Strengthening of Public Health Surveillance System and Control of Dengue Haemorrhagic Fever (DHF) among Surveillance Workers in Community Health Centre in Medan

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DHF is a significant public health problem in Indonesia because the number of case is increasing. There were 58 cases reported with 24 deaths in 1968 while the average number of cases in the last 5 years (1999-2003) is 31,027 cases with 445 deaths in average annually. At the same period, for every 100,000 inhabitant 18 people got DHF and out of every 100 patients 1-2 person would die.

For six years 1998-2003, North Sumatra Province showed an Incidence Rate (IR) of 1-7.66 per 100,000 people, and 3 times the Case Fatality Rate (CFR) over the recommended WHO indicator (CFR < 1%) (1). In 1998, the North Sumatra CFR was 1.69%, in 2002, 3.68%, and in 2003 2.52% (3). Medan has the highest prevalence of DHF cases in North Sumatra Province (2).

Medan is the capital of North Sumatra province. It has population of 1,993,802 with 459,132 households and the population density of 7,520/km². There are 21 sub-district areas and 152 villages (Neighbourhoods/‘Kelurahan’). The 11 sub-districts with the highest reported DHF prevalence in Medan are presented in table 2.

There are five types of dengue surveillance: virological, epidemiological, clinical, serological and entomological surveillance (1). Epidemiological surveillance is the most important program for preventive and control of the disease. This process monitors disease transmission regularly and systematically and the factors that can increase the risk of infection by doing data collection, analysis, interpretation, and improving government DHF action plan (5).

Community Health Centre workers constitute an important epidemiological surveillance workforce. However, there is only one surveillance worker in each community health centre to do all surveillance tasks, including collecting and analysing communicable and non-communicable disease data, reporting, providing feedback and recommendation. In addition, surveillance workers provide weekly reports (W2) and daily reports (W1) of DHF cases in outbreak situations. All the tasks are conducted for monitoring Case Fatality Rate (CFR), Incidence Rate (IR), early detection of outbreaks, and implementation of control measures (3).

To achieve the ‘Healthy Indonesia Vision’, the MOH requires a structured
National Health Information System, which uses Epidemiological surveillance for providing data and information about diseases and health problems based on Indonesia Government Decree No. 25, 2000 (One of Government authorities in Health Policy is Epidemiological Surveillance). If the DHF surveillance system was poor, it would cause public health impact such as lack of public health planning and improperly implemented emergency response plans (6). Creating this authority had the purpose to strengthen the DHF surveillance systems in order to detect the early stages of epidemic transmission, and provide effective and efficient decision programs that are suitable to the available problems (5).

The purpose of this research is to explore the extent of professional background/training of DHF surveillance workers in Community Health Centres, to explore workers’ views on program resources & equipment and DHF surveillance tasks, barriers to effective surveillance activities in order to develop recommendations for improving the quality of surveillance and control program in North Sumatra Provincial Health Office in order to decrease the incidence rate and Case Fatality Rate of DHF. The research was conducted in Medan; capital of North Sumatra Province, Indonesia from December 2004 to February 2005.

METHODS
Recruitment of Sample
The research started with several consultations with two officers in Medan Health Office in order to select the respondents. There were 11 surveillance workers in Community Health Centers, which were selected from the sub-district with the highest DHF cases in Medan.

In addition, four heads of community health centers and one head of Animal transmission Disease Elimination Program were selected in order to get a management perspective and triangulate their responses with workers’ responses. The CHC managers were from the 2 sub-districts with the highest DHF prevalence and the 2 sub-district with the lowest DHF prevalence (of the 11 sub-districts with the highest DHF prevalence).

Semi structured in-depth interviews were conducted in community health centers in sub-district areas to collect the data. The interview protocols were selected for increased reliability and validity of the interviews. A facilitator from Medan Health Office and co-investigator from Southern Cross University in Lismore, NSW, Australia reviewed the questions.. The length of each interview was 30-45 minutes. The interviews were conducted in the respondents’ workplaces. Audio-taping and taking notes were used during interview.

