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Review Article

ASSESSMENT OF PROGRAMS TO CONTROL THE ENDEMIC DENGUE FEVER: A LITERATURE REVIEW

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Abstract: *Dengue hemorrhagic fever (DHF) is a contagious ailment which is ambiguous to manage, in particular, in tropical countries. Social capital is the term used to develop the entire communities' capability to work and coordinate mutually to resolve a communal health dilemma. The incidence of dengue fever can be minimized by raising self-awareness amongst the community about the impact of the disease via social capital which is built on trust, cooperation and mutual teamwork, and can facilitate increasing public understanding and awareness. Community-based dengue fever control programs have been executed in numerous countries to avert the spread of dengue fever. The echelon of triumph and efficacy of community-based dengue fever control programs rely on the capacity of the community to eagerly recognize and pertain projects. Programs should be designed to increase awareness about prevention and transmission of dengue fever vectors on the individual level. A core reason was the failure to involve and activate of all the community social capital, a lack of freedom for the involvement of community, and vague strategies on related areas implicated in community-based dengue fever control program activities, in this manner, affecting their enduring sustainability and efficacy.*

Introduction

Dengue fever is one of the major problems regarding public health faced by countries in Southeast Asia and is inclined to increase in the future. Despite the 2013epidemics, numerous studies have shown that it is not a broadly recognized disease and is insufficiently reported. Furthermore, budget specified for its preventive measures has also been observed to be insufficient. For the very first time, Surabaya and Jakartahad denounced the dengue epidemic in 1968., and in thefollowing years, dengue fever befitted as an epidemicoccurring every year (Kroeger, 2000). Since January 2015, according to the Health Department of the province of East Java, there has been a reported increase of 85.4% in dengue cases as compared to the previous year in the same month and duration (Aryati et al., 2020). In year2008, most cases of dengue were reported in Sawahan (159 cases), followed by Semampir (140 cases) and Tandes (134 cases). It is believed that social capital increases the collective capacity to solve community health problems (Boix and Posner, 1998). Social capital is the basis of community empowerment and the development of community aptitude (Ansari et al., 2012). Most community programs related to dengue fever control and prevention involve community participation, mobilization of community resources, inter-sectoral alliance among diverse sponsors and community capacity building. In areas with health problems, insufficiency of resources and lack of information, social capital serves as a key tool. The social capital concept (SCC) is related directly to the community health role and functionality in the provision of health programs through the influence ofsocial capital in the creation of community capacities and collective action and empowerment (Pronyk et al., 2008). Many studies have argued that people's participation and contribution are crucial in a range of networks, thereby, enlightening that social capital could assist in their communal action (Fukuyama,

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2000). Rendering to the preliminary evaluation in Sawahan, dengue fever control and prevention have been divided into three levels, viz. the individual, neighborhood and community/inter-sectoral levels. These levels may divulge different facets of the management of dengue fever.

DENGUE FEVER

Dengue virus, a member of the flavivirus genus of the Flaviviridae family, is a virus transmitted by arthropods and comprises four (DEN-1, DEN-2, DEN- 3 and DEN-4) serotypes (Mackenzie et al., 2004). The WHO (World Health Organization) deliberates dengue to be a worldwide public health problem in tropical as well as subtropical countries. There has been a reported 30-fold rise in dengue fever from 1960 to 2010 because of the increased growth rate of population, inadvertent urbanization, inept control of mosquitoes, recurrent air journeys, global warming and the absence of medical assistance amenities. 500 million people belong to regions of endemic dengue and about 400 million are infected every year, with a death ratio of more than 5-20% (Joralemon, 2017; Kock and Caceres-Escobar, 2022; Monath and Vasconcelos, 2015; Organization et al., 2009). More than 100 countries are affected by this infection, including the USA (the United States of America) and Europe (de Martel et al., 2015). In 1780, the first case resembling dengue was reportedin Madras, India, while in 1963, the first virological outbreak demonstrating DF occurred in Calcutta and the East coast of India. The infection caused by dengue virus has a varied clinical picture, ranging from asymptomatic disease to serious disease, dengue hemorrhagic fever/dengue shock (DHF / DSS), and dengue syndrome (Organization et al., 2009). Oral mucosal involvement has been observed in 30% of patients, although oral characteristics are usually more linked to dengue hemorrhage fever as compared to dengue fever (Hasan et al., 2016). Due to the diverse clinical features, making an accurate diagnosis a hard nut to crack, thereby, laboratory test confirmation is necessary. As every patient's condition is different, anti-viral therapy regarding DF is currently not available. The preferred treatment strategy is supportive therapy with analgesics, hydration via fluid replacement and adequate rest.

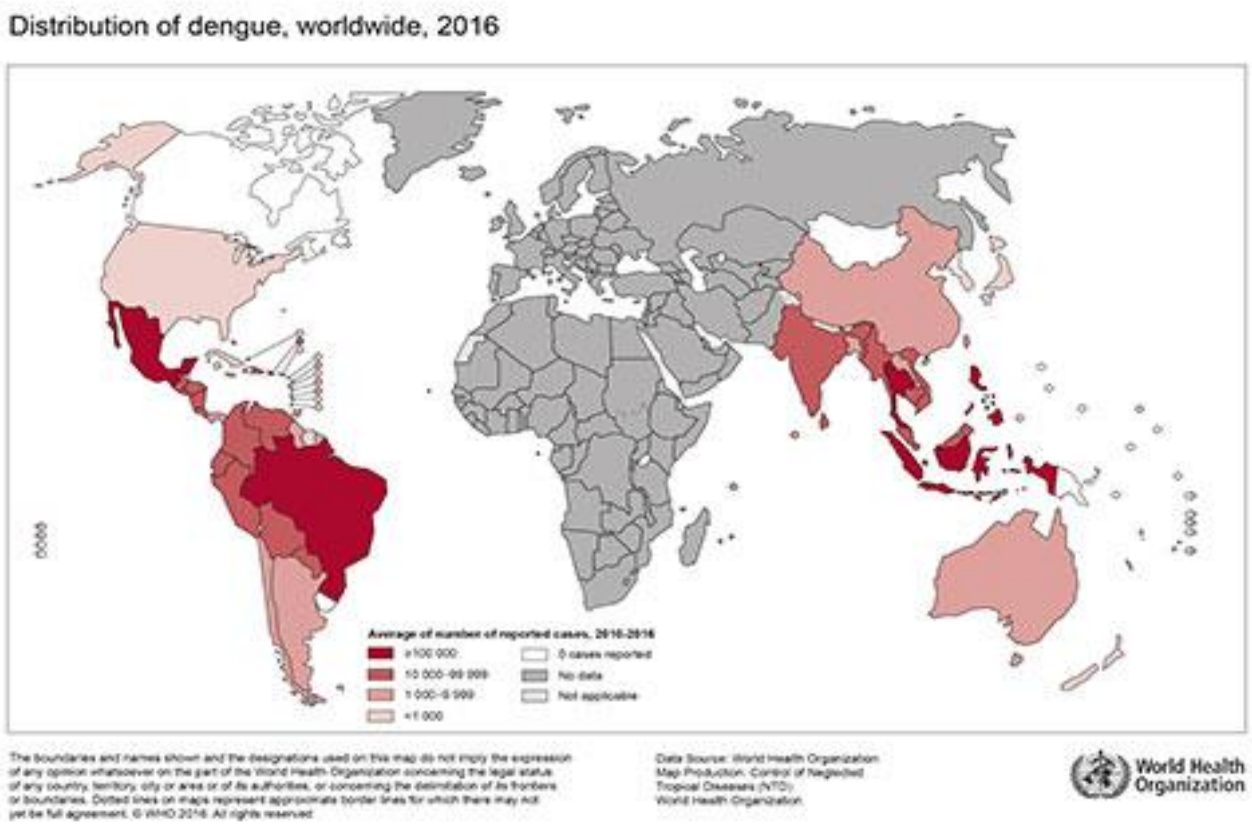

Figure 1: Dengue distribution worldwide (Source: WHO, 2016)

