month of life as early as possible before discharge from hospital and further audiological evaluation and services should be provided as per the WHO guiding principles for newborn and infant hearing screening and the Position Statement from the Joint Committee on Infant Hearing.
- There should be comprehensive ophthalmological assessment.
- Infants born to mothers with suspected, probable or confirmed Zika virus infection during pregnancy, even without microcephaly or craniofacial disproportion should be followed-up to detect, manage and investigate signs of neurodevelopmental abnormality including feeding difficulties, hearing or vision problems and poor head growth. Follow-up visits should occur at 3 months, 9 months and 24 months of age as a minimum.

Complication: Zika virus infection has been associated with complications including congenital microcephaly and fetal losses among women infected during pregnancy. Neurologic complications are: Guillain-Barre Syndrome (GBS) findings from electrophysiological studies were compatible with the acute motor axonal neuropathy subtype of Guillain-Barre Syndrome. Brain ischemia, meningoencephalitis and acute myelitis complicating Zika virus infection also have been reported.



Adverse Fetal Outcomes

The full spectrum of fetal outcomes resulting from fetal Zika virus infection in humans is yet to be determined.

Microcephaly is a clinical finding of a small head size for gestational age and sex and is indicative of an underlying problem with the growth of the brain.

The lack of consistent and standardized case definitions has challenged the accurate monitoring of microcephaly during the current Zika virus outbreak.

Microcephaly can occur as a result of fetal brain disruption sequence, a process in which, after relatively normal brain development in early pregnancy, collapse of the fetal skull follows the destruction of fetal brain tissue.

Although previous case reports of maternal infection leading to fetal brain disruption sequence do not include information on the timing of maternal infection, some evidence indicates that this damage can occur late during the second trimester or even early in the third trimester.

Initial case reports from Brazil have suggested that some of the infants with microcephaly related to Zika virus infection have a phenotype consistent with fetal brain disruption.

Infants with Moderate or Severe Microcephaly associated with Maternal Zika Virus Infection, as compared with a Typical Newborn.

The findings of Zika virus RNA in the amniotic fluid of fetuses with microcephaly and in the brain tissue of fetuses and infants with microcephaly, as well as the high rates of microcephaly among infants born to mothers with proven antecedent acute Zika virus infection, provide strong evidence linking microcephaly to maternal Zika virus infection.

The greatest risk of microcephaly is in the first trimester.

In case reports of microcephaly, documented maternal Zika virus infection most often occurred between 7 and 13 weeks of gestation, but in some cases it occurred as late as at 18 weeks of gestation.

A preliminary report from Brazil indicated that fetal abnormalities detected by ultrasonography were present in 29% of women with Zika virus infection during pregnancy.

Early fetal loss and fetal deaths have been noted in association with maternal infection that occurred between 6 and 32 weeks of gestation.

Ocular anomalies have been reported among infants with microcephaly.

The most common ocular abnormalities were focal pigment mottling, chorioretinal atrophy, and optic-nerve abnormalities (hypoplasia and severe cupping of the optic disk). Other ocular manifestations in this and other case studies have included foveal reflex loss, macular neuroretinal atrophy, lens subluxation, and iris coloboma.

Whether ocular manifestations occur after congenital Zika virus infection in infants without microcephaly remains unknown.

CHAPTER-9
STRATEGIC OBJECTIVE 06
INTEGRATED VECTOR MANAGEMENT

Increase efforts to control the spread of the Aedes mosquito as well as provide access to personal protection measures.

Vector control: Existing vector surveillance will be intensified in the context of Integrated Vector Management (IVM). Enhanced surveillance and control measures will be implemented in places where Aedes mosquitoes might expand, including intensification of existing control measures at breeding sites, source reduction and adult control measures. Vector surveillance and control will be strengthened in all border areas and at points of entry. Insecticide resistance will be assessed and advice will be provided on the use of insecticides. Surveillance and vector control measures developed for Dengue and Chikungunya program provides the basis for adequate preparation against Zika virus, because these viruses are transmitted by the Aedes mosquitoes.

