



REGIONAL OFFICE FOR THE WESTERN PACIFIC
BUREAU REGIONAL DU PACIFIQUE OCCIDENTAL

MISSION REPORT

Subject : Dengue situation in Hong Kong

Place(s) visited : Hong Kong, People's Republic of China

Dates of mission : 10-17 November 2002

Author(s) and designation : Dr Chang Moh Seng
Scientist (Vector Control)

Name of focus : Communicable Disease Surveillance and Response

Participating agencies : Government of the People's Republic of China
(Hong Kong)
World Health Organization

Source of funds : Funds directly given by Japan to WPR for
various health promotion activities

Key words

Dengue - epidemiology, prevention and control / Disease vectors

ICP/CSR/1.1/001

8 August 2003

MR/2002/0822

Revision 1

English only

**WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC**

MISSION REPORT EXECUTIVE SUMMARY

Dr Chang Moh Seng
Author(s)

Hong-Kong
Place(s) visited

10-17 November 2002
Dates of mission

MR/2002/0822
Report series number

WP/ICP/REC/401/XZ/02
Project identifier

04.02.01.DT
Activity code

Objectives of mission:

In collaboration with the Department of Health of Hong Kong:

- 1) to assess the current dengue situation in Hong Kong;
- 2) to review the existing disease control and vector surveillance activities;
- 3) to advise on the plan of action for effective prevention and control of dengue fever; and
- 4) to provide training to professionals on dengue vector control.

Summary of activities, findings, conclusions and recommendations:

The writer conducted a retrospective review of the available reports provided by the Department of Health and by the Food and Environmental Hygiene Department on the dengue fever situation in Hong Kong from September to October this year. The case surveillance and epidemiological investigations done by the Department of Health following reports of the first dengue case at Ma Wan construction site were done well and resulted in the detection of more cases in Ma Wan and subsequently in Kowloon and the other parts of the New Territories. The rapid response organized by the Food and Environmental Hygiene Department was effective in preventing the spread of dengue from these two foci despite the fact that the vector control staff involved had little prior experience in dealing with dengue outbreaks..

The outbreaks in Ma Wan, Tsuen Wan and the So Uk Estate mark a major change in the pattern of dengue transmission in Hong Kong. Prior to these outbreaks, only imported cases had been reported but it is highly likely that a low level of silent transmission had existed for some time but the necessary combination of factors needed for an outbreak had not been present. With Hong Kong's position as a communications hub for Asia, the virus must be continually carried in by visitors and residents infected overseas. The Department of Health and other government departments responsible for the environment should now concentrate on developing a coordinated programme for dengue prevention and control. The focus must be on two aspects: strengthened surveillance leading to the quick detection of dengue cases and vector control. Early recognition and confirmation of probable dengue fever cases will be the key to effective epidemic response and will require a heightened awareness by all medical and health staff.

The following are some of the recommendations:

- 1) A system for the detection, investigation and rapid response to reported cases of dengue should be developed.
- 2) Required reporting of all suspected dengue cases must be strictly enforced. This should be based on a clear set of cases definitions.
- 3) All suspected cases of dengue should be serologically confirmed and all positive cases fully and quickly investigated.
- 4) Investigations should follow a standard procedure using a form similar to the one attached as Annex 3.
- 5) Active case finding should be carried out in the immediate area around all confirmed dengue cases. Recognizing the difficulty of doing such case finding in a high density urban setting such as Hong Kong at the minimum written notices should be given to all units in the same housing block that urges anyone having fever should seek immediate medical attention.
- 6) Vector surveys should also be done in the area around confirmed cases to determine the probable vector species and to identify and destroy key breeding sites
- 7) The location of all confirmed dengue cases should be plotted on a map and the coordinates entered into a Geographical Information System (GIS) that incorporates routine vector surveillance.
- 8) Current methods for vector control during outbreaks should be re-evaluated especially the use of ULV and thermal fogging.
- 9) A comprehensive larval survey should first be done to identify the key breeding places that should then be the target for ongoing vector control operations..
- 10) Considering the general lack of useful Aedes indices which can be used as predictive indicators, and given the housing structure in Hong Kong, the current use of the ovitrap index as the basis for monitoring Aedes mosquitos should continue.

Key words : Dengue - epidemiology, prevention and control / Disease vectors

CONTENTS

	<u>Page</u>
1. PURPOSE OF MISSION	1
2. BACKGROUND	1
3. ACTIVITIES AND FINDINGS	2
3.1 Activities	2
3.2 Findings	2
4. CONCLUSIONS AND RECOMMENDATIONS	7
4.1 Conclusions	7
4.2 Recommendations	8
5. ACKNOWLEDGEMENTS	9

FIGURE:

FIGURE 1 - EPIDEMIC CURVE OF LOCAL DENGUE FEVER CASES IN 2002
(AS AT 19 OCTOBER 2002), HONG KONG

ANNEXES:

ANNEX 1 - PROGRAMME ITINERARY

ANNEX 2 - LIST OF PERSONS MET

ANNEX 3 - RECOMMENDED PROCEDURES ON IMPORTED DENGUE CASES

ANNEX 4 - DENGUE CASES INVESTIGATION AND CASE CONTROL REPORT

1. PURPOSE OF MISSION

The writer visited Hong Kong from 11 to 16 November 2002 with the following terms of reference:

In collaboration with the Department of Health of Hong Kong:

- 1) to assess the current dengue situation in Hong Kong;
- 2) to review the existing disease control and vector surveillance activities;
- 3) to advise on the plan of action for effective prevention and control of dengue fever; and
- 4) to provide training to professionals on dengue vector control.