A pilot interview was conducted and based on the response, the protocol was revised slightly to improve the flow and clarity of the questions. There were twenty-three open-ended questions under the following headings: program resources (5), overview of workers’ tasks (1), Epidemiological Investigation (2), Fieldwork tasks (8), Health Education (2), Data Recording/reporting (2), and interview closing questions (3). These were designed to explore the knowledge, attitudes and opinion of the surveillance workers about the Dengue surveillance program. The interviews were conducted in Bahasa. The participants also completed a background questionnaire that addressed the length of their employment and their dengue surveillance program experience.

The Principal Investigator (DD) also conducted three field observations of the surveillance workers performing work tasks. These workers were selected randomly from among the 11 community health centers. The observation was done when the surveillance worker did the fieldwork such as mosquito breeding place elimination and periodic larvae examination. The author went to the village together with the surveillance worker and observed what the worker did.

In-depth interview data were transcribed from audiotape and were grouped onto a worksheet by question topics in a table. After reading the transcript, coding categories were developed from every question (7, 8). Ministry of Health guidelines were used to compare the surveillance workers responses for questions 3 & 4 (how they described their surveillance tasks and how they performed their fieldworks task respectively) to their officially designated duties (5).
Three MPH students with experience and knowledge about DHF surveillance were asked to independently categorize the answers into three levels; poor, medium and good answer.

For the responses regarding description of surveillance tasks, their agreed levels are:
- Poor answer: < 3 actions
- Medium answer: 3 actions
- Good answer: > 3 actions

For the answers to questions about fieldwork tasks, for each of the tasks; Epidemiological Investigation, Breeding Place Elimination, Abatement usage, and Periodic Monitoring Larvae; answers were rated as follows:
- Poor answer: < 2 answer
- Medium answer: 2 actions
- Good answer: > 2 actions

Field observations were transcribed to field-note paper. After that the results were compared with in-depth interview results (6, 8).

RESULTS

**Surveillance DHF Workers Views on Program Resources**

Respondents, who said the current number of staff in community health centers (CHC) was not sufficient, thought that staffing levels for surveillance of DHF should be based on geographical coverage. Other respondents said staffing levels should be based on task coverage such as epidemiology investigation and fogging. Respondents, who said the current number of staff in CHC was sufficient explained that they received assistance from other CHC staff and that DHF cases were infrequent.

Most respondents did not know that there was a special budget for the DHF program and thought the budget came from the CHC effort. About a third of the respondents knew that there was not any special budget for DHF programs from the local government, but they received funds if there was a special occasion such as an outbreak.

All respondents mentioned appointment from their manager as a reason to be a DHF surveillance worker. Some respondents were chosen for the job because their previous jobs were related to DHF surveillance such as Environmental Health (see table 3). Others were appointed based on previous experience working with the community or because a vacancy needed to be filled although they did not have any experience in DHF surveillance.

There were two main themes regarding barriers for DHF surveillance work: resources and community attitude. In the resources theme, the workers stated two sub-themes: having difficulty in transportation to work sites and lack of time to perform surveillance activities. They identified the following community attitudes as the main barriers: suspicion, non-responsiveness, anger, neglect, and disinterest. Suspicious community attitudes made it difficult for the workers to access houses for inspection. Some community members were angry with surveillance workers because of misunderstanding of the reason the worker was checking their houses; they felt the workers did not believe their house was clean enough. The reason for some community members’ anger was due to their need to ‘save their face’.

**Surveillance Workers Views on Community Health Centre Facilities:**

None of the Community health centers had all of the facilities necessary for successful performance of surveillance activities (computer, telephone, fax machine and official vehicle). Almost all of the respondents used their personal facilities such as their private phones, and vehicles.

**Surveillance Workers Views on Their Tasks:**

Two third of the respondents gave good answers and none of them gave a poor answer, when they were asked to define the tasks in their job. They explained two main themes: environmental fieldwork and epidemiological and administrative data collection. They mentioned two sub-themes in environmental fieldwork: mosquito breeding place prevention (such as mosquito breeding place elimination, larvae survey and abatement usage) and mosquito elimination (fogging). Regarding data collection, they identified two sub-themes: epidemiological investigation and recording/reporting.
**Surveillance Workers’ Views on Epidemiological Investigation (EI)**:

Most of the respondents gave good answers and only one gave a poor answer, regarding activities necessary for effective EI.