Vector Surveillance and Vector Control

Vector borne diseases impose a heavy burden on human populations, particularly in developing countries. Besides the human suffering vector borne diseases are also a significant obstacle to socio-economic development.

Vector control is an important component of the prevention and management of vector borne diseases. Well-planned and well-targeted vector control can reduce or interrupt transmission of diseases.

A. Institution and Focal Point: Institution and a centre and regional focal point /s should be identified to coordinate vector surveillance and vector control programme.

B. Capacity Building : Training Logistics, Operational Research.

C.: Vector Surveillance

Aedes aegypti, is the vector & Zika infection. Zika virus transmission in surveillance for vector mosquito is important in determining the related factors in order to prioritize areas by GIS mapping and seasons for vector control.

i) Larval Surveillance: It is a very important componet of the prevention and control

strategy and should be undertaken at regular intervals. Indices used to assess the larval and pupal infestation rate are House Index (HI), Container Index (CI), Breteau Index (BI), and Pupal Index (PI)

ii) Ovi position trape: Ovi trape should be used to detect the presence of Aedes mosquito where and when the population density of that mosquito is low and larval surveys are unproductive.

D. Integrated Vector Management (IVM):

* Environmental management for source reduction:

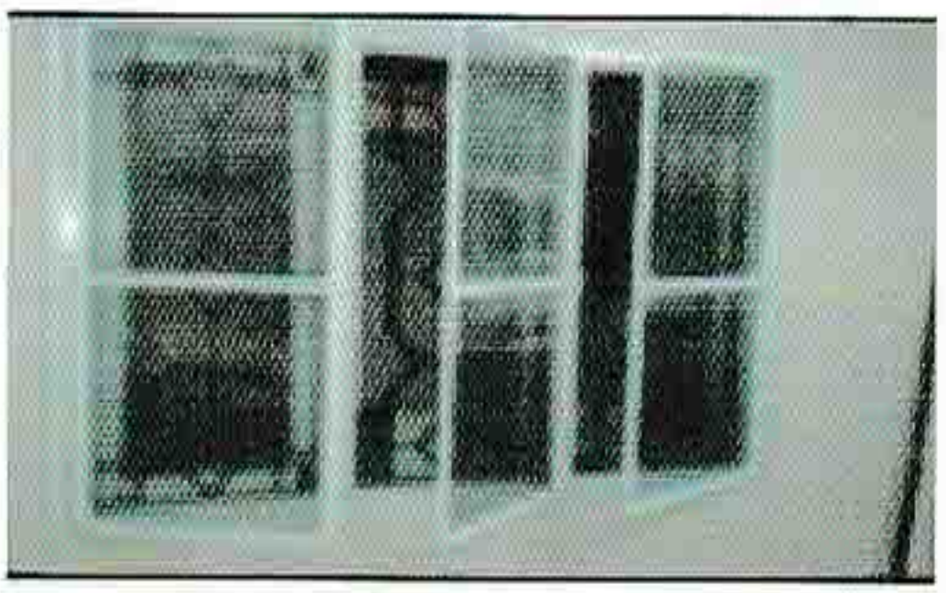
i) Environmental modification: Physical transformation of land water and vegetation to reduce vector habitats without causing any adverse effects on the environment.

ii) Improve water supply: It is essential that portable water supplies are delivered in sufficient quantity, quality and consistancy to reduce the necessity and use of water storage containers that serve as the most productive aedes larval habitat.

iii) Mosquito proffing of overhead tanks or underground reservoirs:

*** Environmental Manipulation:** Activities aimed at producing temporary changes in vector habitats that involve the management of essential and non-essential containers, and management or removal of natural breeding sites.