2. BACKGROUND

Dengue fever was made administratively notifiable in Hong Kong in March 1994. Since then, all notified cases were investigated by the Department of Health to establish their source of infection. Serology tests and, if possible, dengue virus serotype identification are performed. From 1994 to 2001, a total of 72 imported cases including four dengue haemorrhagic fever (DHF) cases, were registered. The rate of notification was higher in 1998 and 2001; these years coincide with epidemics of the disease in most of the Southeast Asian countries. Ovitrap surveillance since 2000 has established that *Aedes albopictus* is the only Aedine vector in Hong Kong with the density increased from April and peaking in June. *Aedes aegypti*, though recorded in the 1950s on a vessel from another city has not been detected since then. The importation of dengue fever from neighbouring countries and the prevalent of the vector *Aedes albopictus* suggest that Hong Kong is receptive to the local spread of dengue fever. The Department of Health has recognized the vulnerability of the situation and has implemented stringent epidemiological investigations and laboratory confirmation of all imported dengue cases. The Food and Environmental Hygiene Department through its Pest Control Advisory Section is responsible for territory-wide vector surveillance and control measures to curb any possibility of local spread of the disease. In addition to ovitrap surveillance, the Food and Environmental Hygiene Department is coordinating with various government departments in taking preemptive action in vector control. The control efforts focus on elimination of possible larval breeding sites either using environmental or chemical larviciding. Health education to solicit community participation is also emphasized. The monthly ovitrap index is used as an indicator to assess the *Aedes albopictus* breeding in the territory. In August 2001, the Department of Health set up the Interdepartmental Coordinating Committee on Dengue Fever to review the prevention and control measures, and to coordinate education and publicity efforts. A contingency plan on the prevention and control of local dengue fever outbreaks was prepared by the Department of Health in June 2002. The plan includes the demarcation of departmental responsibilities, alert procedures, communication flowchart and dengue vector prevention and control.

3. ACTIVITIES AND FINDINGS

3.1 Activities

The writer was briefed on the recent epidemiology of local dengue outbreak, disease surveillance and areas of concern at the headquarters of the Department of Health. A briefing session was organized for the writer at the Food and Environmental Hygiene Department on overall organization of the department and the role of the Pest Control Advisory Section. He was informed on the ovitrap surveillance methods for *Aedes albopictus*, dengue prevention and control activities, with emphasis on the recent outbreak control operation. At the Laboratory of Pest Control Advisory Section, the writer discussed dengue vector control and surveillance, the use of insecticides, laboratory testing on vector resistance and dengue case investigations.

Visits were made to locations where the recent local dengue cases had been reported or where further transmissions were possible. This included Ma Wan, Tsuen Wan, Tin Shui Wai, So Uk Estate and Cheung Sha Wan. Details of these visits/discussions are outlined below in this report.

In addition, the writer also reviewed and discussed the contingency plan on the prevention and control of local dengue fever outbreaks formulated by the Department of Health, the action plan for dengue vector surveillance by oviposition trap and protocol for handling local dengue fever case prepared by the Food and Environmental Hygiene Department. The writer presented a seminar on current epidemiology and control of dengue fever from a global perspective to a group of 100 medical professionals. A training session on dengue vector surveillance and control was also provided to more than 100 government pest control staff and private pest control agencies (see Annex 1 for a more detailed list of activities).

A debriefing session was arranged with the Secretary and Permanent Secretary for Health, Welfare and Food. Several issues pertaining to the recent dengue situation in Hong Kong, strengthening disease and vector surveillance, the role of the Interdepartmental Coordinating Committee and emergency response were discussed and ideas exchanged. A list of the principal persons met is provided in Annex 2.

3.2 Findings

3.2.1 Dengue activity after September 2002

Hong Kong experienced the first local dengue case in the history of the territory in September 2002. The first local case was detected on 19 September 2002 in Ma Wan involving a construction worker. The case was confirmed using polymerase chain reaction (PCR) as dengue serotype 1. Epidemiological investigation had not ruled out the possibility of the case being a local case.

Two co-workers at the same construction site were subsequently detected to have had previous illness compatible to dengue fever. The serum samples taken on 20 September 2002 were tested for anti-dengue IgM antibodies and were found positive. Both cases did not travel outside Hong Kong and thus were classified as indigenous cases.

Following the finding of the three indigenous dengue cases, the Department of Health mounted the medical surveillance and retrospective case finding among residents and constructions workers in Ma Wan on 19 September 2002 and confirmed a total of 16 cases. Of these, 10 cases were workers in Ma Wan with dates of onset between 20 July and 24 September 2002. Six cases were residents in Ma Wan; five had disease onset between 19 July and mid-August 2002, and the remaining one with uncertain date of onset of illness (Figure 1).