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PATHOGENESIS

Dengue fever infects all ages including infants, children, adults and older adults (Hammond et al., 2005). Spread among humans is usually caused by the Aedes Aegypti mosquito and it peaks during rainy seasons. The dengue virus can infect the host by: • Viral replication, mainly in macrophages. • Direct viral infection through skin. Immunological mechanism mediated by

Chemical substances persuaded by the host virus interface. After the bite of the infected mosquito, the virus enters the host organism via the skin. Humoral as well as cellular immune responses are involved in the disease progression while the severe clinical signs arise after the prompt eradication of the host organism virus. Therefore, the most severe clinical presentation during the course of the infection is not related to a high viral load (Tan and Bujang,2013). The alterations of microvascular endothelial permeability and of the mechanisms of tromovellutation determine a greater loss of proteins and plasma. Different theories have suggested that the endothelial cell activation caused as the result of T cells, monocytes and various inflammatory molecules intercede the plasma loss. Thrombocytopenia may occur due to modifications in mega karyocytopoiesis that impair growth of infected human hematopoietic cells and committed progenitor cells. This results in platelet depletion as well as dysfunction and damage that could lead to extensive bleeding (Gibellini et al.,2013; Haurie et al., 1998).

GROUPING

Dengue fever has been categorized in two groups according to WHO known as simple and severe (Cordeiro et al., 2009). Severe cases are related to extreme bleeding, organ disturbances or severe plasma loss while the rest are included in simple category (Organization et al., 2009). Dengue disease was classified as undifferentiated fever, DF and DHF according to 1997 classification (Narvaez et al., 2011). Dengue hemorrhage fever is classified from grade I to grade IV based on severity. In grade I, only slight dents or a positive tourniquet test is reported. Extemporaneous bleeding on the skin and elsewhere is categorized in grade II, grade III includes the clinical signs of shock while grade IV, the most severe one, includes severe shock along with weak pulse and low blood pressure (Kabra et al., 1992).

CLINICAL MENIFESTATIONS

UNDIFFERENTIATED FEVER

Undifferentiated fever has been observed in primary infections but can also occur during the preliminary secondary infectious stage. At the clinical stage and early, it is nearly indistinguishable from other viral diseases.(Monathand Vasconcelos, 2015

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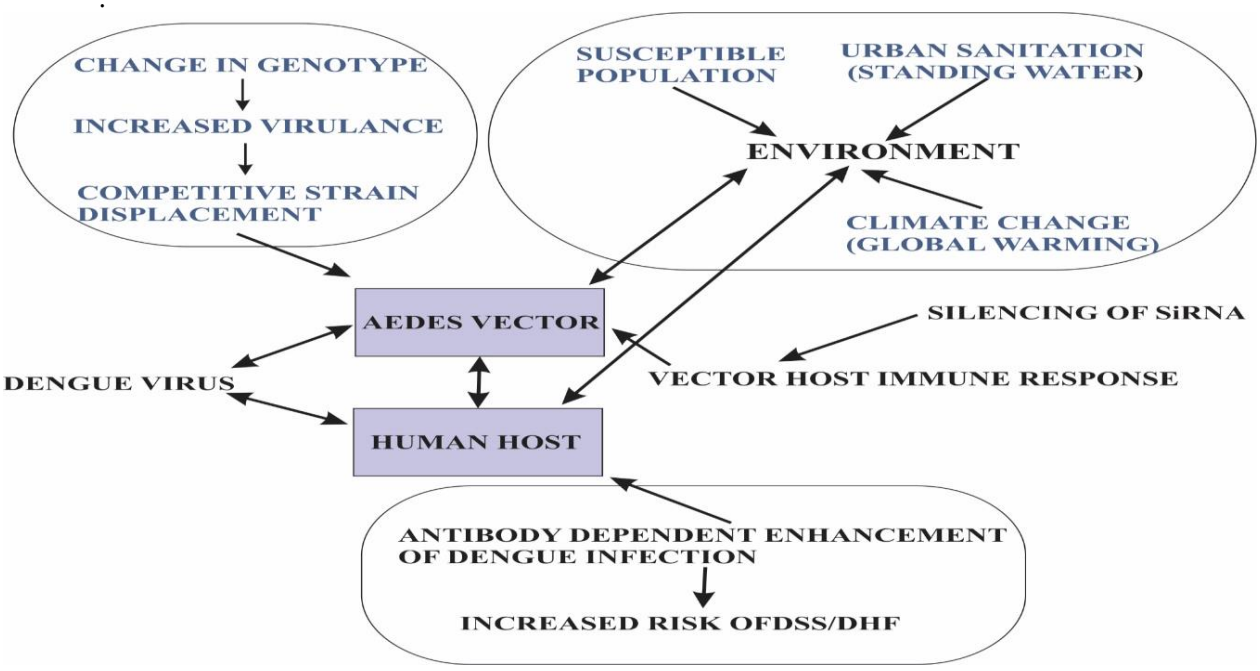

Figure 2: The transmission pathways of dengue virus

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DENGUE FEVER

The dengue fever may lead to primary as well as secondary infections and is mostly encountered by older children and adults. The symptoms at the onset of dengue fever may include headache, painful joints, myalgia, lassitude, loss of appetite, vomiting, diarrhea, stomachache and a high-grade fever that last for 3-7 days (Shastri and Taneja, 2021). There are approximately 50-82% cases with a peculiar cutaneous rash in patients diagnosed with dengue fever (Hasan et al., 2016). Capillary dilation may lead to an initial rash that triggers facial flushing and erythema and remains in the initial 1 to 2 days of fever. The second rash may present as morbilliform eruption or asymptomatic maculopapular rash which can be observed during first week of fever. Usually, the cutaneous rash is asymptomatic, as observed in approximately 17-27% of reports (Citil Dogan et al., 2017). Moreover, bleeding incidences such as gingival bleeding, gastrointestinal tract hemorrhage, epistaxis, and heavy menstruation are irregularly observed in dengue fever (Organization, 1997).

DENGUE HEMORRHAGIC FEVER (DHF)

This type of fever is observed at the stage of secondary dengue infection. In infants, this type may develop during primary infection that obtained dengue antibodies from their mother (Halstead, 1988). A diagnostic criterion has been recommended for dengue hemorrhage fever (DHF) that include various clinical parameters. Acute febrile phase, with a high-grade fever lasts for one week in dengue patients. Hemorrhagic episodes may include various complications (mucosal bleeding, epistaxis, purpura, petechial, ecchymosis, gastrointestinal tract infection, melena and hematemesis). While the laboratory parameters may include thrombocytopenia in which the platelet count is less than 100,000/cu mm, the bleeding episodes in dengue hemorrhagic fever are linked with multifactorial diseases such as impaired blood coagulation, vasculopathy and deficiency of platelets (Hasan et al., 2016). In DHF, the increased damage and decreased synthesis of platelets further leads to the progression of thrombocytopenia [30]. Moreover, dysfunction or deficiency of platelets is responsible for damage to blood vessels that leads to hemorrhage (Mitchell, 2005). The clinical manifestation of DHF is distinguished by three phases: convalescent, leakage and febrile. The high-grade fever during the initiation of disease along with the symptoms and facial erythema represents the commencement of febrile infection. Generally, the initial febrile infection is indicated by hemorrhagic tendencies and a morbilliform rash. The fever is severe for 3 days to 1 week and then drops to sub-normal levels. Moreover, various complications such as shock with pressure rate, ascites, pericardial effusions, cyanosis and hepatomegaly are seen patients that have increased plasma levels. Gastrointestinal bleeding, chronic ecchymosis, and epistaxis have been observed in few reports. In addition, erythema, bradycardia, pallor and petechial rashes may be noted during the dengue hemorrhagic fever (DHF) (Singhi et al., 2007).