They mentioned three activities they need to do within 24 hours: case confirmation, population description and inspection of surrounding area (± 20 houses- sign of *Aedes* larvae and positive symptoms). Another activity is monitoring high fever cases from the community when these are reported.

Respondents reported a number of barriers to conducting EI. The responses were grouped into two main themes: community attitudes and resources. Community attitudes that acted as barriers, were non-responsiveness, neglect and suspicion. A suspicious community attitude led to difficulty in access if the officer visited a community without the leader of the village or the owner of the house was not at home.

Some problems due to lack of resources were identified. These included lack of adequate staff numbers, lack of skill/expertise and lack of funding.

**Mosquito Breeding Place Elimination (MBPE)**:

Mosquito breeding place elimination: encourage the community to eliminate mosquito-breeding sites by “3M” (draining out, burying, and covering) goods or places with high potential for mosquito propagation. Most of the respondents gave poor answers and none of them gave a good answer regarding the mosquito breeding place elimination task.

They mentioned three activities: Friday movement, where the whole community works together to eliminate breeding places on Friday (during an outbreak they do this twice weekly), collaboration with stakeholders, and working simultaneously with the Health Integrated Services Post (one activity when providing other public health services to children < 5 years and pregnant women in the village/neighborhood).

The respondents described some barriers that they faced in mosquitoes breeding place elimination. The barriers were grouped into three major themes: neglectful community attitude, community actions (inconsistent and inappropriate), and lack of support from stakeholder collaboration.

**Abatement Usage**:

The majority of the respondents gave poor answers and a small number of the respondents gave good answers, when they were asked about their Abatement usage activities. They pointed out three themes: time (once in three months), indication (if larvae were present in water containers) and specific location (public water containers and private big water containers in endemic area).

Community attitudes were the only barriers to Abatement usage. The attitudes were neglect, disinterest, and low quality of abatement. As one of the respondent noted: “In the community’s opinion, private abatement is better than free (public) abatement, especially for in elite(richer) communities.”

**Periodic Larvae Monitoring**:

Most of the respondents gave poor answers and only one respondent gave a medium answer regarding the activities in larvae examination. They mentioned three factors: frequency (once in three months or twice a week if outbreak), larvae examination when doing mosquito breeding place elimination activity and house visit inspection to check water containers.

Respondents reported a number of barriers to larvae examination activities. The responses were grouped in three major themes: community attitude, inconsistent community actions and resources. They identified lack of funding and lack of staff in resources issue. Regarding community attitudes, the barriers were similar to barriers when conducting epidemiological investigation (EI).

**Fogging**:

When asked about reason for fogging, they cited as some reasons: prevention of DHF, elimination of adult mosquitoes, community requests, and a positive DHF identification made during EI.

There were three main themes regarding barriers for fogging activity: rainy season, community attitude, and resources. The workers explained that some community
members were suspicious of them and worried about chemical side effects. In resources, they stated two sub-themes: lack of staff, and equipment which included lack of material (chemical), quality and maintenance of fogging machine.

**Respondents’ Views on Health Education:**

The respondents identified two main themes regarding the way health education was given to communities: institutional setting and community setting. There were three sub-themes in institutional setting: Official places, Community health centre clinics, and schools. In community setting, they stated three sub-themes: together with other field tasks, together with health integrated services post and door to door together with epidemiological investigation. The only barrier reported there was from community members’ attitudes such as neglect and lack of audience because of disinterest.

**Interview Closing**

**Surveillance Workers Opinion about DHF Outbreak in Medan**

The respondents explained three main themes regarding reasons for the recent outbreaks in Medan: community, unpredictable weather (when the rainy season starts), and a dirty environment. In community theme, they identified four sub-themes: unprecedented human population growth, unplanned and uncontrolled urbanization, imported cases and community attitude (neglect and disinterest). One of the respondents stated, “In my opinion, if the population is increasing, the mosquitoes’ biting will increase.”

**Surveillance Workers Opinion about The Effective Action for Decreasing DHF Cases:**

There were three main themes when asked about the effective action for decreasing DHF cases: environment, community education and government regulation. In environment theme, they identified three sub-themes: clean environment, mosquito breeding place elimination and mass fogging before the rainy season. One respondent mentioned, "I think the best way to eliminate the adult mosquitoes is mass fogging before the rainy season. Don’t do it after having cases.”

**Surveillance Workers Suggestions to Improve the Activities of DHF surveillance Program:**

The respondents’ suggestions can be grouped into four main themes: government attention, resources, collaboration with stakeholders, and community health education. There were two sub-themes in the resources theme: providing official facilities (such as vehicle, telephone, and computer), and staff capacity building. One respondent stated, “I hope government can give more attention to the Dengue program and the competency of the doctors and health providers. Dengue experts should learn why dengue cases are still high even though all the activities have been done”.

**Field Observation**

Out of three planned field observations were undertaken, only one CHC worker did the fieldwork on the designated day. The other two CHC workers did not do fieldwork as planned. When the principal investigator (DD) followed this worker in the field, the worker carried out the tasks she reported in the interview. The other two workers explained their lack of activity as due to 1.It was still New Year and most CHC workers still have vacation and 2.that he did not need to go to the field because the number of cases had declined.

**DISCUSSION**

The aim of DHF surveillance is the early detection of outbreaks that permits the prompt implementation of control measures. This requires Epidemiological Investigation, Fieldwork tasks (Mosquitoes Breeding Place Elimination, Periodic Larvae Monitoring, Abatement Usage, Fogging), Health Education, and data record/ reporting. However, the results of this study showed that there were lacks of relevant training, lack of budget and lack of community awareness in the DHF surveillance program.

Firstly, not all DHF surveillance workers had an appropriate background or training for this job before they were chosen for this job. Most had a general medical background only. However, the findings showed that workers in service for more than 5 years have been trained in DHF surveillance. Although, the
other workers followed the MOH guidelines, they interpreted the guidelines by themselves without any additional support. This is worrying in terms of workers’ skill and performance. The results suggested that most of the respondents had knowledge about their tasks but they did not work optimally compared with the guidelines. This suggests that CHC’s surveillance system is inadequate and explains epidemics often reach or passed peak transmission before being detected (9).

Both surveillance workers (respondents) and their managers agreed that staffing levels are inadequate. Most of them said that the number of surveillance workers was not sufficient to perform tasks and the facilities in the CHC did not support their tasks. This is a concern in terms of effectiveness and quality. The results also suggested that the staffing levels should be based on geography and task coverage and if the staffing level is appropriate, the work performance would be better. However, this is worrying in terms of budget allocation, as the local Government does not have extra budget for this. DHF is not the only disease to which the local government needs to pay attention.

The findings showed that there was no clear statement about budget in CHC. There is no special budget for the DHF surveillance programs. It seems the local government only provides a special budget if there is an outbreak. If an outbreak occurs, it will have social and economic impacts. Social impacts can lead to family member death and decrease the life expectancy age (6). Economic impact includes cost for DHF patients (direct) and lost efficiency job time, school time (indirect) (4). This is worrying in terms of cost and efficiency. Prevention and Control Programs can be accomplished with lower budgets than curative programs. It would be better if the Government allocated bigger budgets for Prevention and Control program.

The findings show that the respondents tend to do perform only when cases occur, such as Epidemiological Investigation. This task can anticipate disease transmission, but only after the case rate has already climbed. This is worrying in terms of cost effectiveness. Prevention only works well before case counts rise (9). Most of the respondents gave poor responses in case prevention such as Mosquito Breeding Place Elimination, Periodic Larvae Monitoring and Abatement Usage. It would be better if the Government conducts DHF case prevention training.

Both workers and managers reported that community attitudes were the common barriers that the workers faced in their jobs in DHF surveillance and prevention program. It is worrying because the best way to prevent DHF is Community Participation to control mosquito larval breeding sites (6). The objective of Community Participation in DHF Prevention and Control is to get the community working together with health and other related government stakeholders in DHF Prevention and Control activities. The community expects the government to assume the bulk of responsibility. Other studies reported that some community members held the misconception that the mosquito responsible for spreading dengue breeds in the drains and this constitutes a sanitation problem, which is a government responsibility (10). It would be better if workers could increase the level of community awareness of how to protect themselves from infection through effective Health Education (11).

