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Dengue/ Dengue Haemorrhagic Fever Prevention and Control

Report of an Intercountry Consultation of Programme Managers of DF/DHF Batam, Indonesia, 10-13 July 2001

WHO Project: INO CPC 007

World Health Organization
Regional Office for South-East Asia
New Delhi
June 2002

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EXECUTIVE SUMMARY

Dengue and Dengue Haemorrhagic Fever (DF/DHF) have emerged as an international public health problem of the 21st Century. Countries in South-East Asia Region experienced severe outbreaks of DF/DHF during 1996-2000 period. WHO SEARO conducted external review of two worst affected countries i.e., Thailand and Indonesia. The review highlighted many deficiencies and made several recommendations. Simultaneously, other Regions had developed new tools and initiatives for its prevention and control. To review and discuss these developments, an Intercountry Consultation of Programme Managers of DF/DHF of SEA countries was held at Batam, Indonesia from 10-13 July 2001. The meeting was attended by 43 Programme Managers, scientists/experts drawn from endemic countries of the South-East Asia Region and Western Pacific Region, viz., Vietnam and Malaysia.

Global review highlighted occurrence of DF/DHF in more than 100 countries and noted that economic impact of DF/DHF in many of the countries is similar to some of the major tropical diseases. Among the factors identified for increased epidemics are demographic and social changes that are occurring over the past few decades. Similarly, endemic countries of the SEA Region had shown spurt in morbidity and mortality. On an average, over 1000 deaths due to DHF were reported from endemic countries every year. Of late, the Case Fatality Rate (CFR) has come down to <2% due to improvement in case management.

Review of currently available new tools/approaches highlights ELISA and commercially available test kits as popular for diagnosis of dengue cases for surveillance purposes. For vector control, '3M' community-based programme in Indonesia gave promising result during dry season, but during rainy season when *Aedes* breeding get out of the sphere of women domain, the transmission continues. In Thailand, Development of National Programme for Dengue Prevention Control (to mark the 72nd King's birthday) based on empowering individuals/communities for source reduction, health promotion, medical services, multi-sectoral networking and by enhancing capacity building reduced the morbidity from 40 to 30% and mortality from 0.22 to 0.17% over 1999-2000 period.

In community-based programme, the role of social and behaviour scientists was considered essential. It serves as a connecting link between vector control specialists and the communities to achieve the targeted goal. Just passing on knowledge on vector breeding or say about facilities available for treatment has not proved successful. Social mobilization and Communication for Behavioural Impact (COMBI) was all the more essential for the achievement of specific behavioural objectives.

Revised Regional strategy focused on six elements, viz., (i) Establish an effective disease and vector surveillance system based on reliable laboratory and health information systems., (ii) Ensure early recognition and effective case management of DHF/DSS to prevent case mortality, (iii) Undertake disease prevention and control through integrated vector management with community and intersectoral participation, (iv) Undertake activities to achieve sustainable behavioural changes and partnerships, (v) Establish emergency response capacity to control outbreaks with appropriate medical services, vector control, communications and logistics, (vi) Strengthen regional and national capacities to undertake prevention and control of dengue and research related to epidemiology, disease and vector management and behavioural changes.

To achieve effective prevention and control, three areas of networks have been established viz., (i) surveillance (ii) clinical management (iii) vector control.

1. INTRODUCTION

Dengue Fever (DF) and its severe manifestations such as Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) have emerged as an international public health problem, now endemic in more than 100 countries and affecting about 40% of the world population (2.5 billion people) living in tropical and subtropical regions and in urban/peri-urban areas. WHO formulated a global strategy in 1995 for prevention and control of DF/DHF. On the basis of this, a regional strategy was developed and implemented in countries of the SEA Region from 1996. Emphasis was laid on five major elements, viz., (i) Active disease surveillance; (ii) Emergency preparedness; (iii) selective integration of vector control with community participation; (iv) capacity building, and (v) vector control research. Out of seven highly endemic countries, only three countries viz., Indonesia, Thailand and Myanmar have established National Dengue Prevention and Control Programmes (NDPCP), while others embarked upon vector-borne disease control/malaria control organizations for emergency control of epidemics.

The WHO/Regional Office for South-East Asia conducted external indepth review of NDPCP of Thailand and Indonesia during 1999 and 2000 respectively. Several recommendations were made to cover up the deficiencies and further strengthen the programmes. Added to that, the Region experienced several outbreaks of DF/DHF during the period 1996-2000. Worsening epidemiological trends prompted holding of an Intercountry Consultation of the Programme Managers of DF/DHF in Batam, Indonesia from 10-13 July 2001 to review the current situation, learn from the experiences of the Member Countries and consider options most suited for prevention and control of dengue.

2. OBJECTIVES

The objectives were as follows:

(1) To critically review the current available tools for dengue prevention and control and to improve strategies based on the success stories in the Region;

(2) To review the global and regional strategies in the light of regional experiences;

(3) To discuss and develop a regional strategic plan for dengue prevention and control, and

(4) To discuss and formulate recommendations to improve the implementation of prevention and control of dengue programme.

3. ORGANIZATION OF THE MEETING

Prof (Dr) Omar Fahmi Achmadi, Director-General, Directorate General of Communicable Disease Control and Environmental Health (DG CDC&EH), Ministry of Health and Social Welfare, Republic of Indonesia, inaugurated the meeting.

Welcoming the delegates, Prof Achmadi said that DF/DHF continue to spread in spite of relentless efforts. Source reduction methods to eliminate *Aedes aegypti* breeding often had not been successful and whatever is achieved is difficult to sustain. He urged the experts to discuss and review these complexities and come up with innovative ideas for effective control of this infection.