DENGUE SHOCK SYNDROME

Dengue shock syndrome (DSS) is distinct from DHF. Narrow blood pressure greater than 20 mmHg, unstable pulse rate, cold, clammy skin, and circumoral cyanosis may be seen in DHF. On the other hand, multi-organ damage, intravascular coagulation and severe shocks are linked with dengue shock syndrome (DSS). The impaired shock remains for short duration in which the patients, mostly recover by supportive therapy (Hasan et al., 2016; Organization, 2011).

OROFACIAL FEATURES

Orofacial features are irregularly observed in dengue virus infection and are linked with dengue hemorrhagic fever. Various prominent oral features such as palatal vesicles, crusting of the lips and erythema may be seen. The study of Hasan et al, suggests that various hemorrhagic bullae may be seen at the membrane of sublingual mucous, surface of mouth, and floor of the tongue (Hasan et al., 2016). Furthermore, a brown colored plaque was detected at the surface of buccal mucosa which showed the spontaneous bleeding from the tongue and gums. Nasal bleeding, ecchymosis, petechial and purpura have also been observed in the dengue infected patients. The study of Mitra et al., (Dumézil, 1948) has also demonstrated inflamed tonsils, bleeding gums and hemorrhagic plaques in these patients. There might also be the rare occurrence of isolated hypoglossal nerve palsy in the following dengue infected patients. In addition, lymphadenopathy, taste variation and conjunctival redness have also been reporte**d.**

DIAGNOSIS OF DENGUE FEVER

Usually dengue infection can be diagnosed by the detection of antigens, antibodies or viral genomic RNA of dengue virus. The antigen identification test depends on the detection of non-structural protein 1 (NSI). Dengue viral NSI protein is released from the dengue-infected cells and then materialized into the

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bloodstream. ELISA-based serological testsare highly costly but are easy to perform for the detection of dengue virus. Vigilant attention is required during dengue fever in which the patient experiences a high fever from 1-2 weeks (Guha-Sapir and Schimmer, 2005). The laboratory examination of dengue fever suggested that dengue-infected patients have low levels of white blood cells, also called leukopenia, metabolic acidosis, and thrombocytopenia (low platelet counts). Moreover, dengue fever can also be diagnosed by microbiological laboratory. Most significant microbiological assays such as polymerase chain reacts ion (PCR) for nucleic acid expression, virus separation in cell culture and recognition of particular antibodies or viral antigens are included for dengue fever examination. Nucleic acid expression and viral isolation are believed to be high cost and precise diagnostic microbiological assays in the lab. Moreover, virus isolation is also believed to be one of the significant diagnostic methods to detect dengue infection. It can be replaced by Elisa's kit method and reverse-transcription polymerase chain reaction (RT-PCR) for the rapid identification. For the purpose of virus isolation, the blood sample is taken from patients that are cultured in a cell line of live mosquitoes and mammalian cells. The blood sample is taken from diseased patients (Jarman et al., 2011).

Table 1 Depicts the clinical conditions which imitate the critical and febrile phase of dengue infection.

Conditions that mimic the febrile phase of dengue infection	
Flu-like syndrome	Measles, Influenza, Chikungunya, HIV seroconversion illness, infectious mononucleosis
Illness along with a rash	Rubella, Measles, Scarlet fever, Meningococcal infection, drug reactions and Chikungunya
Diarrheal diseases	Rotavirus, other enteric infections
Illness with neurological manifestations	Meningoencephalitis febrile seizures
Conditions that mimic the critical phase of dengue infection	
Infections	Acute HIV, Viral hepatitis, typhus, leptospirosis, Acute gastroenteritis, Malaria, typhoid.
Malignancies	Acute leukemia and other malignancies
Miscellaneous conditions	Acute abdomen- Acute appendicitis Acute cholecystitis Perforated viscus Renal failure Lactic acidosis Diabetic ketoacidosis Kussmaul breathing (Respiratory distress) Leukopenia and thrombocytopenia, bleeding; Platelet disorders Systemic lupus erythematosus

TREATMENT OF DENGUE INFECTION

Currently, there is no antiviral drug available for the treatment of dengue infection. The treatment depends on the signs and symptoms of the disease, and it relies on supportive care. For uncomplicated cases of dengue fever, the patients are advised to take bed rest, paracetamol and oral rehydration. One of the most preferred therapies for the treatment of dengue infection are antipyretics, paracetamol and fluid replacement during febrile phase. Other non-steroidal anti-inflammatory drugs (NSAIDs) must be avoided. Moreover, judicious fluid management provides one of the strongest bases for dengue infection treatment. The most regularly used fluids for dengue treatment are Ringer's lactate, normal saline, diluted glucose, albumin and plasma substitutes (Rajapakse et al., 2012). Oral fluids are usually appropriate for most patients. Whereas intravenous fluids are employed for patients that have some other problems such as prostration, severe vomiting and shock. In addition, crystalloids are believed to be the first choice of intravenous fluid. On the other hand, for hypotensive

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patients, unresponsive to colloids, boluses of intravenous crystalloids are given. In that case, if patients remain in critical condition with decreased levels of platelets, then they can be managed by fresh whole blood transfusion.

SOCIAL CAPITAL

Social capital is broadly referred to as an effective functional social group that comprises of the following: a sense of identity, interpersonal relationship, shared values, reciprocity, trust, shared norms, shared understanding and cooperation. Basically, social capital is used to improve the diverse group performance, increase supply chain relations, evolution of communities, and the value originating from strategic association. This concept has become increasingly popular in the field of politics and social science (Vanolo, 2014). However, social capital is more important for the community. Several factors such as power sharing media, achieving togetherness, developing solidarity, community organization, as well as community resources deployment is strongly associated with social capital. In addition, it is a force which is capable of developing a civil community that can ultimately improve the participatory development. Therefore, the foundation of social capital is religion, trust and ideology. It can be distinguished by the individual's enthusiasm to give preference to community resolution. The study of Fukuyama suggested that social capital in the overtaken, believe and trust that explain the significance of trust rooted in morals and ethics. He has also stated that local network and organization are significantly involved in the development of economic welfare and environmental management (Wilson et al., 2006). The main purpose of social capital is to organize informal values between different members of the community group that provides the opportunities and cooperation among them. In common areas, the capability of social capital is significantly lower as compared to potential areas. Basically, endemic areas are extensively lower due to the condition of bringing up the social capital itself. In addition, social capital is the basic aspect in the synthesis of active position in society. However, it has also appeared as cognitive social capital and structural social capital. The other function of social capital is community participation in the state of the surrounding environment, particularly the communities experiencing dengue infection (Kasjono et al., 2016). Previous research work has suggested that cognitive social capital in society is in the form of reciprocity, trust and solidarity. Notably, social capital may lead to network, scope and structural composition. On the other hand, the structural social capital suggests the person's behavior with their activities, and cognitive social capital advocates social relationships among people. Therefore, it has been concluded that the public efforts may be predisposed for more success by linking methods and bridging of social capital (Bian and Leung, 2015).