From 29 September to 4 October 2002, three other local cases outside Ma Wan (residence in Tsuen Wan, Tin Shui Wai and Shamshuipo) were confirmed to be dengue fever. One of them was dengue serotype 2. From the investigations, there was no evidence to suggest any epidemiological relationship of these cases with the cases in Ma Wan.

Since the last imported case notified on 13 November 2002 there has been no further cases reported. To date, the total number of dengue fever cases reported in Hong Kong stands at 42 with 20 classified as local cases. Based on epidemiological evidence, the dengue clusters had been confined to Ma Wan and its nearby areas in Tsuen Wan.

3.2.2 Emergency response

The Department of Health responded to the dengue situation as soon as a local case from Ma Wan was detected. The response included intensifying case surveillance, issuing an alert to the government, general outpatient clinics and private medical communities and setting up a hotline for public enquiries on dengue fever. The Interdepartmental Coordinating Committee on Dengue Fever was convened to strengthen the governmental efforts in response to the local dengue outbreak a week after the establishment of the three local dengue cases in Ma Wan. Dengue vector control measures focused on elimination of breeding sites and the promotion of public awareness were strengthened. The public was advised on precautions and prevention of dengue fever through press releases, media, web site and health education materials and campaigns.

3.2.3 Organization of control measures

3.2.3.1 Organization

The Pest Control Advisory Section of the Food and Public Health Branch of the Food and Environmental Hygiene Department has been conducting a programme for the assessment of the risk of dengue transmission in Hong Kong since January 2000. There were three main responsibilities of the Pest Control Advisory Section: dengue fever vector surveillance, dengue fever case investigation and technical support, and providing advice and training to operational staff. The actual implementation of the vector preventive and control activities is by the 20 administrative districts of the Environmental Hygiene Branch of the Food and Environmental Hygiene Department. Dengue vector prevention and control in each of the administrative districts is operated under the Mosquito Control Unit of the Pest Control Section. The other two units on parallel with Mosquito Control Unit are Malaria Control Unit and Rodent Control Unit. A total of 79 mosquito control teams with 205 staff are employed in mosquito control work throughout the territory. However, since the first outbreak of dengue fever detected on 20 September 2002, 300 staff from the Cleansing Section have been mobilized and another 180 contractual staff were also made available to strengthen the vector control activities.

3.2.3.2 Dengue vector prevention and control

Under the mosquito control services in Hong Kong, there are five main areas of work against dengue vector: weekly inspection of construction sites and problem spots, handling complaints on mosquito problems, regular surveillance of potential areas in the district, elimination of potential mosquito breeding sites and disinfection of vector for dengue fever case control. *Aedes albopictus* surveillance using ovitrap and elimination of the mosquito breeding grounds have been the two major dengue prevention and control activities. Enforcement of legislation is provided under Sections 27 and 28 of the Public Health and Municipal Services Ordinance. It is implemented either by issuing warning for any potential breeding sites or instituting direct prosecution against the owner/occupiers of the premises including construction sites for mosquito breeding. The number of prosecution in 2000 and 2001 was 451 and 399 respectively. As at 6 November 2002, a total of 367 prosecutions were taken by the Food and Environmental Hygiene Department.

3.2.3.3 Territory-wide anti-mosquito campaign

A territory-wide anti-mosquito campaign to be implemented in three phases was launched in April 2002. The commencement of the third phase coincided with the occurrence of the local dengue fever outbreak. The campaign was coordinated with various government departments with the main objective of eliminating breeding sites through community participation. The campaign also aimed to increase the public awareness about the potential risk of dengue fever. The Pest Control Advisory Section formulated the implementation plan and highlighted the target areas and specific control measures to deal with various potential *Aedes albopictus* breeding sites. Specific advice to the public and the management of construction sites were also provided. The effectiveness of the campaign will be evaluated using process indicators (number of breeding places found, number of legal action and amount of pesticide used) by the district mosquito control staff, and also using ovitrap indices conducted by the Pest Control Advisory Section.

3.2.3.4 Ovitrap surveillance

Ovitrap is used as a main *Aedes* surveillance tool in Hong Kong and the ovitrap index is the only available *Aedes* index so far. Since 2000, this device has been used in 38 strategic places to assess mosquito infestation in areas in close proximity to human residence such as in housing estates, waterfront cargoes, hospital and schools. Each target site is monitored once every four months and there is a plan to increase to monthly monitoring from January 2003. Results of the ovitrap indices are released to the public on a regular basis with specific advice on actions to be taken. Internally the direct pest control staff would step up mosquito control actions according to the level of ovitrap index. However, for areas with a report of dengue cases, insecticidal space spraying is conducted regardless of the level of the ovitrap index detected. Ovitrap surveillance results showed an early surge of the index in March 2002. As a result, the second phase of the anti-mosquito campaign was advanced.

3.2.3.5 Dengue fever case control

The Pest Control Advisory Section of the Food and Environmental Hygiene Department works closely with the Department of Health in the investigation of any confirmed or probable local cases and imported case of dengue fever. Case investigations are initiated within 24 hours of notification covering an area of 500 meters radius around the patient's residence, place of work and sites of visit. The incubation period of the case is also taken into consideration during the extensive investigations. Breeding sites inspection and health education are also carried out

during the case investigations. The whole process is expected to be complete within two days after the case is notified.