Dr Frits Reijsenbach De Haan, Ag WR-Indonesia, who represented Dr Uton Muchtar Rafei, the Regional Director, WHO South-East Asia Region, read out his address. The Regional Director's message emphasized that Dengue/Dengue Haemorrhagic Fever is the most important resurgent tropical infectious disease. It stated that 1.2 billion people (52%) residing in South-East Asian countries were at risk of DF/DHF from a total population of 2.5 billion. During the past decade, an estimated 0.1 to 0.2 million cases and over 1 000 deaths had been reported annually from the Region. He stressed the need for establishing active lab-based surveillance in the Member Countries with a view to predicting epidemics. Lack of infrastructure and clinical diagnostic facilities not only prevented early and effective response to control epidemics but clinicians/physicians also felt handicapped in case-management to reduce case-fatality rates. He urged the participants to critically review the Regional Strategy for Dengue Prevention and Control to look into deficient areas and make recommendations to improve programme implementation in the Member Countries.

Dr Thomas Suroso (Indonesia) was elected Chairman and Dr Prida Malasit (Thailand) was elected Co-chairman. Drs V K Raina (India) and Ravindra R Abeyasinghe (Sri Lanka) were elected Rapporteurs.

Approximately 43 participants and experts attended the meeting (See Annex 1 for list of participants)

4. GLOBAL AND REGIONAL SITUATION OF DF/DHF

4.1 Global

The pandemic of dengue/dengue haemorrhagic fever has continued to intensify in many areas of the world and has resulted in DF/DHF becoming the most important resurgent tropical disease of the new millennium. At present DHF is reported from more than 100 countries of the world and DF/DHF remains a major public health problem in many of these countries. Recent studies have indicated that the economic impact of DF/DHF on many of these countries is similar to some of the major tropical diseases.

Several factors have been identified as being responsible for the increase in epidemics of DF/DHF. Among these are demographic and social changes that have taken place during the past few decades, mainly in parts of the tropical world, increased mobility of humans within and between population centres, the increased use of plastic and other non-biodegradable materials in the packaging of consumer articles, dramatic increases in the numbers of discarded automobile tyres, expanded geographic distribution and increased densities of the principal vector mosquito *Aedes aegypti* and the expansion of the distribution of the four viral serotypes responsible for causing the disease. These factors have resulted in many countries of the tropical world becoming hyperendemic. In the countries of Africa and the Middle East, dengue epidemics appear with increasing frequency and DHF cases have also been reported. Most tropical cities in the Americas have been reinfested with *Aedes aegypti* and several epidemics of dengue fever have occurred in several countries. In Asia, dengue is endemic in almost all the countries where the vector *Aedes aegypti* exists and major epidemics continue to occur.

4.2 Situation in South-East Asia Region

There are approximately 2.5 billion population at risk or 24.2% of the total world population. An estimated 1.3 billion people or 52% of the population residing in the SEA Region are at risk of DF/DHF or approximately 87% of SEAR population are at risk. Seven of the ten countries in the Region regularly report disease incidence, i.e. Bangladesh, India, Indonesia, Maldives, Myanmar, Sri Lanka and Thailand. No report of DF/DHF has been made so far from the Himalayan Kingdoms of Nepal and Bhutan and from the Democratic People's Republic of Korea.

The total number of reported cases from the seven countries during the recent past ranged from 46 458 (1986) to 205 380 (1987). During epidemic years case incidence generally exceeds 100 000. Similarly, the number of deaths due to DHF varied from 467 (1999) to 1 923 (1996). The total number of deaths reported from the affected countries of the Region exceeds 1 000 in most years. However, the case fatality rate has decreased during recent years and varies between 1 and 2%. (Figure 1 and Table 1).

Figure 1. *No. of reported cases and deaths due to DF/DHF in SEAR (1985-2002*)*

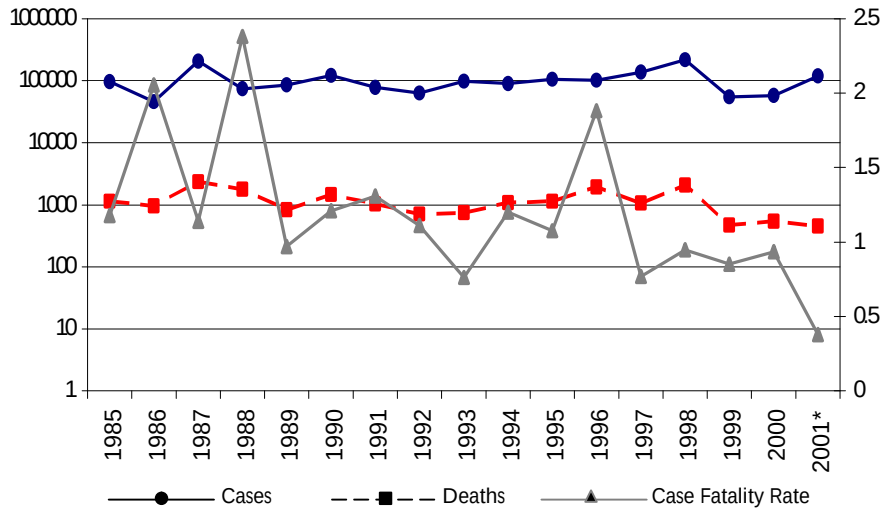

Table 1: ***Number of reported cases and deaths of DF/DHF in SEAR by countries, years 1985-2001****