The Government needs to develop legislation that authorizes health workers to take necessary action within the community for the control of epidemics (1). This should cover all aspects of environmental sanitation in order to contribute to the prevention of all transmissible disease effectively. One example is Mosquito Breeding Place Elimination (12).

Health Education is another major strategy used in Control of DHF. It serves to create community awareness about the disease, educate people about the facts of the disease and its prevention, and promote public action in prevention and control of the disease (13). The findings showed that the respondents have already given education to the community, but there was lack of audience and uptake. Health Education should be carried out regularly and routinely in DHF endemic areas through a variety of education activities. This should be done in a way that is interesting and relevant in order to encourage the community to pay attention to the messages (14). As well as DHF Health Education content, surveillance workers...
should explain surveillance tasks such as the house inspection, in order to avoid difficulty in the community when workers perform surveillance tasks.

In field observation, a discrepancy was found between reported and actual work performance. It seems that some respondents wanted to give a better impression than their real work performance during the interview. This is a concern in terms of how authentic their interview data were. However, some respondents did perform in line with most of what they reported. The opportunity for field observation was limited in this study due to time constraints. Therefore, high-level stakeholders who have authority should provide checks and balance on workers’ performance in action, not only in writing report.

Workers tended to work more intensively when an outbreak was in progress. This was evident in the Medan Health Office’s data. The CHCs with the highest prevalence cases were the CHCs which did not carry out prevention and control program intensively.

**Limitations:**

Several limitations of this study should be considered when interpreting the findings. The structure of the interviews, which allowed for probing and clarification of responses, was designed to minimize misinterpretation. However, as with all qualitative studies, there is still the possibility of misunderstanding or biased interpretation of informants’ responses. These samples were purposive (i.e. only workers from the highest DHF prevalence areas were interviewed) and only three field observations were conducted. Interviews were conducted in the workplace and included questions on work performance. This could have resulted in the interviewees trying to make a good impression so they were not reported. The interviews were conducted and analysed in Bahasa, and it is possible that the meaning might be changed during the translation to English for this report.

**Conclusion**

Community Health Centers (CHCs) play the most important role in the Indonesian DHF surveillance and control program because the CHC is the sole place for community access to primary health service. The CHC provides the whole gamut of preventive, curative, rehabilitative, and health promotion services to their community. DHF Surveillance and control is just one preventive program in this very large list of challenges.

In the absence of a safe, effective and economic vaccine against DHF, vector (mosquito) control is the only method available to prevent and control this disease. Source reduction (elimination of the mosquito larvae habitats) through community participation is the most promising method for a sustainable, long-term control program and is the fundamental control strategy for DHF. Surveillance and control program can prevent outbreaks if the program performance is optimal. However, the program cannot be performed optimally if important factors are not in place to support it. The important factors are staffing levels, relevant training, and infrastructure resources.

In Medan it is necessary to strengthen surveillance and control programs by several ways:

1. Strengthen capacity of the workers by providing formal training in surveillance, case management and prevention.
2. Provide tighter performance management of surveillance.
3. Allocate more financial support to DHF prevention and control program.
4. Provide necessary resources such as computer, telephone, fax-machine and vehicles to support their tasks.
5. Develop national plans of action with realistic and clear objectives and targets to reduce DHF morbidity and mortality.
6. Develop legislative support for DHF control program.
7. Conduct regular, effective health education/health promotion through the different channels of personal communication, group educational activities and mass media.
8. Improve the content of health education by including the explanation about the surveillance tasks to avoid the barrier in the fieldwork tasks.
9. Convince communities, through health promotion and education activities, of the
short and long term benefits of the DHF surveillance and control program to ensure their cooperation and participation.

REFERENCE
2. Sulani F. Analysis Dengue Haemorrhagic Fever Disease in North Sumatra Province. In: DHF Course; 2004; Medical Faculty, USU; 2004.