Sequential fogging or Ultra Low Volume spraying using Aqua-resigen (water based pyrethroid insecticide) is normally instituted for one month. The frequency of the spraying is on alternate day for the first week and at least twice weekly for the next three weeks (a total of nine spraying rounds). The status of the vector breeding in the affected areas is reviewed after one month to determine the next control action.

Since the local outbreak was detected in Ma Wan, several other mosquito control measures were implemented. These included inspection of the common parts of tenement buildings in the vicinity of the cases, inspection of village houses in Ma Wan, and removal of 80 tonnes of waste collected from vacant lands, hillsides and common parts of buildings.

3.2.3.6 Current situation in Ma Wan

A field visit was arranged by the Food and Environmental Hygiene Department to Ma Wan and Tsuen Wan where the majority of the local dengue cases were reported. The construction of high-rise private housings in Ma Wan construction site where the first three local dengue cases were employed is nearly completed. All the potential breeding sites have been eliminated or removed. A pest control agency was hired by the developer in Ma Wan to carry out mosquito control measures. The true situation during the period when the infections of the cases might be acquired during August-September cannot be assessed.

Intensive source reduction campaigns have been carried out in Ma Wan village by the district pest control teams. No positive breeding of *Aedes albopictus* was detected during the inspection visit. However, a limited number of potential residual breeding sites, mainly the discarded plastic receptacles, are still present. These potential breeding sites are harder to detect and are covered by overgrowth vegetation. The Pest Control Advisory Section is currently carrying out an ovitrap assessment in the village and ULV spraying is still continuing. There are two areas concerning *Aedes* breeding sites that might need public health attention: the vacant village houses and abandoned fishing vessels. A substantial number of houses are unoccupied or abandoned. To enter these unoccupied premises to conduct larval source reduction activities, ascertaining the ownership of these premises is required. The water accumulated inside abandoned fishing vessels could be another suitable *Aedes* mosquito breeding sites in the village.

3.2.3.7 Situation in Tsuen Wan

The writer visited one primary school, one housing flat and one private tenement building, both in Fuk Loi Estate for the purpose of identifying the potential *Aedes* breeding sites. A premise unit in the block of a housing flat was randomly picked for inspection and yielded a positive result. The breeding site was a flower vase for cultivation of ornamental plants. Adult *Aedes* mosquitoes were also spotted emerging from the vase indicating a productive breeding site. This finding provided sufficient evidence that harbouring *Aedes* mosquito in private residential housing units may be common in Fuk Loi Estate. Due to the close proximity of the residential units to the primary school (Holy Cross Lutheran Mission School), special efforts should be taken to remedy the current situation. Water storage jars and flower-pot plates were also commonly observed on the rooftop of a private tenement building. The above findings suggested that in addition to outdoor public areas, control of *Aedes* mosquito breeding in private houses should be intensified.

3.2.3.8 Other probable locations

Arrangements were made for the writer to visit the other probable locations where local dengue cases might have acquired their infection. Epidemiologically, these local cases were not related to the dengue cluster in Ma Wan. Visits to the patient residential house and a public park in Tin Shui Wai, and Sham Tseng Sun Tsuen were also arranged.

A visit to the case's residence at the new Tin Shui Wai housing flat did not support the likelihood of the patient having acquired his infection at this location. Subsequent visits to the patient's place of work, Cheung Sha Wan fishing wharf, provided some evidence that rubber tires hang around the fishing vessels and cargo ship could have been and may continue to be a potential breeding site. It was also found that some of the vessels at the fishing wharf came from as far as Kaohsiung, Taiwan. This city reported an outbreak of DF/DHF in July/August 2002. The situation is also conducive for the importation of *Aedes aegypti* from the water storage tank in the vessel to the fishing wharf.

An inspection of So Uk Estate, one of the case's house (DEN- type 2), and its adjacent hill slope land reserved area that the patient frequently visited, revealed a high biting rate of *Aedes albopictus*. The probability that the patient acquired an infective bite on this hilly slope reserved land was very likely.

3.2.3.9 Vector control in outlying islands

Lamma Island, situated to the south west of Hong Kong, where two imported dengue cases were notified in September 2002 can be considered as a potential risk to a local dengue outbreak. There is active mobility of people between Hong Kong and the island through regular express ferry. More than a few thousand people, including foreigners are currently settled on the island. The abundance of outdoor discarded water receptacles and the natural habitats could substantially support the local *Aedes albopictus* population. In such an area, the use of ovitrap will not provide any useful information to guide the control programme. A special plan of action on dengue prevention and vector control will have to be prepared for the outlying islands such as Lamma. Organization of mass destruction of discarded containers should be carried out before the rainy season and the islands should continue to be monitored and assessed. Extensive space spraying using trolley mounted ULV equipment will have an added advantage over the portable backpack sprayers for ensuring better coverage.

3.2.3.10 Seminar and training sessions

A seminar session on dengue fever control was organized by the Department of Health jointly with the Hong Kong Medical Association for the medical profession. A total of more than 100 members, primarily private practitioners, attended the talk. A training session organized by the Food and Environmental Hygiene Department was provided for the government and private pest control staff on dengue vector control. The first session focused on epidemiology, transmission factors and principle of dengue control. The second session emphasized operational aspects of dengue vector control.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The writer conducted a retrospective review of the available reports provided by the Department of Health and by the Food and Environmental Hygiene Department on the dengue fever situation in Hong Kong from September to October 2002. The writer attended several briefings and discussion sessions involving key personnel from both the Department of Health and the Food and Environmental Hygiene Department and field visits were made to areas where local dengue cases had been reported.