YEAR		BAN	BHU	IND	INO	MAV	MMR	NEP	SRL	THA	SEAR
1985	**Cases**	0	0	NA	13588	0	2666	0		80076	96330
	Deaths	0	0	NA	460	0	134	0	NA	542	1136
1986	**Cases**	0	0	NA	16592	0	2092	0	0	27837	46458
	Deaths	0	0	NA	608	0	111	0	NA	236	955
1987	**Cases**	0	0	NA	23864	0	7231				
	Deaths	0	0	NA	1105	0	227	0	NA	1007	2339
1988	**Cases**										
	Deaths	0	0	NA	1527	9	64	0	NA	179	1779
1989	**Cases**										
	Deaths	0	0	NA	464	0	62	0	20	290	836
1990	**Cases**										
	Deaths	0	0	NA	821	0	179	0	54	414	1468
1991	**Cases**										
	Deaths	0	0	3	578	0	282	0	31	137	1031
1992	**Cases**										
	Deaths	0	0	12	509	0	37	0	15	136	709
1993	**Cases**										
	Deaths	0	0	36	418	0	67	0	7	222	750
1994	**Cases**	0									
	Deaths	0	0	4	471	0	461	0	7	140	1083
1995	**Cases**										
	Deaths	0	0	10	885	0	53	0	11	183	1142
1996	**Cases**										
	Deaths	0	0	545	1192	0	18	0	54	116	1925
1997	**Cases**										
	Deaths	0	0	36	681	0	82	0	17	253	1069
1998	**Cases**										
	Deaths	0	0	18	1414	0	211	0	8	424	2075
1999	**Cases**										
	Deaths	4	0	17	291	1	88	0	14	56	471
2000	**Cases**										
	Deaths	85	0	7	366	1	14	0	37	32	542
2001	**Cases**										
	Deaths	8	0	1	180	0	65	0	29	169	452

* Data upto September 2001

Notes: NA = Not available
0 = No cases reported
India's report includes only number of cases and deaths of Delhi outbreak.

Many of the Member Countries have cyclical epidemics of DF/DHF and many of the factors responsible for the resurgence of dengue in the Region are similar to the factors that have contributed to DF/DHF becoming a global health problem. Surveillance is weak or non-existent in many of the Member Countries and improved clinical management would result in further reduction of the case fatality rates.

5. CASE STUDY REPORTS FROM COUNTRIES

5.1 Bangladesh

First outbreak of dengue fever (Dhaka fever) was documented in 1964 in Dhaka followed by few scattered cases of DF during 1977-78. In 1996-97 dengue infections were confirmed in 13.7% of 255 fever patients screened at Chittagong Medical College. The first epidemic of dengue haemorrhagic fever occurred in mid 2000, when 5 551 dengue infections were reported from Dhaka, Chittagong and Khulna cities, occurring mainly among adults. Among the reported cases 4 385 (62.4%) were dengue fever infections and 1 186 (37.6%) cases were dengue haemorrhagic fever. The case fatality rate was 1.7% with 93 deaths reported. *Aedes aegypti* was identified as the main vector responsible for the epidemic and *Aedes albopictus* was identified as a potential vector in Chittagong. National Guidelines for the Clinical Management of Dengue Syndrome have been developed, based on the established WHO guidelines, and distributed among medical officers in the country.

5.2 India

Dengue fever has been reported from India over a long time, but dengue haemorrhagic fever was first reported in 1963 from Calcutta city. Although several outbreaks of dengue fever have been reported from India since then, a major epidemic of dengue haemorrhagic fever occurred in Delhi during 1996 when 10 252 cases and 423 deaths were reported. Cases were also reported from the neighbouring states of Haryana, Punjab, Rajasthan, Utter Pradesh and two southern and western states. DEN-2 was isolated during this epidemic and the proportion of DHF to DF was very high. The number of DF/DHF cases and deaths reported since the epidemic have been low with 1 177/36 cases being reported in 1997, 707/18 cases in 1998, 944/17 cases in

1999 and 622/7 cases being reported in 2000 (see Table 1). However, the reporting system requires further strengthening.

Aedes aegypti was reported from all the affected areas with house indices exceeding 20%. Surveillance activities are carried out on a limited scale by the National Institute of Virology, Pune and few other institutions in the country. Since 1996, dengue control activities are coordinated and carried out by the National Anti-Malaria Programme. A proposal to set up a National Dengue/Dengue Haemorrhagic Fever Control Programme is under consideration by the Government.

5.3 Indonesia

DHF was first reported in 1968 during an outbreak that occurred in Surabaya and Jakarta. In the epidemic of DHF, which occurred in 1998, a total of 47 573 cases of DHF were reported with 1 527 deaths. These cases were reported from 201 of 304 districts of Indonesia. *Aedes aegypti* is the main vector and high indices reported in the many areas of the country indicate that the vector is widespread throughout.

An in-depth country review was conducted in June 2000 with several recommendations being made. Considerable progress has been achieved with regard to the implementation of the recommendations. However, some recommendations, especially relating to the adoption of emergency plans, surveillance based on laboratory evidence, capacity-building, community participation and partnership formation require priority attention.

5.4 Maldives

Maldives recorded the first ever outbreak of dengue in 1979 and again in 1983. The 1988 outbreak was the worst when 2 054 cases of DF were reported and nine children (<10 years) died. Between May 1998 and June 1999, a total of 1 834 cases of DF/DHF were recorded and 34 were confirmed as that of DHF. Similarly high breeding with container indices exceeding 60% were detected in the port and airport areas during 1998.

For control of DF/DHF, school children from all senior schools undertook emergency campaigns for source reduction and control of *Aedes* aegypti in Malé town and the adjoining islands of Vinigiri, in addition to space

spraying and larviciding with Temephos. In the outer islands, Women's Development Committees undertook house to house mosquite control activities. Members of women's organizations, teachers and other health workers have been trained by VBDC/MCP project staff.

VBDC responsible for control of mosquito vectors including *Aedes aegypti* in port/airport areas strictly implemented International Health Regulations by establishing intersectoral linkages and capacity building of all vendors operating in port/airport areas. This approach paid rich dividend and by 1999 *Aedes aegypti* breeding was totally checked.

5.5 Myanmar

Dengue haemorrhagic fever was first reported in 1969, and the first epidemic occurred in 1970 in the capital Yangon when 1 651 cases with 90 deaths were reported. By 1982, DHF spread to other States/Divisions. The disease maintained a cyclical trend in Myanmar with epidemic peaks every 4-5 years. Between 1970-2000 a total of 109 896 cases and 3 679 deaths (mean CFR =3.35%) have been reported. In 2001, Mon state reported an epidemic. Although the vulnerable age group varied between 5-14 years, but since 1998, older age groups (7-19 years) are frequently involved. Similarly CFR is also stabilizing at 1-2% since 1995 (see Table 1).