ACCOUNTABLE FACTORS FOR RENAISSANCE OF DENGUE FEVER

There are certain factors that are responsible for a remarkable renaissance of widespread dengue fever in the declining years of 20th century (Joralemon, 2017). Changes in demographic and cultural issues including modern transportation, urbanization, and an increase in population has widely contributed to an increased prevalence and geographic spread of dengue fever. For instance, Gubler and Meltzer stated that increased prevalence of dengue fever in the past is greatly associated with the inclining population (Meltzer et al., 1998). This is compounded in common about the infectious diseases and vector-borne diseases in specific and shortage of resources related to public health research, observation, preclusion and programs associated with control measures. Rising epidemic activity caused by various virus serotypes augmented the genetic change rate in the viruses and thus increased the probability of the emergence of virus strains or genotypes with greater epidemic potential and virulence, dengue hemorrhage fever's important risk factor. In past two decades, some new geographical areas have reported new virus strains with increasing frequency, some of which lead to epidemic transmission while others have silent transmission (Gubler, 2002). This change in dengue virus transmission dynamics also raised the prospect of secondary dengue infectivity, another primary risk factor for dengue hemorrhage fever. More than 2.5 billion people are residents in the virus transmission regions. The disease is prevalent in areas of America, South-East Asia, the Eastern Mediterranean, the Western Pacific and Africa's tropical regions. Recent research reported that dengue's worldwide burden is of same magnitude as various other transmissible diseases including malaria, tuberculosis, and other sexually transmitted diseases, except HIV/AIDS. These diseases receive much greater political and financial support for their prevention and control than dengue (Renganathan et

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al., 2003). The origin of dengue occurrence comprises sustained and habitually unplanned urbanization, inappropriate municipal services including supply of water and disposal of solid waste, the growing rate and geographical viral transmission range carried via travel from continent to continent, the circulation of multiple strains and serotypes in one area, the adaptability of the vectors, the unrestrained production and use of non-biodegradable food and drink packaging, and drums and other water storage vessels that often become larval habitats; the importation of used tyres by developing countries at risk for dengue; and non-existent, inconsistent, or fragmented national programmes (Parks and Lloyd, 2004).

Up till now, there has been no particular medicine for the complete treatment of dengue. Although, some vaccines are under development that are effective against all four viruses, they are not ready for public health use. Yet then, it is probable that they will only balance rather than substitute existing measures. The primary Aedes control method is performed in many countries yet continues to be space spraying of insecticide for the control of adult mosquito. This technique must be repeated continuously and is highly expensive and its effectiveness is restricted (Baldacchino et al., 2015). The main habitat for AedesAegypti is the houses, so the aerial insecticides spraying simply do not reach the mosquitoes resting in hidden places such as cupboards. The potency of this intervention is reduced as many of the house owners refuse the household spraying teams' entry in their houses or tightly shut the windows and doors to avoid the entry of outdoor insecticidal fogs. Moreover, inappropriate dengue surveillance systems have spraying often too late to prevent epidemic transmission, and adult mosquito populations rapidly return after spraying (Esu et al., 2010). The trust of public and complacency in these ineffective approaches has only enhanced the challenge of explaining the community involvement need for the control of the habitats of mosquitos' larva.

SOCIO-ECONOMICAL AND PUBLIC HEALTH IMPACT OF DENGUE FEVER

A recent cross-sectional survey about the awareness of the level of knowledge, attitude and practices adopted by the patients and their families regarding the cure for dengue fever in rural communities has authenticated that the community knowledge was plead with epidemic outbreak of dengue fever (Vadivalagan et al., 2016). Another study has explored the linkage between the variation of seasons, probability of dispersing chronic dengue fever and change in social-economic status of the dengue fever is considered as a precarious disease in which a dengue victim has a nonspecific epidemiological pattern. Over and above this the dengue patient can suffer from permanent shocks that escalate toward their life expiration within few days. Dengue victims and their families who experienced this rapid worsening endure various economic predicaments related to the expenditures of this disease in addition to this, the researcher revealed the implications of dengue fever on financial conditions of the patients and their families. It is somewhat intricate to highlight the economic burden on families of dengue patients.

PUBLIC HEALTH IMPACT

At the start of 21st century, Dengue Fever is the most prevalent arboviral disease of humans, taking place in tropical countries of the world where>2.5 billion people are at risk of infection (Gubler, 2002; Joralemon, 2017). More than 100 tropical countries have widespread dengue virus infections, and dengue hemorrhagic fever has a tribute in greater than 60 countries. DF/DHF inspection is pitiable in most countries, and the past has focused principally on dengue hemorrhage fever. The abundant Dengue Fever cases that occur each year can therefore only be projected. In 1998, nevertheless, foremost epidemics occurred throughout Asia and the Americas, with >1.2 million cases of dengue fever reported to the WHO. Global DHF reports have raised on average by fivefold in the past 20 years at the beginning of the 21st century, Ndis predictable that between 50 and 100 million cases of dengue fever and several hundred thousand cases of dengue hemorrhage occur each year, depending on the epidemic activity. The case fatality rate (CFR) varies among countries but can be as high as 10-15% in some and <1%in others. The mainstream of dengue fever cases is reported from Asia where the disease has impacted most countries and is an important cause of hospitalization and death among children. In the tropical America areas, DHF was an atypical disease before 1981. Up till that time, epidemic DF/DHF has befell as one of the most imperative public health tribulations in Africa, where other disease problems are devastating by comparison. The genuine public health DF/DHF impact arises during the disease epidemics due to poor surveillance at the initial phases of epidemic spread, with cases disgustingly under- reported until the epidemic is documented as dengue, which is generally

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near its maximal transmission. At that time, emergency control of mosquito is commenced, but these efforts are typically wrongly directed and are too diminutive and too tardy to have any influence on the contagion (Bréal, 1900). Thus, the public health effect of epidemic dengue fever/ dengue hemorrhage fever is augmented because of compromised surveillance, no public health planning and no appropriately executed emergency response strategies.

SOCIAL IMPACT

In America, the victorious Aedes Aegypti control program contributed to the global victory against infectious diseases in the 1950s and 1960s. The consequential complacency that develops among government, public health administrators and the public ultimately directs to the awareness that dengue fever was not a significant disease and, eventually, to public health infrastructure deterioration required to deal with dengue fever and other vector-borne diseases. When epidemic dengue fever/dengue hemorrhage fever began to recur and extend geographically, firstly in Southeast Asia in the 1950s- 1970s and then worldwide in the declining years of the 20th century, it was unobserved for the most part by public health officials, and the public had to bear the disturbance of their lives that arose every few years when the episodic but gradually, more recurrent and huge epidemics occurred. Most dengue endemic countries have poor surveillance for dengue fever (Joralemon, 2017). This is particularly factual in those countries where clinical dengue hemorrhage fever management is outdated, and where there is no relevant strategy for patients. The outcome is overcapacity of clinics and hospitals by dengue fever patients or with serene non-dengue infection, an ignorant medical staff, imperfect care for life threatening dengue shock syndrome patients and frequently inclining mortality. In hefty epidemics, there is often disarray and uncertainty among the general population. This is explicable because DHF can be an incredibly vivid disease; a patient can have a fuzzy viral syndrome which advances to irreversible shock and death within a few hours. Patients or family members who encounter this quick destruction do not frequently forget it, and therefore contribute to the perplexity and burden at health amenities. An ordinary effect of these devastating circumstances is the need that government health organizations execute something to control this disease. Health officials and politicians require emergency response actions that are noticeable (Ansell et al., 2010). This has escorted the especially low quantity insecticide space sprays used to manage epidemics, an extremely detectable method that reveals action on the government's part. Unfortunately, it is not efficient in controlling the primary vector mosquito, Aedes Aegypti, and consequently, in combating the epidemic, besides being very expensive (Regis et al., 2008). The community influence of this type of incompetent emergency response is not well comprehended, but it is obvious that the extremely visible mosquito space sprays, and the government support that they are managing the outbreak, results in a forged sense of public safety measures who then do nothing for mosquitoes control in and around their houses, thus affecting the epidemic cycles. So, at end of the day, neither the government nor the public take part in the prevention of the social interruption that escorts epidemic dengue fever/ dengue hemorrhage fever. Instead, they live from epidemic to epidemic under the erroneous conviction that it is far from their control (Rigau-Pérez et al., 1998). Suarez et al., 2005 portrayed that vector borne diseases always attack the public health. Thus, the social-cultural particulars of dengue fever have been publicized to be central and have not been considered to avoid different control programs.

ECONOMICAL INFLUENCE

Financial influence of epidemic DF/DHF on a public is much problematic to measure. Usually, concentrating on a particular epidemic and have not occupied the complete load of the disease on population, especially because it is hard to place a worth of dollar on a disease like DF that has a comparatively reduced CFR but produces communal disturbance. In 1977, prevalence in Puerto Rico was projected to have a budget of US $6 and $16 million in medical costs and control procedures, and the 1994 epidemic on the similar landmass to have budget US $12 million in medical costs only (Huang et al., 2009). In 1998, epidemic in Cuba was approximated to have budget US $103 million, almost part of that for mosquito control. The yearly financial load of DHF on the country was approximately US $31.5 and $51.5 million which is dependent on epidemic action in Thailand. These are gross undervalues of the true financial influence of dengue because they do not amount to the whole cost of huge epidemics of flu- like disease on the economy like deficient work and production, vanish traveling and communal disturbance. The disease load that occurs due to this virus throughout inter-epidemic duration has been

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totally overlooked due to poor observation. The World Bank has established a non-monetary complex known as 'disability-adjusted life years' (DALYs), which accounts for the influence of both morbidity and mortality of a disease on community (Murray, 1994). Current examination using this method to measure the influence of DF/DHF in relation to prevalence and duration, have revealed that there is significant disease load throughout inter-epidemic duration, generally in the form of unintended budgets, for example decreased output and absence from work or school. Dengue fever has a huge influence, as numerous other infectious diseases including malaria, tuberculosis, bacterial meningitis, and hepatitis. International funding agencies give a great deal of attention and funding for these endemic diseases. For instance, in the year 1998, itis estimated a funding of US $84 million was reserved for malaria worldwide , while less than US $5millions were directed for dengue fever/ dengue hemorrhage fever (McCoy et al., 2009). These disparities may have further increased in recent years. Dengue fever puts a heavy economic burden on dengue patients and their families. Apart from this, the study evaluated different aspects of economic pressures on the victims and their families via direct and indirect expenditures. The approximate average expenditure of the family of a dengue patient is about US$61, which is a source of economic burden for them.

GLOBAL STRATGIES FOR PREVENTION OF DANGUE DISEASE AND CONTROL

A Global strategy has been designed to comprehensively address several aspects in relation to dengue and to assess the integrated management system introduced by the World Health Organization for dengue control and prevention. This global integrated strategy has proven to be a useful component of the dengue control program; it acts as the basis for the development of a technical team to make basic adjustments in order to reduce mortality rate by 2020 (Organization, 2013). Five different components are involved in this Global strategy. Integrated management of these component system helps countries in detecting dengue cases(Harrington et al., 2013). This global strategy increases the synchronization and association of integrated vector control approach and constant control measures among multi-sectoral partners. A cost effective, sustainable and ecologically sound system is thus maintained for surveillance, prevention and management in accordance with the health systems of the country. This kind of strategy reduces the mortality and morbidity rates worldwide and supports coordination at both local and national level. Allocation and mobilization of resources will also be helpful for successful application of strategy.

The following components are involved in this globally integrated strategy for dengue control.

LABORATORY DIAGNOSIS AND MANAGEMENT OF CASES

An accurate diagnosis is necessary as it must be differentiated from other infectious diseases such as leptospirosis, flavivirus and rubella. Currently, no specific vaccines for treatment of dengue are available, and based on symptoms supportive care is possible. Diagnosis is also important for epidemiological reasons, it allows ongoing research to determine the pathogenesis of disease and other related characteristics of the virus, its life cycle in hosts and also aids in vaccine research. Early diagnosis of disease in the laboratory and timely management can drastically reduce the mortality rate to zero and an effective clinical outcome can be achieved (Organization, 2012). Research regarding biomarkers for prediction and better diagnostic tools for predicting disease severity are needed on urgent basis (Giannobile et al., 2009).

Dengue infection shows both mild and severe manifestations. However, many infections are not apparent. After a brief incubation period illness begins suddenly with three different phases: Febrile, critical and recovery. Dengue is a disease with complex manifestations, but its management is inexpensive and simple once timely and correct interventions are established. Early diagnosis and understanding of the early phase direct a rational approach for management. Investigations of primary cause of death are necessary for dengue control. Signs and symptoms of dengue are similar to the signs of other parasitic and vector borne disease such as zika or malaria virus (Organization, 2014a). Diagnosis may involve a number of entities such as antigens, nucleic acid, virus and antibodies. In febrile patients' early diagnosis is usually done by non- structural antigens laboratory tests. Virus can be detected in plasma, serum, tissues or other circulating blood cells within 4-5 days of infection. During the acute phase of infection, isolation of virus and detection of antigen or nucleic acid at the end serology is used for detection. Assays to detect specific antibodies such as IgG and IgM are widely used. Polymerase chain reaction is

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another assay used to diagnose dengue fever (Kao et al., 2005).

Early dengue virus infection shows specific response of IgM antibodies however, in secondary phase of infection, IgM and strong IgG response were shown. Management of primary and secondary infection is critical in determining specific clinical outcomes. In order to achieve the goal of reduced mortality from dengue some important points in case management and diagnosis should be kept under consideration. These include improved detection of dengue infection at the level of both early or secondary infection, improvement in management with careful intervention, upgraded health service organization in the case of outbreak situations. (Organization, 2012).

INTEGRATED INVESTIGATION AND OUTBREAK PREPAREDNESS

The most critical element of dengue control and prevention program is integrated surveillance. Both passive and active forms of data collection are involved in this surveillance program. Information related to economic and social impact of dengue in society is fundamental for successful evaluation. Understanding of Sequential and spatial distribution of dengue in different regions allow planners to organize resources in regions that will have a great impact by disease eradication. Three major elements of integrated surveillance are disease investigation, vector investigation and social and environmental risk monitoring (Joralemon, 2017).

EPIDEMIOLOGICAL INVESTIGATION:

Epidemiological data includes the collection, recording, interpretation, analysis and distribution of data regarding the current status of dengue prevalence in the community so that specific actions may be planned accordingly for disease eradication. Surveillance is an important component of dengue control program; it provides information that is critical for epidemic response and assessment of risks and program evaluation. Both active and passive processes for data collection are used for epidemiological surveillance. Different data sources are used to expand and enhance the epidemiological picture of dengue transmission risk. The main objective of this kind of investigation should be clearly defined to include the proposed use of the system. The main purpose of surveillance system will guide the type of investigations conducted, signal threshold and timings of investigation.

The overall objectives include Epidemic detection in order to measure the burden of disease, make quick early interventions, measure trends in spread and distribution of dengue geographically, and enable planning and allocation of resources and its impact on different regions. The surveillance system should include recommendations in order to reduce the dengue epidemic, and its economic, social and medical impact with early interventions, considering the limited resources available for surveillance. Different attributes are involved in order to determine the usefulness of disease surveillance system. Attributes include timeliness of dengue cases that are reported in a certain area and sensitivity of a system to detect cases in geographical area. Positive predictive value (PPV) is the probability of occurring dengue case and negative predictive value is the prediction of surveillance system when no case of dengue is seen in certain area and system does not show dengue signal. Quality of disease surveillance system is measured by its precision and representativeness which reflects the accuracy of investigation system to describe the distribution of cases at specific place and time (geographical distribution of patients). Data may not be representative when case ascertainment is not accurate. Forecasting and detection of epidemic activity in a certain geographical region is the main objective of the dengue surveillance system. Prevalence and incidence monitoring establishes a standard measurement of rate of disease occurrence so that sudden rise in dengue proportion will trigger an alert about intervention, investigation and preventive measures. Warning about the rise in dengue cases enables the health service department to allocate resources more efficiently and alert the clinicians about the need to diagnose and treat dengue patients in order to improve clinical outcomes. Moreover, control and prevention of dengue epidemics require an active disease surveillance program based on laboratory methods. Both virological and serological diagnosis are commonly used laboratory methods. Quality control should be provided for laboratory diagnostics by international reference laboratory. Diagnostic laboratories are designed that should be capable of performing (Joralemon, 2017).

ENTOMOLOGICAL SURVEILLANCE

Vector surveillance is used for research purposes in order to determine the distribution of dengue vectors in different geographical regions, and monitoring of

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control program allows for timely and suitable decisions concerning interventions. Several methods are used for evaluating dengue vectors. However, methods used by surveillance depend upon the availability of resources and skills and require clear understanding of investigation objectives. Vector surveillance identifies the distribution of vector in areas where it previously did not exist and ascertain the reason for vector introduction and widespread distribution. Evaluation of Susceptibility of vectors to insecticides is also an integral part of surveillance programme (Joralemon, 2017).

ENVIRONMENT AND SOCIAL RISKMONITORING

Strategies that measure parameters other than vector management systems and that directly affect vector distribution and density are also required. Various factors that influence the vulnerability of community to dengue epidemics have been determined. The most fundamental and important inter-related risk factor for assessing dengue is the monitoring of density and distribution of human population, their socioeconomic status and housing style. Assessment of water supply and waste disposal service and domestic water storage practices are of particular significance. This kind of knowledge helps in the establishment of ecological profiles that is valuable for managing activities and organizing intervention measures. Health sector can also help in vector control by giving frequent updates. Meteorological data can also be used in order to determine the fluctuations in vector population.

The most important operational and technical factor of this strategy is outbreak preparedness. A Well-developed, pre-tested and completely understood plan is required for an effective response. Relevant agencies and sectors should be involved in this plan. Response constituents will include logistic ability to cope with the patient inflow, supplies of medical facilities, political issues, management, and efforts to control vector. The dengue response plan should be cleared in its scope, objectives and aims. Organizations and agencies are responsible for implementing different aspects of plans and other support agencies that may be involved in recovery period after its prevalence. Responsibility and specific role of each agency in plan management should be identified by each agency (Joralemon, 2017).

VECTOR CONTROL PROCESS

A List of interventions for dengue vector control from WHO guidelines was generated. Specific regulations and topical repellents were added. Effective measures taken for vector control are critical for achieving the desired reduction in morbidity of dengue. Vector control management aims to reduce the incidence of infection and thus preventing occurrences of disease. A Theory developed by George Macdonald and Ronald Ross strongly influenced the vector control discipline. This theory which is called the Ross-Macdonald theory emphasizes that the potential for transmission of pathogen through mosquitoes actually depends upon the abundance of vector mosquito and rate of human biting (Saul, 2003). Interventions for reducing the population density of mosquitoes, their probability of survival and their contact rate with humans were proposed. However, this model was not formulated for the control of larval mosquitoes. Recent quantitative evaluations have shown that reduction in dengue pathogen could be achieved by controlling the mosquitoes' larva. Plans for dengue vector control like insecticidal sprays are recommended by panel participants (Reiter, 2014). Perifocal insecticide sprays used in North Territory of Australia for the reduction of larvae and adult mosquitoes have given successful results. Perifocal spraying was the backbone of the eradication campaign in America.

However, several other factors are involved that indicate the ineffectiveness of previous tools for vector control that increase interest in developing new tools. Some tools are developed by improving existing tools. However, other novel approaches also emerged through advances in biotechnology. Different strategies and tools have been developed by meeting participants for dengue suppression. Strategy design is based on the following factors:

A. Reduction in the population of mosquitoes
B. Alteration in the structure of age of female mosquito population
C. Manipulation of the behavior of female mosquitos
D. Replacement of wild type of mosquitoes with genotypes that do not transmit dengue viruses.

FUTURE VACCINE IMPLEMENTATION

The accessibility of a safe and effective vaccine would change the concept for dengue prevention significantly. As the spread of dengue continues worldwide, a vaccine development process has gained increased attention by vaccine manufacturers and its associated funding agencies, researchers, and policy makers. It has been frequently demonstrated

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that effectiveness of vaccines depends upon an appropriate delivery method. Development of effective application of vaccine delivery is a technical component that should be addressed now. The most innovative vaccine candidate is live- attenuated chimeric yellow fever-dengue virus that has been progressed to clinical trials phase III (Guirakhoo et al., 2006). Numerous other live-attenuated vaccines, either their subunits or a DNA vaccine, are at primary stages of clinical trials. Several other approaches such as inactivated vaccines and virus vectored are under preclinical studies (Thisyakorn and Thisyakorn, 2015). Clinical trials regarding vaccine development include the need to give protection against four virus of dengue and also the specific immune response.

Persistent care and efficacy of dengue vaccines will need significantly careful monitoring. This involves the checkout of vaccine trial candidates for numerous years post-vaccination, exclusive post- licensure examinations and supervision schemes accomplished by the assessment of vaccine influence on dengue epidemiology and its disease load. In the expectation of vaccine licensure and overview in approximately smallest prevalent countries in upcoming years, it is very essential to confirm safeguarding and supervising capability in countries. Confirmation and decision-making on the overview of vaccines and their usage will need to be consistent on vaccine product features for example security, efficiency and budget and should be evidenced on vaccination scheme, their effect on disease load and budget. Numerous disease problems are linked to vaccines, for example incorporation into the national immunization programme, vaccine preservation, transport and budget, therefore, these will have to be accounted for (Organization, 2014b).

Supposing evidence of thought is encountered, some. of the complexities for vaccine transportation are :(1) developing analytical means in countries where dengue is prevalent to choose which section of the community to defend when national reserve or vaccine transportation is controlled, as vast number of cases are found at the tropical zone. (2) developing improved distribution and budget. Preferably, a vaccine will be managed as a solitary dose, will defend alongside all four viruses and will have a long effectiveness without considerable after effects. In actual, all of these thoughts will not be encountered. A vaccine that needs numerous doses, for example which cannot be included in a long-drawn-out programme on immunization will need additional assets in to transport substructure: (3) Assessment of vaccinated community and durable control capability in dengue prevalent countries will be required:(4) supervision and organization in improving the influence of the vaccine should be essential.:(5) Eradication of dengue from various areas like small regions and landmasses.

BASIC, OPERATIONAL AND IMPLEMENTATION RESEARCH

All the objects of the programme, primitive, functional and employment studies are required. All candidates should highlight the importance of study and its endorsement. The inhibition and control of Dengue programmes would be authorized with more operational gears. Study should report how advance methods could be improved. Recent diagnostic gears and means of vector control are required. Further, more efficient methods to promoting community candidates are also required.

ENABLE FACTORS FOR VICTORIOUSIMPLEMENTATION

Five enabling factors are necessary for the triumphant execution of global policy that includes:

- Advocacy and resource mobilization
- Partnership, coordination and collaboration
- Communication to achieve behavioral outcomes
- Capacity-building
- Monitoring and evaluation.

These factors entail greater alliance at all stages of government and other sectors; worldwide, implementation requires strenuous action by member circumstances, effectual global leadership and suitable rendezvous of all appropriate stakeholders.

MOBILIZATION

There is very insufficient international advocacy or successful funding efforts for the prevention and control of dengue. Whereas, some research organizations are lucratively giving funds for focused research work, approximately no money is presented for global efforts for control. This funding breach influence all international response areas that could participate including outbreak preparedness and response, training material development, training courses organizations and research networks support. World health Organization should guide the worldwide advocacy effort. To develop and execute advocacy plans, WHO should collaborate with regional and country offices to enhance the political

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support and resource mobilization necessary for executing the plans and strategies for the Americas and Asia-Pacific areas; and it should also assist in building relevant capacities in the African, Eastern Mediterranean and European regions.

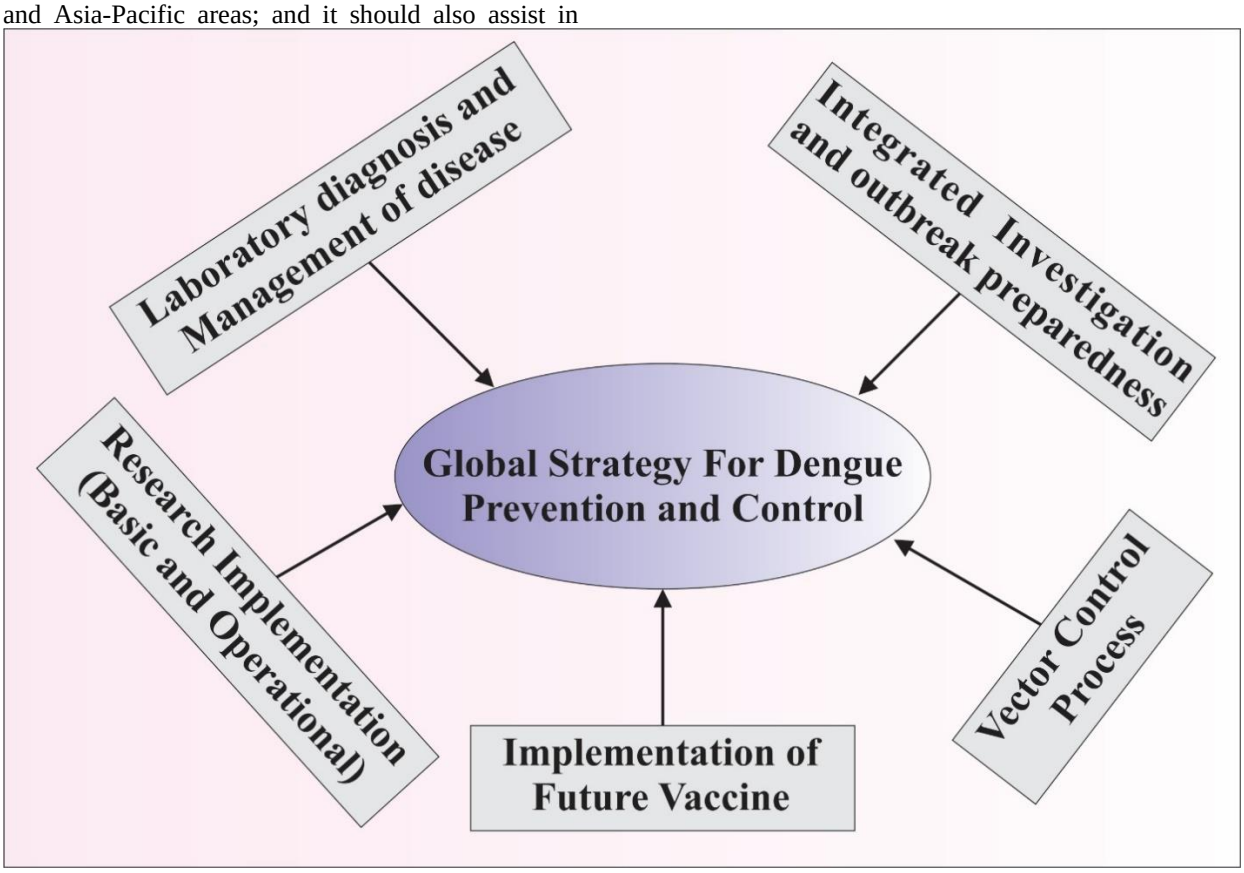

Figure 3: Components involved Global strategy for dengue prevention and control

ADVOCACY AND RESOURCE

WHO is exclusively positioned to persuade and aid closer incorporation of dengue surveillance and pandemic alleviation with the syndromic approaches mandatory by the IHR [84], specifically as it pertains to a general case definition and to synchronized collection of data, analysis of data, and data dissemination. At country and regional levels, the advocacy packages need to be developed for political support and resource mobilization. It would be superlative to put efforts on dengue by using prestigious public figures as champions for the reason at nationwide levels and utilize existing regional and global collaborations to endorse the effort broadly. A paradigm of a regional enterprise is the ASEAN (Association of South East Asian Nations) countries' verdict to memorialize "ASEAN Dengue Day" every year on 15 June. Unique advocacy movements should aim the public sector, the private sector that includes infrastructure related to water and sanitation etc. and areas implicated in developing new products associated with the prevention and control of dengue.

PARTNERSHIP, MANAGEMENT AND COLLABORATION

Dengue is the emblematic 21st century disease, driven by an urban tailored mosquito that can easily transported by infected people or the vector via escalating trade, altering use of land and growing urbanization. Victorious control programmes related to dengue are described by multi-sectoral and inter-agency vigilance and response. Unfortunately, this is not the frequent case in most countries, and this approach should be encouraged at all stages in every endemic country. Worldwide different organizations working on the research or control of dengue that are equally important are often not connected. There is highly desirable to develop the network for partnership, coordination and collaboration. An effective inter-sectoral approach and coordination is

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required between the health ministry and other interrelated ministries and other government agencies, NGOs, private health providing sectors, and local communities for the prevention and control of dengue. Sharing of resources is an imperative coordination feature and is decisive in emergency circumstances when sparse or broadly discrete human and material resources must be assembled swiftly and their use harmonized to ease the epidemic disease effects. Urban planning and water resources management coordination is particularly significant for prevention efforts and in dropping dengue morbidity (Kabra et al., 1992). In dengue-endemic countries, the anticipated increases in urban populations additionally spotlights the requisite for simultaneous enhancement in improved and trustworthy supplies of piped drinking water and sanitation in order to avert storage of water, decrease urban breeding sites and improve drainage, including closer community water gathering points. Intra-sectoral as well as inter-sectoral collaboration among partners is necessary for the triumphant execution of the global strategy. Networking aids a further synchronized approach than the individual and sovereign efforts of diverse sectors or departments, and endows with a platform for partners to determine interagency and intra-agency problems and to share superlative performances while diminishing replication of efforts. Associations for dengue control also aids to influence the partner strengths and to coordinate their efforts, thereby raising the effectiveness and efficiency of actions for the prevention and control of dengue. Effective surveillance systems necessitate networking among technical agencies and personnel who work on data collection and process data and who can support in launching sentinel sites. Inter-ministerial or inter-departmental actions remain a challenge due to a lack of awareness to construct relationships and hierarchal organization within the ministry, which must be tackled at the utmost political level. A dengue task force or steering committee is set up in various countries but is often activated only at times of spread of disease. In order to execute the global strategy effectively, affiliates of the task force should have appropriate technical capability and decision making authority and should congregate recurrently to assess and scrutinize advancement and present strategic lapse. A greater unity level among partners will be accomplished by focusing efforts on team construction and better communication expertise. Partnerships building with industry and allied sectors can avoid vector proliferation via development of product and shared best practices. WHO requires sustaining efforts at corresponding case definitions, collection and processing of data, propagation of data and cross border information exchange among affiliated countries at sub-regional and regional levels (Kabra et al., 1992).

COMMUNICATION TO ACCOMPLISH BEHAVIORAL OUTCOMES

Communication is fundamental to every movement required to employ the technical elements in this tactic document. Dengue cases and dengue deaths can be diminished only via the behavioral actions of those conscientious for designing and implementing programmes for the prevention and control of dengue and by the implementation of risk decline and at-risk population' health protection behaviors. Knowledge is a prerequisite before action but it does not always influence and convince people to take actions. WHO has adopted a organized planning methodology Communication for Behavioral Impact (COMBI) to propose and put into practice behaviorally focused communication strategies for amending behaviors related to dengue and other vector borne diseases. COMBI measures used in prevention and controls of dengue includes increasing mobilization of community for the reduction of source, suitable use of households' insecticides, adequate and timely health services use, dengue cases diagnosis and report, and receiving vaccination of dengue when recommended . World health organization (WHO) prerequisite the advocacy of behavioral outcomes to partners and Member states and might include a communication section to achieve it in all related documents including dengue and vector-borne diseases (Kabra et al., 1992). Awareness and competence should be produced at all levels of programme to aid:

- Formative or inquisition research that is accomplished to recognize existing behaviors which could endorse or hinder the outcomes of programme.
- Functional internal behaviors and communication linked to outcomes of programme. For example improved synchronization of each technical element or intrusion, at-risk population programme interactions.
- Effectual external communication and behaviors associated to outcome of population e.g. disease reduction, mortality reduction rate, crafting messages and their propagation via media mass and other channels.

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OUTBREAK RESPONSE COMMUNICATION

Effective communication associated to support particular, measurable, apt, pragmatic and timely outbreak deterrence and control behaviors are essential for:

- Policy makers and senior managers to grade interventions and assign resources including people, supplies and funds, so that ground teams might react appropriately and quickly;
- Eevent managers to gather the related information and data from the facts very carefully and under the keen intelligence to uplift the efficiency of the technicians under the need and for the delivery of appropriate interventions that are necessary for the proper control of the events.
- Quick response and eruptive investigation teams that could communicate with healthcare professionals, official committee members, members from the associated NGOs and other philanthropic organizations under the swift and smooth delivery of the suitable measures that are necessary for the proper prevention and management of the outbreak conditions.
- Members that are associated with the rapid task force that foresee proper risk management and those who could get involved in the implementation of such strategies that are for the common interest of communities, stakeholders and other related personals.
- Social mobilization and health promoting staff that could align the proper array of protocols for the social interest of public health and to ensure decrease in the related risk (Kabra et al., 1992).

CAPACITY BUILDING

At all stages of inhibition and control of dengue, the capacity building has been ignored. Current attempts like exercise courses are not continued at national level. Effectual application of the global policy needs sufficient workforce with suitable apparatus and services, information, capabilities to perform efficiently, observe and assess the dengue control programme. The programme organization should be supported for effectual maintainable dengue influence. Community scientists and reporting and conveying professionals, community health entomologists, trajectory employees, epidemiologists, diagnostic supervise and health care officials perform a significant role and are required to work concurrently. Working out involving training should be adapted to the requirements of the numerous groups of workers, participate fully-grown knowledge-able practices and concentrate on recovering the workout of multidisciplinary squads. WHO has announced on various characteristics of dengue control programmes like diagnosis, organization, inhibition and approaching techniques. Labors and hard work must remodel these documents for indigenous purposes at country and provincial levels. Extensive distribution of present data would beneficially help all investors and prevent from repetition (Kabra et al., 1992).

EMPOWERING THE CAPABILITIES OF LOCAL MANAGEMENT IN MAKING INFORMED DECISIONS

Indigenous health interventions are highly susceptible for the variability of diseases and their inhibition. Although, they are not prepared for the proper steps that could be helpful in the management of outbreaks of dengue. WHO should introduces ‘Table top’ or stimulation like maneuvers for practice at regional level. Occasionally, time-consuming inter-epidemic durations are trival to continue response management competence. Managers require back from their bosses so that dengue inhibition and control doings persist to have suitable consideration within the wider conveyable disease control programme. Organizers and event managers have many other duties and might not understand to line up control and outburst events with sufficient protection to handle possible alterations in the epidemiology of the disease. They require approach to the board of technical authorities to notify their determination. Endurance and maintainable control measures are crucial. The inhibition and control requires a more democratic tackle at indigenous level, and main decision-makers required to construct corporations with public heads to enhance conveyance and teamwork. It is necessary to identify the available systems for replying to local health crises that can prolong from administration to the public level. Facilities from Health ministry at public level should also assimilate main constituents like observation, entomology, atmosphere, conveyance and laboratory to enhance determination and effective use of reserves. To confirm application and acceptability of control programmes at public level, the nationwide control on vector or pesticides might be modified to assimilate investigation and control as obligatory donations of public jurisdictions to nationwide strategy (Council, 2002).

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MONITORING AND EVALUATION

The intensive care and assessment scheme is fundamental to the popular application of the dengue plan. Assessment and nursing influences the preparation of the worldwide plan, evaluate its efficacy, recognizes the regions for upgrading and enhances the usage of reserves. Appropriate teaching programmes are offered at both the national and international stages. Nursing and assessment permits the recognition of achievement through which lessons can learnt. A big dare is to classify indicators for the use of every level of health system that can be measured accurately and methodically. At dispersed heights of the system, pointers for the use of reserves, procedures, performance, epidemiology and entomology are required to be established by Member States. The usage of one scheme to assemble, examine, transcribe and assessment material is inspired to downgrade the reporting load. Increasing the class and texture of material needs, material assembly methods and consistent examination and clarification. WHO accumulates less dengue signs from Member States are:

- Quantity of supposed dengue cases
- Quantity of acute dengue cases
- Quantity of deaths from supposed and established dengue
- Quantity of cases set by laboratory
- Presence of Serotype in blood

The top monitoring of the dengue and its current trends must depend on the group of supposed cases and established material, precise supervision should be the fundamental goalmouth for schedules (Miller, 2010). Supervision has two specific benefits for the influence of variations in the features that effect dengue outbursts and incidence from cities and provinces and from year by year, particularly the features related to atmospheric alteration, serotype and control interferences. For these purposes, assessment and intensive care is analytical and should be a main constituent for dengue observation, organization that make available control and monitoring through the choice of described places where the variables can be clear and by growing epidemiological techniques for their approximation like virus incidence (Kabra et al., 1992).

CONCLUSION

International acknowledgment of the key importance of social mobilization for dengue fever prevention and control has come into limelight in past few decades as dengue is considered to be a worldwide life-threatening public health concern, affecting approximately 2.5 billion populations. Social capital can influence the dengue fever cause and prevention as it can strengthen the public awareness to reform and mobilize the society in preventing and combating the dengue fever occurrence appropriately. The individual, families and medical practitioners including all concerned entities should be aware and well-informed about the diverse clinical and behavioral manifestations regarding and make certain the adequate measures and initial treatment plan for combating with this devastating disease. Further directions to fight this dreadful condition should be aimed at various innovative strategies for the control of culprit mosquito as well as vaccines development and antiviral drug therapy.

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