The case surveillance and epidemiological investigations done by the Department of Health following reports of the first dengue case at Ma Wan construction site were done well and resulted in the detection of more cases in Ma Wan and subsequently in Kowloon and the other parts of the New Territories. There were two transmission foci involved in the outbreak; the first in Ma Wan and nearby Tsuen Wan in the New Territories and the second in So Uk Estate in Kowloon. The rapid response organized by the Food and Environmental Hygiene Department was effective in preventing the spread of dengue from these two foci even though the vector control staff involved had little prior experience in dealing with dengue outbreaks.

The outbreaks in Ma Wan, Tsuen Wan and the So Uk Estate mark a major change in the pattern of dengue transmission in Hong Kong. Prior to these outbreaks only imported cases had been reported. However, it is likely that a low level of silent transmission had existed for some time but the necessary combination of factors needed for an outbreak had not been present. With Hong Kong's position as a communications hub for Asia, the virus must be continually carried in by visitors and residents infected overseas. It is likely that weather and other factors had led to a high density of *Aedes albopictus* in the area around the Ma Wan construction site which when combined with the arrival of a worker carrying the virus was enough to result in local transmission. The virus was then carried to the other two receptive areas resulting in secondary outbreaks. It is highly likely that similar outbreaks will continue to take place on a more or less regular basis unless preventive measures are instituted.

The Department of Health and other government departments responsible for the environment should now concentrate on developing a coordinated programme for dengue prevention and control. The focus should be on two aspects: strengthened surveillance leading to the quick detection of dengue cases and vector control.

Early recognition and confirmation of probable dengue fever cases will be the key to effective epidemic response and will require a heightened awareness by all medical and health staff.

There is no doubt that *Aedes albopictus* is currently the sole vector of dengue in Hong Kong. Experience from Macau in 2001 has shown that this species is capable of causing localized dengue outbreaks when the population density is sufficiently high. Sound environmental management based on a thorough knowledge of key breeding places is required in order to reduce mosquito populations in all private and public areas. To be effective, source reduction must be based on active participation by all sectors of the community including construction companies, property managers, architects, and individual families. It is a complex problem requiring full community participation and it is best that the necessary actions to prevent

future outbreaks be put in place now while the memory of the recent outbreaks is still in the minds of the public.

4.2 Recommendations

- 1) A system for the detection, investigation and rapid response to reported cases of dengue should be developed.
- 2) Required reporting of all suspected dengue cases must be strictly enforced. This should be based on a clear set of cases definitions.
- 3) All suspected cases of dengue should be serologically confirmed and all positive cases fully and quickly investigated.
- 4) Investigations should follow a standard procedure (Annex 3) using a form similar to the one attached as Annex 4.
- 5) Active case finding should be carried out in the immediate area around all confirmed dengue cases. Recognizing the difficulty of doing such case finding in a high density urban setting such as Hong Kong, at the minimum written notices should be given to all units in the same housing block that urges anyone having fever to seek immediate medical attention.
- 6) Vector surveys should also be done in the area around confirmed cases to determine the probable vector species and to identify and destroy key breeding sites.
- 7) The location of all confirmed dengue cases should be plotted on a map and the coordinates entered into a Geographical Information System (GIS) that incorporates routine vector surveillance. That database will facilitate spatial and temporal analyses leading to the identification of possible "hot spots".
- 8) Current methods for vector control during outbreaks should be re-evaluated, particularly the use of ULV and thermal fogging.
- 9) A comprehensive larval survey should first be done to identify the key breeding places that should then be the target for ongoing vector control operations.
- 10) Considering the general lack of useful *Aedes* indices which can be used as predictive indicators, and given the housing structure in Hong Kong, the current use of the ovitrap index as the basis for monitoring *Aedes* mosquitoes should continue.
- 11) Localities selected for the ovitrap survey should be further stratified based on epidemiological-ecological characteristics and this should include the housing estates, outreach villages, vacant lands adjacent to the housing area, the public parks, schools and hospitals.
- 12) The area selected for ovitrap survey should be mapped and location of the ovitraps indicated. Specific targets (ovitrap index) for each area should then be determined to assess the level of control achieved. A stringent target should be considered in the public housing estate due to its dense population density and greater epidemiological risk for dengue transmission. Any land reserve far from the human habitation should be excluded from the survey. If there is an increase in the readings, control operation should be mounted in the area immediately.