The Directorate of Vector-Borne Diseases Control established the National Committee on DHF which coordinates the DHF control activities in the country. DHF prevention and control is largely community-based and all residents are involved in larval survey and source reduction under National Mosquito Control campaigns. During epidemics, residents in coordination with local health personnel undertake larval survey and control. Communities and local NGOs are also involved in fever surveillance and reporting system of DHF cases.

5.6 Sri Lanka

Dengue has been endemic in Sri Lanka for several decades and the first serologically confirmed outbreak occurred in 1965. Although several cases were recorded during some years since then, a major outbreak occurred during 1989 when 203 cases were recorded with 20 deaths (CFR was 9.3%).

In 1990, the number of reported cases were 1 350 and 345 were serologically confirmed as DF/DHF and 54 deaths (CFR was 4%) were reported. During this epidemic, DHF cases were reported from outside Colombo for the first time. During the 1990s, the disease was seen more frequently in the younger age groups. Two peaks of dengue occur following the monsoons in June/July and October/December. Since 1996, DF/DHF showed an upward trend each year with cases ranging from 1 294 (1996) to 688 (1999). However reported deaths showed a downward trend with 54 (1996) to 14 (1999).

The epidemic of 2000 began in the southern coastal town of Matara and the majority of cases were reported from Colombo and towns along the southwestern costal belt of the country. During this epidemic, 3 339 suspected cases were reported, of which 637 were serologically confirmed. There were 37 deaths due to DHF and the CFR was 1.1%. During 2001, a total of 1 780 cases have been reported to date with 10 deaths. The control strategies since adopted include: the reactivation of the Dengue Task Force, the setting up of emergency response teams, surveillance (disease, vector and active laboratory), vector control (environmental cleanup days, larviciding and thermal fogging), social mobilization, improved clinical management, emergency response and legislative enactment.

5.7 Thailand

DHF was first reported in 1949, while the first outbreak of dengue was reported in 1958, during which 2 158 cases and 300 deaths occurred. The country has experienced two major epidemics during the recent past, first in 1987 when 174 285 cases were reported and second in 1998 when 129 954 cases were reported. However the case fatality rates during both epidemics were very low (0.58% in 1987 and 0.2% in 2000). The majority of cases were reported in children below 14 years of age and all four serotypes of the virus have been isolated in the country. *Aedes aegypti* is the principal vector in the country.

The Office of Dengue Control was established in the country and a National Plan for Dengue Prevention and Control formulated in 1999, following an external review of the country situation. The new programme envisages the active involvement of other sectors and the strategies included in the programme are empowering of individuals and communities in DF/DHF prevention and control; environmental modifications to control the breeding of *Aedes* vectors; health promotion and improvement of medical

services; multisectoral networking for DHF prevention and control; development of administrative and management systems, and technological development. These interventions resulted in the reduction of morbidity to 30 per 100 000 and CFR to 0.17% in 2000 as compared to 40 and 0.22 respectively in 1999.

6. TOOLS AND APPROACHES FOR PREVENTION AND CONTROL OF DF/DHF

6.1 Epidemiological Surveillance

The surveillance system needs to be expanded to include both active and passive components. Active surveillance should be laboratory-based and focused on early warning predictive capabilities. Diagnostic tests for surveillance as adopted by the countries of the Region include the following:

(1) Enzyme Linked Immunosorbent Assay (ELISA) test: This test has become the most popular method for diagnosis of dengue. It is simple, rapid and does not require sophisticated equipment. The test requires one sera sample as against paired sera for HI test, however it needs to be timed between 2-4 days after onset, when detectable IgM antibodies are available. It is ideal for population-based sero-surveys. However, this should not be used to make patient management decisions.

(2) Commercial Test Kits: Two lateral flow tests available are commercially. They are unique, as they incorporate recombinent antigens. These proteins represent the N. terminal 80% of the viral envelope glycoprotein of dengue viruses 1,2, 3 and 4. The antigens demonstrated good agreement with native dengue antigens when compared with both ELISA and lateral flow test.

6.2 Integrated Vector Control with Community and Intersectoral Participation

(1) Indonesian experience: 3M Programme

The programme is called "*Bulan Gerakan*" - 3M, i.e., (1) covering water containers (*menutrap*); (2) clearing and brushing water containers (*mengguras*) and (3) burying water containers (*Mengubur*). The 3M programme

emphasized three areas (a) intensive health education using mass media, women's groups and school children; (b) source reduction through community participation and (c) door to door house visit to check the containers for the presence of mosquito larvae to clean water containers and/or apply temephos if necessary. An important member of the 3M programme is the Family Welfare Education Women's movement (PKK). One woman member is attached to 10 houses in a village to carry out the 3M programme. The "work group members" regularly visit their communities and impart training to house owners on the 3M programme. In addition, health education programmes have been developed for elementary school children and for use with mass media. While appreciating the 3M programme, it is observed that it does not reflect the range of urban and periurban ecology in Indonesia and is not adapted to specific local ecologies of the vector. The Yogyakarta experiment proved the above observations, that, so long as the *Aede*s breeding is restricted to the domestic sphere during summer, it is all well; however, when breeding extends to peri-domestic or open plots during the rainy season, it goes out of the women's sphere of activities. Therefore, there is a need to build up strong linkages with local authorities, public/private sector undertakings, market associates, professionals, private bodies, NGOs for source reduction measures in their offices, schools, buildings and premises.

(2) Thailand experience: Development of the National Plan for Dengue Prevention and Control

The National Dengue Prevention and Control Plan (NDPCP) aims to prevent and reduce morbidity and mortality resulting from DHF at the family, community and national levels with active involvement of other sectors, viz., environmental control, rural development, local administration, mass mobilization and basic education. The specific objectives of the National Plan are:

- Reduction of morbidity <50 cases/100 000 pop and mortality not to exceed 0.2%.
- Reduction of household vector breeding reflected by Breteau Index (BI) to <50 in every community and Container Index (CI) <10 in all schools.
- Empowering individuals and communities in DHF prevention and control.

The integration of DHF control into primary health care programme involves all village health volunteers (VHV) (approximately 700 000 persons) who will be trained and assigned to work primarily on DHF control, but communities will be trained to undertake analysis, planning, implementation and support the budget on DHF control, by themselves to sustain the activities.

The *Aedes*-free programmes have been conducted in various institutions and communities such as households, communities, schools, medical and health facilities. The massive public education campaign continues throughout the year to ensure the implementation. The role of the business sector for the development of appropriate mass media was also promoted.

All provinces will set up Provincial Dengue Prevention and Control Committee PDPCC, which have the same functions as NDPCC and the special response team will be set up to control the outbreak within 24 hours.

(3) Environmental approaches for control of Aedes aegypti in SEA countries

Aedes control in the SEA Region started in the 1920s in international ports and airports in compliance with the International Sanitary Health Regulation to prevent entry of yellow fever in the Region. To achieve these objectives, *Aedes* control units were raised under the supervision of port/airport health officers and the strategy followed source reduction methods supported by legislative measures. In the port city of Mumbai (earlier known as Bombay), the Port Health Organization was responsible for control of *Aedes* and the Container Index for *Aedes aegypti* was maintained <1 in the port area. However, peripheral area up to 400 meters came under the jurisdiction of the Municipal Corporation, which had enacted mosquito control legislation in 1928. Bye-laws covered all types of breeding sites under various provisions of the Act

6.3 Role of Social and Behaviour Scientists in DHF Control

Communities vary in their perceptions about the spread of vector-borne diseases as well as knowledge about mosquito breeding habits. Besides this, human activities coupled with sociocultural habits are largely responsible for

generation of high breeding potential. Therefore, there is a need to develop a strong nexus between entomologists, vector control specialists and social and behavioural scientists, so that technical details outlined for implementation could be successfully passed on to the communities by social scientists to address both the vector and human element through an integrated vector control approach. Behavioural scientists try to identify the factors which influence behaviour and motivate the communities to enhance the desired behaviour. Some successful examples include "shift in focus of programme from less productive breeding habitats of vectors to control of most productive habitats.

6.4 Social Mobilization and Communication for Behavioural Impact (COMBI)

Social mobilization is a broad scale movement to engage people's participation in achieving a specific developmental goal through self-reliant efforts. It involves all relevant segments of the society. It is planned in a decentralized process that seeks to facilitate change through a range of stakeholders engaged in interrelated and complementary efforts. It takes into account the felt needs of the people, embraces community involvement and seeks to empower individual and groups for action.

Communication for Behavioural Impact is a planned process based on private sector marketing principles that incorporates advocacy, programme communication and social mobilization to achieve specific behavioural objectives.

Dengue prevention and control hinges on the behavioural responses of a broad range of people, government leaders, legislators, policy-makers, health administrators, donors and ultimately, the public at large. The goal of the programme, therefore, is to prompt specific behavioural response that produces a desirable impact on all the actors. For example:

- The appropriate government department needs to act to provide clean piped water and regular garbage collection.
- Individuals need to act to source reduction regularly.

- Individuals with fever during high-risk period to act to promptly seek diagnosis and treatment from a health clinic.

7. STRATEGIC DIRECTIONS FOR PREVENTION AND CONTROL OF DF/DHF

In the regional perspective, three areas, viz., (i) surveillance for planning and response (ii) disease management and (iii) changing behaviour and building partnership were considered critical. These three elements were reviewed and discussed by three orientation working groups and each group presented their recommendations to further improve the implementation process for DF/DHF Control. After considering the interactive outcome of actions of the three working groups and the priorities of action, a revised Regional Strategy for DF/DHF Prevention and Control - July 2001 was evolved. The highlights of the revised strategy are as follows:

7.1 Surveillance for Planning and Response

(1) Epidemiologic surveillance

Epidemiologic surveillance for DF/DHF should include both passive and active surveillance systems:

(a) Passive Surveillance

- WHO global and regional strategies recommend that every dengue endemic country adopts the standardized WHO case definitions for use in reporting DF/DHF.
- All SEAR countries should establish a passive surveillance system for both DF and DHF.

(b) Active Surveillance

- Every dengue endemic country should have at least one national reference laboratory to support the development of a laboratory-based active surveillance system.

- Two or more countries should be selected to pilot a prototype for early warning/response system for DF/DHF epidemic using sentinel sites to provide proof of the concept of this approach.
- An initiative should be supported to investigate the utility of integrating inter-annual and seasonal weather forecasts in early warning/response system for epidemic of DF/DHF in regional countries.

To establish and further develop active surveillance, the following activities are required:

(a) A multi-disciplinary panel of experts should be convened to develop standardized protocols and recommendations for further strengthening of surveillance systems keeping the following elements in view:

- Role of information technology in integration, display, analysis;
- Analysis of user needs- clinicians, vector control personnel, MoH, and the public;
- Data flow, quality, ownership;
- Anticipated serologic diagnostic developments in cost, ease of use, users- central vs. district-level;
- Mechanisms to provide standardized reagents and supplies to support laboratory-based surveillance;
- Timeframe for implementation of passive and active surveillance systems;
- Integrating the WHO "DengueNet" into the countries of the Region

(b) A comprehensive development plan and requirements for potential central reference laboratories in each dengue endemic country needs to be spelt out.

(c) Resources should be mobilized from outside donors to help implement this programme in Member Countries.

(2) Laboratory support

Efforts should be made to pay special attention to the following:

(a) Existing regional reference laboratories should be utilized to provide quality control and reference support for the national reference laboratories. Ultimately, a regional reference laboratory should be developed in SEAR.

(b) Every dengue-endemic country should have a national laboratory that can provide reference services and support capacity building for laboratory-based surveillance at the provincial/district level.

(c) Every dengue-endemic country should develop provincial-level laboratory capacity to support surveillance for dengue and other infectious diseases.

(d) The usefulness of regional and national laboratory-based surveillance is contingent upon concurrent development and maintenance of quality databases, and timely data exchange protocols should be developed to ensure quality control.

(3) Entomological surveillance

The purpose of entomological surveillance is to provide guidance and evaluation of DF/DHF control programmes. At the minimum, endemic countries should conduct periodic seasonal surveys to identify the most important habitats and use these data for targeted larval control operations. The utility of the pupal/demographic survey in estimating the importance of various types of breeding habitats for targeted source reduction efforts should be evaluated. Monitoring insecticide resistance in *Aedes aegypti* should be carried out as regular activity by Member Countries.

(4) Emergency response

Emergency response preparations should include as a minimum:

- Development of specific behavioural messages and mechanisms for their dissemination to the public and other segments of the populations;
- Hospitalization plans to deal with large number of patients, ensuring quality case management;
- Appropriate vector control measures with emphasis on targeted larval control, and

- Provisions to evaluate the emergency response measures in an effort to improve the plan.

7.2 Disease Management

(1) Medical services during epidemic

Guidelines for case management of DF/DHF should be made in the local language using the WHO guidelines (1997, 1999) for doctors, nurses and paramedical personnel.

(2) Medical & laboratory services and standard case management of DF/DHF during epidemics

Appointment of coordination committees for epidemic and case management should be made at the central level, which includes representatives of private hospitals. In addition, a local committee should also be established within the hospital for effective medical services during the outbreak.

(a) Outpatient medical service: Screening of all cases with fever

- Proper history (especially bleeding), clinical examination, especially tourniquet test
- Laboratory examination: CBC; WBC, Hct, platelet count
- Health education for parents/patients for warning signs of shock
- Observation wards / day care facility

(b) Inpatient service

Dengue ward/dengue corner

(c) Prompt reporting of cases to the concerned authorities

(d) Laboratory support

- Small hospital: basic lab - complete blood count, WBC, haematocrit, platelet count

- Large hospital: additional facilities for liver function test, blood gas and electrolytes analysis, renal function test, test to confirm diagnosis.
- Confirmatory test should be provided (at regional/ central laboratories) for selected cases such as unusual manifestations, encephalopathy, suspected dengue death cases, etc. (HI, ELISA, PCR, etc.)

(e) Referral system: need for strong referral system

- Good communication and consultation
- Quick arrangement for transferring patients

(f) Equipment/medications

- Oral electrolyte (oral rehydration solution)
- Isotonic solutions: crystalloid and colloid solution Dextran 40
- Manometer for blood pressure with different cuff sizes

(g) Training during epidemics

- Hospital staff, doctors and nurses to diagnose cases, recognize shock, and proper management
- Clinical meeting/ case conferences

7.3 Changing Behaviour and Building Partnerships

To achieve sustainable behaviour change activities and partnerships, the five components considered necessary are: situational analysis; identification of behaviours; social mobilization and communication; empowerment of the community, and partnerships.

(1) Situational analysis

A situational analysis should be conducted as the first step in developing behaviour change strategies and partnerships. This activity includes conducting a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis

of the current dengue programme; analyzing, and collecting where necessary, entomological data on vector breeding habitats; collecting information on local beliefs and practices related to dengue and mosquitos (qualitative data, not KAP survey data); collecting information on existing individual behaviours as they pertain to vector breeding and health seeking; and collecting information on institutional behaviours which result in vector breeding, including health institutions (clinics, hospitals) and other institutions such as schools, and centres of worship.

As part of the situational analysis, a stakeholder analysis should be conducted to identify all groups and/or partner institutions that already have or should have a role in dengue fever/dengue haemorrhagic fever prevention and control.

Implementation

To be accomplished by the end of 2002.

Capacity building

In the first half of 2002, a regional workshop for behavioural change interventions will be conducted with multidisciplinary country teams. In the second half of 2002, national workshops will be held, followed by a situational analysis in each country.

(2) Identification of behaviours to be changed

The first step to identifying behaviours to be changed is to identify the levels for intervention (e.g., individual, household, community, health professionals, institutional, policy makers, and private sector). Once the levels have been identified, the behaviours specific to that level should be clearly described along with methods for the behaviour change to occur.

In order for national dengue programmes to be successful in integrating this new programme component, capacity building issues need to be addressed. To ensure that all relevant departments within the Ministry of Health (e.g., Health Education/Health Promotion) as well as the partners identified through the stakeholder analysis understand the framework through

which behaviour change will be promoted, it was suggested that periodic informational meetings be held.

A second key area identified for capacity-building is monitoring and evaluation of the recommended behaviour changes. The capacity to monitor behaviour change can be strengthened by development of guidelines for behaviour change (following guidelines such as those for clinical case management), which would establish standards for developing the behavioural options, developing indicators which reflect the behaviour change, and tools, such as survey instruments, for measuring the change.

Political commitment is needed to implement expanded behaviour change activities. One behaviour change to be expected is greater commitment, in particular in the area of financing the programme, for dengue prevention and control.

Implementation

By the end of 2003, for the 3-5 core behaviours identified through situational analysis interventions should be developed and field tested.

Capacity building

Institutional ability to develop and manage behaviour change interventions should be strengthened.

(3) Social mobilization and communication

As part of building partnerships and developing capacity, individuals with specialized expertise in communications and social marketing will need to be brought into the process. Dengue programmes have traditionally lacked input from individuals with experience in mass media, including how to develop messages for specific target populations, how to identify and use various communications channels, including traditional communication channels. Guidelines on social mobilization and communications for each level targeted for behaviour change, and ways to monitor the communication methods for each level are needed.

