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# PUBLIC HEALTH RESEARCH

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## The COMBI Approach in Managing Dengue Cases in an Urban Residential Area, Nilai, Malaysia

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### ABSTRACT

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<b>Accepted</b>	5 September 2013
<b>Introduction</b>	Dengue is a disease propagated by vectors namely <i>Aedes</i> spp. mosquitoes. One of the effective approaches to control dengue is through integrated vector management and intervention programs. COMBI or Communication for Behavioral Impact is a strategic approach to control the <i>Aedes</i> population as well as dengue cases.
<b>Methods</b>	This study was conducted at Taman Desa Kolej, Nilai, Negeri Sembilan, an suburban residential area to determine the effectiveness of COMBI, by using questionnaire and entomological survey as well as implementation of an intervention program. We carried out activities such as the establishment of COMBI promoter team, clean up events, talk shows with the residential community and distributed pamphlets containing information about dengue.
<b>Results</b>	Results indicated significant difference ( $p < 0.05$ ) on the knowledge, opinion and practices about dengue among the residents, for the pre and post intervention program. The entomological survey showed that, the primary mosquito species in this area was <i>Aedes albopictus</i> which comprised of 78 (31%) of the total mosquitoes examined, followed by <i>Culex gelidus</i> of 58 (23%), <i>Culex quinquefasciatus</i> of 37 (14.7%) and <i>Aedes aegypti</i> of 21 (8.3%). The density of <i>Aedes</i> population did not show any significant difference.
<b>Conclusions</b>	In conclusion, COMBI intervention was effective in controlling dengue cases in Taman Desa Kolej.
<b>Keywords</b>	Dengue - Survey - <i>Aedes</i> spp. - COMBI approach.

## INTRODUCTION

Communication for Behavioral Impact or COMBI is an approach that had been used to control diseases all over the world. In Bangladesh, India, and Kenya, COMBI has been applied for the control of Tuberculosis (TB), Lymphatic filariasis in Sri Lanka, Nepal and Zanzibar and leprosy in Mozambique<sup>1</sup>. Application of COMBI for controlling dengue cases started with WHO's COMBI planning model, draft versions of the guide involving multidisciplinary teams from 20 dengue-affected countries<sup>2</sup>. There were various interactive processes involved in the case studies to modify the existing practices in controlling dengue cases at the global scale. Before COMBI was implemented as a preventive tool, vector control and active surveillance from government sectors played major roles in controlling dengue<sup>3,4</sup>. Effectiveness of the prevention programs requires numerous integrated components, combined with active laboratory-based surveillance, adequate emergency response, trained medical community to guarantee correct case management, community-based integrated mosquito control, and effective use of vaccines if they were available<sup>5</sup>.

In Malaysia, the COMBI approach was initially implemented in Johor. It was launched in August 2001 as a pilot project and it was sustained for 12 weeks<sup>6</sup>. This approach highlighted on the importance of advocacy together with community mobilization as well as good communication regarding dengue control and preventive measures. In 2004, COMBI intervention was also implemented in Bandar Baru Bangi, Selangor<sup>7</sup>.

Since then, there have been intensive efforts by Malaysia's health authorities to educate the public on dengue and the *Aedes* mosquitoes through campaigns, the mass media, health visits and forums especially in areas that were identified as high risk for dengue outbreaks. It is important to assess levels of knowledge, opinion and practice among urban residents of such localities. The objective of this study was to measure the effectiveness of COMBI approach in the control of dengue cases in Taman Desa Kolej, Nilai, Negeri Sembilan.

## MATERIAL AND METHODS

### *Study design*

We conducted a cross-sectional study in Taman Desa Kolej. The respondents were residents in Taman Desa Kolej aged between 12 to 60 years old. The sample size was calculated using Krejcie and Morgan (1970) formula, were 224 respondents. The study was carried out from November 2011 to March 2012. One respondent per household was interviewed based on the inclusion criteria. The information was collected via face-to-face

interviews using a pre-tested structured questionnaire. Face and content validity were tested and reliability testing resulted in a Cronbach's Alpha of 0.76. Informed consent was taken from all respondents prior to the survey.

The questionnaires were distributed to Taman Desa Kolej residents to determine levels of knowledge, opinion and practices before and after the intervention (implementation of the COMBI programme). The pre-test was carried out in November while the COMBI intervention program was implemented in early December and the post test was done in early January 2012. Most of respondents were the heads of the households. This group of people was identified as persons who were responsible and capable of taking subsequent preventive and control measures. The questionnaires were divided into three sections; the first section was on knowledge regarding dengue, the second part was on respondent's opinion on dengue prevention and the third part was on the practices to prevent breeding sites at home. The marks are given as either 2 or 1 for correct answers and 0 for wrong answers. For knowledge section the maximum score is 30. For the attitude and practice, the maximum scores are 70 and 27 respectively.