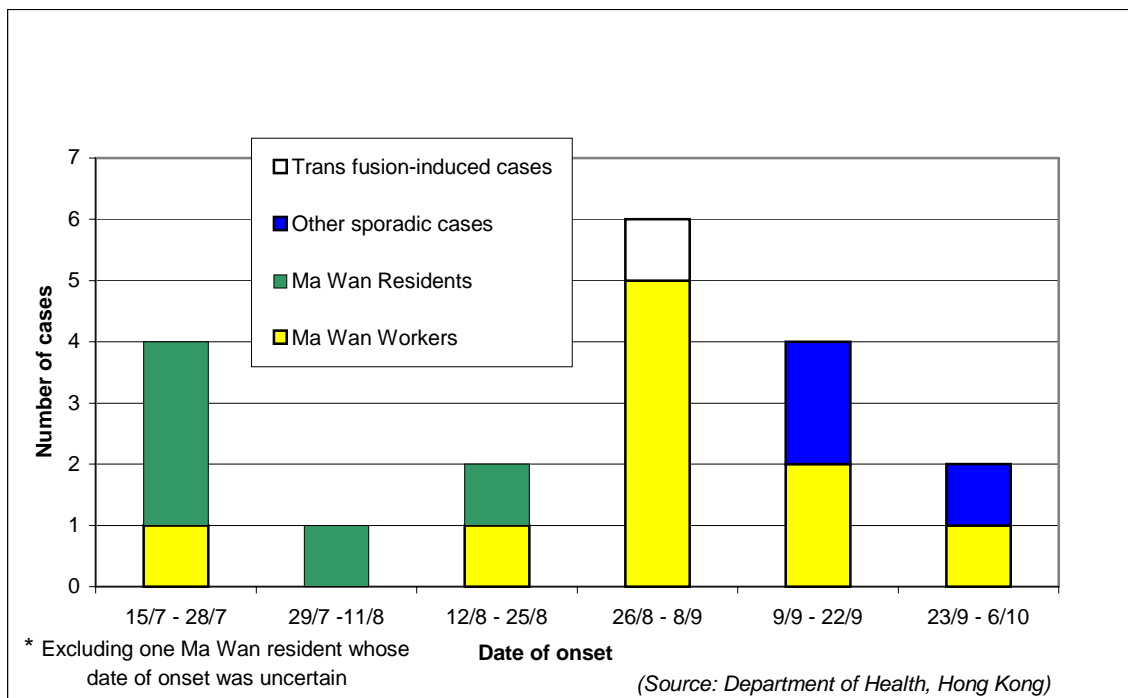
- 13) Due to the type of housing in Hong Kong and the labour-intensive nature of house-to-house searches for *Aedes* breeding to identify blocks of flats which are likely harbouring *Aedes* mosquitoes, the use of enhanced ovitrap (10% infusion) should be evaluated. The layout of this enhanced ovitrap in the block of building should be carefully evaluated. Strategic location and level in the block of building should be taken into consideration. To lay the trap only on the ground floor of the block would not represent the true condition of *Aedes* breeding in the block of housing. The presence of positive ovitraps would be justified for an indoor inspection on breeding sites. Feedback will then be provided to the inhabitants (or management) to generate their vigilance in source reduction.
- 14) All ports of entry including seaports, airport and vessels cargo wharfs should be spot-checked and the ovitrap should be used to detect the possibility of importation of *Aedes aegypti* into Hong Kong. Construction sites should be under strict surveillance and enforcement of legislation to ensure mosquito free. Pest control operators should be trained and their quality of work assessed by the Pest Control Advisory Section. All the picnic areas of the country park where people congregate should be ensured *Aedes* free.
- 15) The Food and Environmental Hygiene Department should take a leading role in the Inter-department Coordination Committee for dengue prevention and control. Greater support should be provided by the Department of Health to ensure its sustainability. In *Aedes albopictus* control larval source reduction is of paramount importance. Clear technical guidelines on how to eliminate the possible breeding sites in the respective areas of jurisdiction should be provided for each members of the committee and regular training, assessment and meetings should be convened.
- 16) The current intensive health education programme of dengue prevention should be assessed. In addition to using telephone interviews to assess the level of knowledge, attitude, belief and practice (KABP) on dengue and *Aedes* mosquito, spot surveys of selected households should be done on the measurement of the behavioural change. Assessment of the effectiveness of the space spraying using enhanced ovitrap should be considered. Since the insecticidal effect of space sprays is immediate and transient, the adult mosquito population must be monitored on a daily basis. The assessment should be over a period of one week in a confined area where migration of the mosquito to the spray area is not possible. This can be done by laying the ovitraps in the centre of the sprayed area with at least 400 meters radius as buffer. The village in Ma Wan should be the priority area to assess.

5. ACKNOWLEDGEMENTS

The writer would like to express sincere gratitude to Dr E.K. Yeoh, Secretary for Health, Welfare and Food, Dr. Margaret F.C. Chan, Director Health and Mr W.L. Leung, Director, Food and Environmental Hygiene for their administrative support and hospitality. Dr Leung P.Y., Dr Mak S.P. and staff from the Department of Health and Food and Environmental Hygiene Department, especially, Dr Tse Lai Yin, Dr Ho Yuk Yin, Ms Lo Yuet Yee and Mr Yuen Ming Chi for their enthusiastic cooperation and technical collaboration. The writer would also like to thank all staff of the Pest Control Advisory Section of the Food and Environmental Hygiene Department for their full participation and kind assistant during his assignment in Hong Kong.