The need to use multiple communication channels and to have consistency in the messages across the multiple channels was agreed upon by the group members. There is a need to target messages to specific groups in the community.

Ongoing monitoring of all communications activities to assess their impact should be instituted and changes made if the activity is not having the desired effect. Communication indicators for monitoring should be identified.

Social mobilization needs to be an integral part of all dengue prevention and control programmes. Cultural differences need to be taken into account when discussing and developing social mobilization activities. These differences can be used to create culturally appropriate mobilization activities. To achieve this, all other stakeholders should be identified to take advantage of the experience of other groups/initiatives with a longer history of working in social mobilization (e.g., UNICEF, Rotary, Expanded Programme of Immunization) to develop this component of the programme.

Implementation

- Beginning 2003, an introductory meeting to present the results of the situational analysis to stakeholders and partners should be held.
- In 2003, possible behaviours should be developed and pilot tested in selected areas and behaviour change indicators for each behaviour to be introduced should be developed.
- In early 2004, a follow-up meeting to introduce the behavioural methods to key stakeholders and partners should be held.
- Throughout 2004 to 2006, behaviour change interventions should be implemented, and behaviour change progress annually monitored using identified indicators.

(4) Empowerment of the community

All programme activities will be implemented in close collaboration with the local administrative units, local bodies/organizations, or national/local community-based organizations (CBOs) as a means of empowering these groups in dengue prevention and control. Groups such as the PKK (Indonesia), the Resident Welfare Associations (India), the Grameen Bank and

BRAC (Bangladesh) are already involved in the development, maintenance of community infrastructure, and implementation of health programmes. These local groups (political subunits in some countries) take responsibility for implementation, supervision, monitoring and enforcement issues.

The empowerment processes should be supported by the national or provincial health authorities in both technical and administrative programme aspects.

Implementation

- By the end of 2002, local administrative units, local bodies/organizations, or national/local CBOs should be identified as part of the situational analysis.
- Throughout 2003 to 2006: The relationship and outcomes of relationship between programme and local administrative units should be reported annually.

(5) Partnerships

Partners or stakeholders should be identified and roles and responsibilities in the prevention and control of dengue mutually defined. Partners do not work for us alone, we need to recognize that they have other goals. We can work with them, but need to identify what the programme can expect from the partner and what the partner can expect from the programme. The relationship must be mutually beneficial, a symbiosis.

For the partnership to be sustainable, it is necessary to: define mutually accepted goals; identify leadership and coordination, and identify the comparative advantage of each partner, intersectoral partnerships should be developed with relevant governmental agencies, since dengue control strategies may require the involvement of other ministries, such as the ministries of Environment, Tourism and Rural Development.

Implementation

- By the end of 2002, the roles, responsibilities and expectations of each partner will have been identified as part of the situational analysis.

- Throughout 2003 to 2006: The functioning and sustainability of partnerships should be reported annually.

8. REVISED REGIONAL STRATEGIES FOR PREVENTION AND CONTROL OF DF/DHF (JULY 2001)

There are six basic elements of the revised regional strategies:-

(1) Establishing an effective disease and vector surveillance system based on reliable laboratory and health information systems;

(2) Ensuring early recognition and effective case management of DHF/DSS to prevent case mortality;

(3) Undertaking disease prevention and control through integrated vector management with community and intersectoral participation;

(4) Undertaking activities to achieve sustainable behavioural changes and partnerships;

(5) Establishing emergency response capacity to control outbreaks with appropriate medical services, vector control, communications and logistics, and

(6) Strengthening regional and national capacities to undertake prevention and control of dengue and research related to epidemiology, disease and vector management and behavioural changes.

9. NETWORKS AND NEW INITIATIVES OF DF/DHF PREVENTION AND CONTROL

9.1 DengueNet on Surveillance for Planning and Response

Increasing occurrence of epidemics globally and geographic spread due to rapid circulation of dengue viruses has heightened the urgency to make available surveillance data to all the affected countries to develop early warning system and to mobilize resources for epidemic preparedness and control. DengueNet needs to be developed at national and regional levels and linked with global agency.

Objectives

(1) To improve standardized reporting of dengue and dengue haemorrhagic fever;

(2) To establish a single global data management system on an internet site for dengue fever surveillance including:

? Clinical surveillance data (number of DF, DHF cases and deaths reported weekly at state/provincial level), and

? Laboratory virological data (number of serotypes/genotypes identified weekly in each participating laboratory).

(3) To present instantly updated epidemiological trends for the affected countries each Member Country will develop a central data management system. Data will be generated by collecting all relevant information on cases of both DF and DHF, serotypes and genotypes as per standard definitions, indicators provided by WHO and present epidemiological trends as new data are entered. Information retrieval from 'DengueNet' will be helpful both for policy-makers and programme managers.

9.2 Institution and Agencies from Member Countries to form Network for Dengue Prevention and Control

Clinical Management Network

The Clinical Management Network mainly revolves round three elements, viz., (i) early diagnosis, (ii) case management and (iii) clinical research. Such networks should be developed at national and regional levels.

Objectives

(1) To identify expert committee and centre at the regional, national, and provincial levels;

(2) To update information and communication about DHF;

(3) To provide consultation regarding case management, and

(4) To enable capacity-building for health personnel at all levels.

The network mechanism will include all collaborative activities, viz., consultation, capacity building, and research development by using all elements of information technology. Initiation of the network will require development of national and regional expert committees and centres of excellence for establishing networking and websites with the active support by WHO.

The meeting endorsed the following institutions and agencies to form the network:

- Queen Sirikit National Institute of Child Health (Children Hospital), Department of Medical Services, Rajavithi Road, Thailand
- Faculty of Medicine, University of Indonesia (Indonesia)
- University of Gajahmada -Yogyakarta (Indonesia)
- Epidemiology Unit and College of Physician and Paediatricians (Sri Lanka)
- Paediatric Hospital (Vietnam)
- All India Institute of Medical Sciences, New Delhi (India)

Vector Control Network

The efficacy of insecticidal space spraying for control of the dengue vector *Aedes aegypti* could be ascertained through the Vector Control Network.

Space spraying has traditionally been used for control of DF/DHF epidemics. However, the impact has been variable from country to country. The efficiency of spray is greatly influenced by a wide range of environmental and operational factors. For this reason, WHO strongly recommends that programme managers/research institutions directly assess the impact on the wild mosquito population under local conditions. Such assessment should form an integral part of control operations as well as the first step in determining its cost-effectiveness in relation to other control strategies. Focus and study should be on entomological impact and on modelling analysis of impact on transmission. WHO has prepared a detailed common protocol for programme manager/research scientists to be followed for such assessment for comparable research. Institutions involved in this activity are:

- Anti-Malaria Campaign, Medical Research (Sri Lanka)
- Malaria Division and Vector-Borne Disease Control Offices, MoPH (Thailand)
- Dept. of Medical Sciences, MoPH (Thailand)
- Vector Control Research Centre, Pondicherry (India)
- Directorate of VBDC, Jakarta (Indonesia)
- Centre of Health Ecology -National Institute of Health Research and Development (NIHRD) (Indonesia)
- Vector Control and Research Department, Ministry of Environment (Singapore)
- Entomology Unit, National Institute of Hygiene and Epidemiology (Vietnam)

10. NEW INITIATIVES FOR DF/DHF PREVENTION AND CONTROL

10.1 Dengue Early Warning and Control - Role of Transmission Thresholds, the Pupal and Demographic, Targetted Source Reduction

For DF/DHF control, traditional "*Stegomyia*" indices are useful tools that can be used to evaluate operational control programme. However, they do not predict epidemiological risk, because they fail to take into account vector productivity, temperature and critical parameters such as the ratio of vectors to human host.

Recent developments of dengue transmission thresholds in terms of *Aedes aegypti* pupae per person, temperature and estimations of herd immunity permit the following:

(1) Classification of the absolute epidemiological importance of the various types of containers in the environment using as a measurement, the product of container productivity (average pupae per container) and abundance (containers per person);

(2) Enhancing the estimation of the risk of epidemic transmission on a spatial and temporal basis, by taking into account vector abundance per person, temperature and herd immunity, should viruses associated significant levels of morbidity/mortality be endemic or introduced, and

(3) Developing targeted larval control strategies against specific types of containers that reflect the epidemiological importance and the ability to control or eliminate the various classes of containers.

To implement this type of programme, detailed surveys are initially conducted to provide estimates of the productivity of the various classes of containers in the environment. Subsequently, risk assessments and documentation of the state of source reduction efforts can be made on the basis of counting only wet containers and people, using the productivity estimates from the detailed survey. Operationally, using the measure pupae per person differs from the traditional survey methods, in that wet containers are counted on a per person basis instead of per house.

In the light of these developments, it is recommended that this method be vindicated in several regional dengue-endemic countries.

10.2 Dengue Document

Globally, vector control programmes face a dilemma of sustainability, particularly when the interventions are community-based. The single most difficult obstacle recognized by National Dengue Control Programmes relates to behaviour change of the individual household, community, workplace and policy level. WHO, in 1999, during an informal consultation held in Geneva called for a package of tools, approaches and guidelines to assist national programmes in the design and implementation of appropriate behaviour change interventions. It was also recommended that indicators of "behaviour change" be developed for incorporation into surveillance activities by national programmes, along with epidemiological and entomological surveillance.

A dengue document is under preparation by a team of social scientists/communication specialists with experience in dengue control. The dengue document will emphasize the use of communication for behavioural impact (COMBI), while at the same time consider how to stimulate and

sustain community involvement in chemical, biological and environmental control measures.

The dengue document will comprise two volumes as follows: -

- A guide book for designing, implementing and evaluating behaviour change intervention, including a 5-20 days' workshop outline for practical introduction to the guide book.
- A toolbox of methods for formative monitoring and evaluation research for behaviour change interventions including 5-20 days workshop outline for practical introduction to the toolbox.

11. RECOMMENDATIONS

For countries

(1) Passive and active surveillance for both DF and DHF should be developed or strengthened using WHO standardized case definitions and standard laboratory diagnostic methods and vector surveillance.

(2) A network of laboratories should be developed and strengthened to support DF and DHF surveillance, including a national central laboratory to provide reference and quality control.

(3) An early warning system should be developed to predict, and an emergency response plan to control an epidemic.

(4) National guidelines on case management based on existing WHO guidelines should be developed and widely distributed and a programme for training all levels of medical personnel, both in the public and private sector drawn up.

(5) A National Expert committee on Case Management and Centre of Excellence for Case Management should be established.

(6) A situational analysis as a first step towards identification of risk behaviours and developing behaviour change strategies should be conducted.

(7) Social mobilization and communication activities that empower communities and establish/build on partnerships to prevent and control dengue should be initiated.

(8) With the coordination of WHO, a networking system for timely exchange of surveillance data using state-of-the-art information technology should be developed and implemented.

For WHO

(1) Effective implementation of the regional strategies for prevention and control of DF/DHF should be facilitated.

(2) Implementation of effective surveillance in the Region should be facilitated by convening a group of experts to draft standardized protocols and recommendations, soliciting outside donor support to help countries implement their programmes, and by establishing and strengthening the network of WHO collaborating centres for reference and research.

(3) Guidelines for case management of DF/DHF/DSS for nurses/paramedics should be developed and training for healthcare personnel continued to be provided through the intercountry network.

(4) Research and implementation of sustainable behaviour change activities in the Region should be facilitated through provision of technical support and intercountry networks to initiate social mobilization and communication activities.

(5) Collaborative studies on cost-effectiveness of vector control interventions and the socioeconomic burden of the disease should be undertaken.

Annex

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