### *Intervention programme*

Activities that were carried out were the establishment of COMBI promoter team, clean up events, talk shows with residential communities and distribution of dengue pamphlets to residents. The promoters of COMBI were selected from the Taman Desa Kolej's residents. These groups visited premises on foot to distribute dengue messages and inspected households for breeding sites. Pamphlets containing information about dengue served as tools for this intervention. The clean up event was held on 18 March 2012 with the cooperation of Seremban District Health Office and Universiti Kebangsaan Malaysia. The event consisted of numerous activities including a competition for children to find breeding sites and exciting prizes were given to winners.

### *Entomology survey*

Entomological surveys were performed, before and after the COMBI intervention. The surveys include Bare Leg Catching (BLC), CDC Light Trap, and calculating the ovitrap index. These were used as indicators to measure the effectiveness of COMBI program with regards to the vector ecology. For BLC, six volunteers were used in 3 sessions. It was carried out for 15 hours, starting from 6 am to 9 pm. CDC Light Trap was used to determine the adult mosquitoes distribution in a day. Ovitrap or oviposition trap was used to determine the ovitrap index in this locality.

Ovitrap index:

$$\frac{\text{no. of positive ovitrap that consist egg} \times 100}{\text{total no. of ovitrap that inspected}}$$

We used randomized selection to choose 30 houses to determine the distribution of mosquitos species in this area. Ovitrap were located inside and outside the house.

*Statistical analysis*

Wilcoxon signed rank analysis was employed to compare levels of knowledge, opinion and practice with the distribution of mosquitoes before and after the implementation of the intervention programme. Spearman correlation analysis was used to correlate

ovitrap index inside and outside the house with the daily rainfall distribution in the study location.

**RESULTS**

*Sociodemographic*

Table 1 showed the demographic distribution of 106 respondents from Taman Desa Kolej. Malays have the higher percentage compared to Indians, Chinese and others which was 73.6%, 12.3%, 9.4%, and 5%, respectively. The average age of the respondents was 38±14.8years. Based on the survey, the majority of the respondents are male (62.3%). The majority of the respondents had household income of RM 4,000 per month and above.

**Table 1** Sociodemographic distribution of respondents (n=106)

Demographic		n (%)
Race	Malay	78 (73.6)
	Indian	13 (12.3)
	Chinese	10 (9.4)
	Others	5 (5.0)
Age (mean±sd)	38 ± 14.81 years	
Gender	Male	66 (62.3)
	Female	40 (37.7)
Period of education	0 – 10 years	2 (2.0)
	11 – 20 years	95 (93.1)
	> 20 years	5 (4.9)
Household income	< RM 2000	4 (5.4)
	RM 2000 – RM 3999	13 (17.6)
	RM 4000 and above	57 (77.0)

*Knowledge, opinion, and practices during pre and post intervention*

There were significant differences between the pre and post intervention scores. The differences were significant (p<0.05) for all the three sections of the study questionnaires.

Comparison between score percentage for pre and post intervention were measured using Wilcoxon signed rank test (p<0.05).

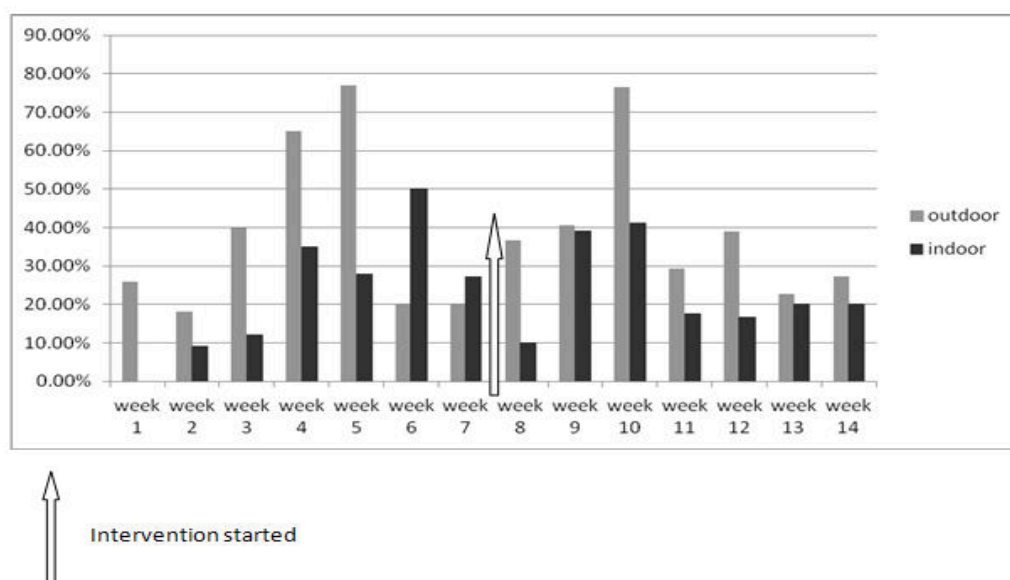
**Table 2** Change of knowledge scores after the intervention program (n=62) in Taman Desa Kolej, Negeri Sembilan

Variable	Pre-intervention Mean(SD)	Post-intervention Mean(SD)	Mean of score difference (95% CI)	t statistics (df)	p value
Knowledge score	21.9(4.24)	26.8(4.28)	4.8(-6.3,-3.3)	6.5(61) <sup>a</sup>	<0.001
Attitude score	51.7(7.75)	52.3(4.85)	-0.66(-2.87,1.55)	-0.59(61) <sup>a</sup>	0.551
Practice score	21.9(4.74)	22.5(1.96)	-0.52(-1.84,0.81)	-0.78(61) <sup>a</sup>	0.439

<sup>a</sup>paired t test

**Table 3** Number of adult mosquitoes caught using BLC and CDC light trap from 16 weeks outdoor and indoor ovitrap surveillance in Taman Desa Kolej, Negeri Sembilan

Species	Pre intervention		Post intervention	
	BLC	CDC light trap	BLC	CDC light trap
<i>Ae.albopictus</i>	28	9	38	3
<i>Ae.egypti</i>	7	5	9	0
<i>Culex</i> sp	10	35	17	62



**Figure 1** Ovitrap index of *Aedes* spp. obtained from 16 weeks outdoor and indoor ovitrap surveillance in Taman Desa Kolej, Negeri Sembilan

**Table 5** Comparison of Ovitrap Indexes after the intervention program

Variable	Pre intervention median (IQR)	Post intervention median (IQR)	Z statistics <sup>a</sup>	P value <sup>a</sup>
Ovitrap Index (indoor)	65.0(26.0,77.0)	36.8(27.3,40.7)	-1.18	0.237
Ovitrap Index (outdoor)	27.8(9.1,38.5)	20.0(16.7,39.1)	-0.17	0.866

<sup>a</sup>Wilcoxon Signed Rank Test

**Table 6** Correlation between Ovitrap Index and rainfall

Variable	Correlation coefficient ( <i>r</i> ) <sup>b</sup>	Pvalue <sup>b</sup>
Ovitrap index		
Pre-intervention(indoor)	0.356	0.433
Pre-intervention (outdoor)	0.134	0.775
Post intervention (indoor)	0.204	0.661
Post intervention (outdoor)	-0.412	0.358

<sup>b</sup>Spearman Correlation

*Dengue cases and COMBI*

Initially there were 5 confirmed dengue cases in the study locality. The intervention in the form of COMBI, was initiated in early December 2011. During the intervention period, there was no new dengue cases reported. Subsequently the number reduced to only 1 case.

**DISCUSSION**

The *Aedes* spp. and *Culex* spp. are dominant species in Taman Desa Kolej. *Aedes aegypti* were abundant in domestic area whereas *Aedes albopictus* usually prefer suburban areas<sup>8</sup>. *Aedes* spp. is a vector of dengue fever and Chikugunya<sup>9</sup>. The other genus is *Culex* mosquitoes which breed in dirty water such as clogged drains and mud<sup>10</sup>.

*Culex* spp is a vector for disease Japanese Encephalitis (JE) <sup>11</sup>. The presence of this genus explained by the pig farming existence in approximately 5 km radius from study site. However, since the matter of concern here is the dengue cases and *Aedes* spp. mosquito, therefore the subject on *Culex*spp. will not be elaborated.

Studies conducted in Myanmar showed relationship between knowledge and attitude of individuals towards dengue <sup>12</sup>. Overall, the score of pre-intervention knowledge was low at 48.8% but score of attitude and practices related to dengue was 80.3%, and 81.8% respectively. After intervention, these scores increased to 59.53%, 80.52% and 83.33% respectively. This study showed that the level of knowledge did not influence the attitude and practices among the residents. According to Nahla et al. (2009), high knowledge was the only predictor of high mean practice score <sup>13</sup>. This survey is a good platform to assess the impact of health education and community outreach approach to behavior change <sup>14</sup>.

There was a decrease in the number of dengue cases notified to Health District Office during sampling period from five cases to one cases. One of the factors that contributed for reducing the dengue case is through community intervention programme. According to Katyal et al. <sup>15</sup>, reduction of mosquitoes population and dengue cases are closely related to the implementation of educational programs to the community. Increased number of programs applied to the community, results in higher level of knowledge, and more control measures to prevent dengue would be carried out in the neighborhood.

## CONCLUSIONS

*Aedes* spp and *Culex* spp are dominant species in Taman Desa Kolej. Although, the density of *Aedes* spp showed no significant difference in pre and post intervention programme, there was a reduction in the number of dengue cases. In conclusion, COMBI intervention programme was effective in reducing the number of dengue cases in Taman Desa Kolej.

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