FIGURE 1

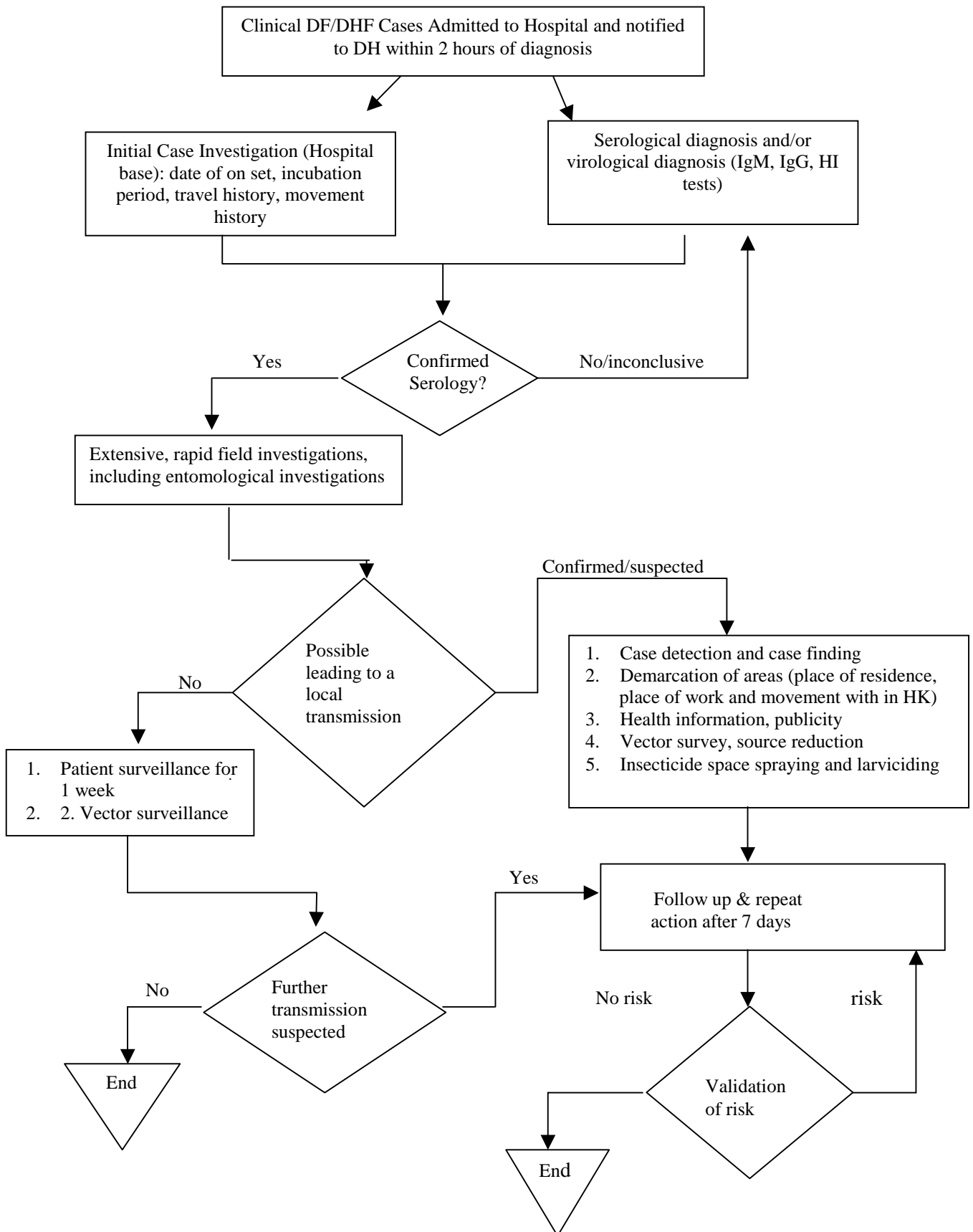
EPIDEMIC CURVE OF LOCAL DENGUE FEVER CASES* IN 2002
(AS AT 19 OCTOBER 2002), HONG KONG



PROGRAMME ITINERARY

Date	AM/PM	Programme
10.11.2002	PM	- Arrival at Hong Kong
11.11.2002	AM	- Visit Headquarters of the Department of Health to meet the Director of Health - Group briefing at Headquarters with the Director of Health
	AM	- Visit Headquarters of Food and Environmental Hygiene - Department to meet with DD (FPH), Con (CM)(RAC) - Group briefing
	PM	- Visit Pest Control Advisory Section (PCAS) at Public Health Laboratory Centre to meet the staff of PCAS and apprehend the work of the Section.
12.11.2002	AM	- Field visit to Ma Wan where the local dengue fever cases had been report - Discuss on the dengue fever outbreak in Ma Wan
	PM	- Visit Tsuen Wan district Office to meet the district pest control staff - Field visit to Fuk Loi estate, Hoi Pa Street and a constriction site at Chai Wan Kok where local dengue fever cases had been reported - Observe the mosquito control work conducted by district pest control staff
13.11.2002	AM	- Field visit to Tin Shui Wai and Sham Tseng to see the locations where further transmission of dengue fever were possible
	PM	- Field visit to So Uk Estate to see the location where the first DEN 2 local case reported - Field visit to Cheung Sha Wan to see the location where a local dengue fever case had been reported - Discussion on the dengue vector surveillance
14.11.2002	AM	- Group briefing at the Headquarters of Food and Environmental Hygiene Department
	PM	- Visit the Health, Welfare and Food Bureau to meet the Secretary for Health, Welfare and Food - Re-visit the Headquarters of the Department of Health to further discussion on the epidemiological surveillance
15.11.2002	AM	- Field visit to Lamma Island where two imported dengue cases were report
	PM	- Talk on dengue vector control to members of the ICC and medical doctors (new Medical Association Building)
16.11.2002	AM	- Seminar for pest control personnel on dengue vector control (Sai Wan Ho Civic Centre)
17.11.2002	PM	- Departure