i) Covering : Domestic water storage containers should be covered with tightly fitting lids or screens and care should be taken to replace them after water is used.



ii) Cleaning flower pots/ vases and ant-traps :

Cleaning incidental water collections: Water accummulated from airconditioners, refrigerators should be regularly inspected, drained and cleaned.

iii) Managing construction sites and building exteriors: Water storage facilities at construction sites should be mosquito proof. The design of buildings is important to prevent aedes breeding.

iv) Managing discarded receptacles: Discarded receptacles namely tins, bottles, glass bottle, cans, buckets, plastic cup, coconut shell, tyres and other waste materials should be disposed of properly.

* Personal protection:

i) Mats, Coil, Aerosols: Household insecticidal products namely, mosquito coil, aerosol, electric vaporizer, mats and chemical repellents (DEET), natural repellents (citronella oil, lemon grass oil, neem oil) should be used for personal protection.

ii) Insecticide treated materials: Insecticide treated mosquito nets (ITNs) and LLIN have limited utility in Aedes control programmes since the vector species bites during day time. However nets can be used to protect infants and hospital setup, specially for pregnant women and women of child bearing age.

iii) Protective clothing: Clothing reduces the risk of mosquito bite. If the cloth material is sufficiently thick or loosely fitting and full sleeved.

iv) Lethal Ovi position Trape: Lethal ovitrap can be introduced in and around the houses to kill adult vector mosquitoes.

d) Chemical control: Application of chemical insecticides that kill adult mosquitoes (indoor residual spray) and larvae, along with removing breeding sites, can be done.

e) Legislation: Legislation support is essential for the success of Aedes control programme.

* Mass awareness:

Public education/awareness campaign should be taken, includes information not just on vector, breeding site, vector resting place, personal protection measures, but also how citizens may reduce or eliminate breeding sites for Aedes and to motivate the community to remove and dispose of any water holding containers. The special awareness programme should be conducted for pregnant women and girls of reproductive age.

Mass media can play an important role in public awareness programme.

CHAPTER-10

References

1. World Health Organization. Countries and territories with current or previous Zika virus transmission. Updated July2019. Accessible at: https://www.who.int/emergencies/diseases/zika/countries-with-zika-and-vectors-table.pdf

2. WHO Region of the Americas/Pan American Health Organization. PLISA Health Information Platform for the Americas: Cases of Zika virus disease, by country or territory. Accessible at: http://www.paho.org/data/index.php/en/mnu-topics/zika/524-zika-weekly-en.html

3. Sasmono RT, Dhenni R, Yohan B, et al. Zika virus seropositivity in 1-4-year-old children, Indonesia, 2014. Emerg Infect Dis2018;24(9):1740-3. doi:10.3201/eid2409.180582.Accessible at: https://wwwnc.cdc.gov/eid/article/24/9/18-0582_article

4. Pastorino B, Sengvilaipaseuth O, Chanthongthip A, et al. LowZika virus seroprevalence in Vientiane, Laos, 2003-2015.Am J Trop Med Hyg2019 Mar;100(3):639-642. Accessible at: http://www.ajtmh.org/docserver/fulltext/14761645/100/3/tpmd180439.pdf?expires=1553552085&id=id&accname=guest&checksum=0F159ED83E9C3C8CC939A55FAF31147A

5. World Health Organization. Zika virus infection: India, 2 November 2018. Accessible at: https://www.who.int/emergencies/diseases/zika/india-november-2018/en/

6. World Health Organization Regional Office for Africa. Microcephaly -suspected congenital Zika syndrome, Angola. Weekly Bulletin on Outbreaks and Other Emergencies; Week48: 25 November-1 December 2017. Accessible at: https://apps.who.int/iris/bitstream/handle/10665/259557/OEW48-2504122017.pdf?sequence=1

7. Sassetti M, Zé-Zé L, Franco J, et al. First case of confirmed congenital Zika syndrome in continental Africa.Trans R Soc Trop Med Hyg2018;112(10):458-462.

8. Hill S, Vasconcelos J, Neto Z, et al.Emergence of the Zika virus Asian lineage in Angola. Lancet Inf Dis2019, in press. Accessible at: https://www.biorxiv.org/content/10.1101/520437v1

9. Sassetti M, Zé-Zé L, Franco J, et al. First case of confirmed congenital Zika syndrome in continental Africa.Trans R Soc Trop Med Hyg2018;112(10):458-462.

10. Wongsurawat T, Athipanyasilp N, Jenjaroenpun P, et al. Case of microcephaly after congenital infection with Asian lineage Zika virus, Thailand. Emerg Infect Dis2018;24(9). Accessible at: https://wwwnc.cdc.gov/eid/article/24/9/18-0416_article

11. Lan PT, Quang LC, Huong VTQ, et al. Fetal Zika virus infection in Vietnam. PLOS Curr Outbr2017;Edition 1. doi: 20. 1371/currents.outbreaks.1c8f631e0ef8cd7777d639eba48647fa.Accessible at: http://currents.plos.org/outbreaks/article/obk-17-0016-fetal-zika-virus-infection-in-viet

12. Moi ML, Nguyen TTT, Nguyen CT, et al. Zika virus infection and microcephaly inVietnam. Lancet Inf Dis2017;17(8):8055-6. Accessible at: https://www.thelancet.com/journals/laninf/article/PIIS1473-3099%2817%2930412-7/fulltext

13. Metsky HC, Matranga CB, Wohl S, et al. Zika virus evolution and spread in the Americas. Nature2017;546(7658):411-4

14. Musso D, Gubler DJ. 2016. Zika virus. ClinMicrobiol Rev2016;29:487-524. Accessible at: https://cmr.asm.org/content/29/3/487.long

15. Pettersson JH, Bohlin J, Dupont-Rouzeyrol M, et al. Re-visiting the evolution, dispersal and epidemiology of Zika virus in Asia.Emerg Microbes Infect2018;7(1):79.

16. Liu ZY, Shi WF, Qin CF. The evolution of Zika virus from Asia to the Americas. Nat Rev Microbiol2019;17(3):131-139.10

17. Hu T, Li J, Carr MJ, Duchêne S, Shi W. The Asian lineage of Zika virus: transmission and evolution in Asia and the Americas.VirolSin2019;34(1):1-8.

18. Yadav PD, Malhotra B, Sapkal G, et al. Zika virus outbreak in Rajasthan, India in 2018 was caused by a virus endemic to Asia.Infect Genet Evol2019;69:199-202.

19. Duggal NK, Ritter JM, McDonald EM et al. Differential neurovirulence of African and Asian genotype Zika virus isolates in outbred immunocompetent mice. Am J Trop Med Hyg2017;97(5):1410-17. doi:10.4269.ajtmh.17-0263.

20. Badolo A, Burt F, Daniel S, et al. Third Tofo Advanced Study Week on Emerging and Re-emerging Viruses, 2018. Antiviral Res2019;162:142-150.

21. Lanciotti RS, Kosoy OL, Laven JJ, et al. Genetic and serologic properties of Zika virus associated with an epidemic, Yap State, Micronesia, 2007. Emerg Infect Dis2008;14(8):1232-9.Accessible at: https://wwwnc.cdc.gov/eid/article/14/8/08-0287_article

22. Santiago GA, Vázquez J, Courtney S, et al. Performance of the Trioplex real-time RT-PCR assay for detection of Zika, dengue, and chikungunya viruses. Nat Commun2018;9(1):1391. Accessible at: https://www.nature.com/articles/s41467-018-03772-1

23. Stettler K, Beltramello M, Espinosa DA, et al. Specificity, cross-reactivity, and function of antibodies elicited by Zika virus infection. Science2016;353:823-8

Note

Note

Note