RECOMMENDED PROCEDURES ON IMPORTED DENGUE CASES



DENGUE CASES INVESTIGATION AND CASE CONTROL REPORT

Ref/Case No.: _____ Regional Office _____

Name of Hospital: _____

Date of admission _____ Date of notification to DH _____

PART I : TO BE COMPLETED BY THE MEDICAL DOCTOR AT THE HOPITAL

1 Patient particulars

Name of patient _____ Age _____

Sex _____ Occupation _____

Home address in HK _____

Occupation address in HK _____

2 Initial case investigations

Classification of cases: Imported/Local/unclassified _____

Imported Cases: Name of country/territory: _____

Date of on set _____ Date of entry to Hong Kong _____

Date of diagnosis _____

Movement after arrival at Hong Kong (if imported case)

Initial assessment on source of infection _____

Risk of secondary transmission (nil/low/possible/highly possible)

3 Serological results

First blood sample taken on _____ Test on _____ Result _____

Second blood sample taken on _____ Test on _____ Result _____

Annex 4

4 Clinical findings, Laboratory diagnosis and virology (if applicable)

Clinical Findings	Laboratory Tests	Virology (PCR)

Provincial Classification: DF/DHF _____

5 Date of discharge: _____

Name Medical doctor:

Signature:

Date:

PART II: TO BE COMPLETED BY THE DEPARTMENT OF HEALTH

Case Ref No. _____ Hospital _____

1. Date of receiving notification: _____ Time (hour): _____

2. Date of case investigation and case tracing _____

3. Re-classification of case: Imported/local/other/unclassified _____

4. Patient home address: _____

4.1 Type of house and environment: _____

4.2 Number of contact _____ Number with clinical signs & symptoms _____

4.3 Number refer to hospital: _____

4.4 Other action taken _____

5. Patient place(s) of visit for the first 14 days of onset (in HK) _____

5.1 Number of contact _____ Number with clinical signs & symptoms _____

5.2 Type of house and environment _____

5.3 Number refer to hospital: _____

5.4. Other action taken _____

6. Patient place of work

6.1 Full address and location _____

6.2 Environment _____

6.3 Number contact _____ Number with clinical signs & symptom _____

6.4 Number refer to hospital _____

6.5 Specific action taken _____

7. Recommendations and conclusions

Medical officer (Consultant, community medicine i/c): _____

Date: _____

Department Of Health, Hong Kong

Annex 4

PART III: TO BE COMPLETED BY FOOD AND ENVIRONMENTAL HYGIENE DEPARTMENT

Case ref. Number _____

Date notified to FEHD: _____ Time _____

Date carried out initial entomological surveillance _____ Time _____

Date of follow up inspection: _____

ACTION TAKEN

1. At patient home address: _____

a. Vector survey and main findings (date of survey and main breeding site)

b. Source reduction _____

c. Space spraying

- Date and time of first spraying: _____ Total spray rounds _____
- Type of spray (ULV/Fogging): _____
- Total Insecticide use (litre) :
- Area covered: _____
- Application rate (ml per minute)
- Dosage per ml/ha _____

d. Larviciding/oiling

- Date: _____ Frequency _____
- Type of larvicide(s) use _____
- Total quantity used (Litre) _____
- Specific breeding sites treated _____
- Application rate (ml/ha)

e. Other vector control _____

2. Place of visits by the patient

2.1 List of possible places visited by the patient within 14 days of onset of the disease

a. Vector survey and main findings (date of survey and main breeding sites)

b. Source reduction _____

c. Space spraying

- Date and time of spray : _____
- Type of spray (ULV/Fogging): _____
- Insecticide use (litre) :
- Area covered: _____
- Application rate (ml per minute)
- Dosage per ml/ha _____

d. Larviciding/oiling

- Date: _____
- Type of larvicide(s) use _____
- Quantity used _____
- Specific breeding sites treated _____
- Application rate (ml/ha)

e. Other vector control _____

3. Occupational address: _____

a. Vector survey and main findings (date of survey and main breeding sites)

b. Source reduction _____

c. Space spraying

- Date and time of spray : _____
- Type of spray (ULV/Fogging): _____
- Insecticide use (litre) :
- Area covered: _____
- Application rate (ml per minute)
- Dosage per ml/ha _____

Annex 4

d. Larviciding/oiling

- Date: _____
- Type of larvicide(s) use _____
- Quantity used _____
- Specific breeding sites treated _____
- Application rate (ml/ha)

e. Other vector control measures:

4. Other Control measures implemented:

4.1 Health education activities:

4.2 Inter-department dengue coordinating committee:

4.3 Legislation:

4.4 Others (specify)

5. Overall Comments, conclusions and recommendations

Officer i/c PCAS _____

Date:

Deputy Director (FPH): _____

Date: