
ORIGINAL ARTICLE

THE COMBI (COMMUNICATION FOR BEHAVIOURAL IMPACT) PROGRAM IN THE PREVENTION AND CONTROL OF DENGUE – THE HULU LANGAT EXPERIENCE

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ABSTRACT

Background: The COMBI concept is a novel approach by the WHO to control communicable diseases which are influenced by community behaviour. The Ministry of Health is currently evaluating its use against dengue in selected areas throughout Malaysia. COMBI doctrine differs from previous dengue campaigns. It acknowledges that the factors contributing to dengue proliferation may differ between areas. Factors for a given area are analysed, then a single precise behavioural goal to overcome those problems is formulated. To inculcate this behavioural change, the target community is subjected to an intensive campaign using Integrated Marketing Communication techniques adapted from the advertising industry, particularly involving volunteers from the community itself.

Methodology: In Selangor the pilot project was implemented in Section 3 and Section 4 of Bandar Baru Bangi, in the district of Hulu Langat. Here, *Aedes* breeding was found to occur mainly in water containers of semi permanent nature (eg. 'kolah', aquatic plant jars, flower pot bases etc). A total of 172 volunteers were recruited to disperse the message of "Suluh – Suluh, Basuh - Basuh" whilst distributing leaflets and flashlights to 2666 homes. Residents were instructed to illuminate such water containers twice weekly and scrub any containers found to contain larvae. The program commenced on 23/5/2004 and lasted 16 weeks.

Results : During this period, the initial *Aedes* Index of 5 was reduced to 0.96 while combined cases of Dengue Fever / Dengue Haemorrhagic Fever in Sections 3 and 4 reported to the Hulu Langat District Health Office also dropped to 1 (unconfirmed).

Conclusion : The COMBI approach in Hulu Langat successfully demonstrated that correct problem identification synergized with community engagement can potentially reduce *Aedes* proliferation and dengue morbidity.

Keywords : COMBI, Community, Behavioural Approach, Dengue Fever, *Aedes* Index

INTRODUCTION

Dengue fever (DF) was first recorded in Malaysia in 1902 while the first case of Dengue Haemorrhagic Fever (DHF) was first described in 1962 during an epidemic in Pulau Pinang. Since then, dengue has remained an endemic disease with sporadic outbreaks and fatalities, whose control remains a major public health concern to the Ministry of Health (MOH), as well as the Ministry of Housing and Local Government.

In 1992 there were 5,473 reported cases (incidence rate of 29.38/100,000 population) while in 2001 there were 16, 363 reported cases (incidence rate of 68.78/100,000 population)¹.

In Malaysia, dengue is predominantly a disease of urban and rapidly developing areas, whose vector, the *Aedes* mosquito species, is found in two subtypes, *A. Albopictus* and *A. Aegypti*. Pending the commercial availability of a suitable dengue virus vaccine, all disease control efforts necessarily focus on eradication of breeding habitats of these mosquitoes. Studies conducted by the Institute of Medical Research (IMR) have long shown that both these subtypes favour breeding in shaded containers or water retaining structures of almost any type where rain or any other clear water can stagnate².

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The propagation of *Aedes* mosquitoes owes as much to the practices and behaviours of convenience of the affected communities as it does to the existing architectural and infrastructural conditions. Urban buildings and dwellings, slum and squatter areas, construction sites, refuse sites, storage yards and domestic households have all been implicated with flower pot bases, bathroom water troughs, discarded refuse, blocked gutters and unused tyres³, as well as domestic, commercial and industrial junk, static machinery, landed and strata property water storage tanks⁴ are frequently incriminated. Any attempt to resolve the problem of *Aedes* cum dengue proliferation by addressing certain issues in isolation is unlikely to attain long term success.

While improvements involving legislation and personnel, urban renewal and resettlement, better city structural and landscape designs, improved drainage and council refuse disposal services are actions within the government's prerogative, there is a recognized need for a fresh approach to action at community level. This recognition and issues related to it were discussed at great length by speakers and participants at the MOH-organized COMBI training course in Melaka in September 2003, and some of the salient comments are reiterated in the following paragraphs.

Although in general, most states in Malaysia often exhibit common patterns of urban dengue endemicity, it is only recently that the more subtle differences in breeding circumstances among different communities have begun to be explored in the hope of finding alternative solutions. It is with such considerations in mind that the COMBI concept was introduced to Malaysia, with the aim of using its unique methodology to identify social traits in dengue affected communities and tailor eradication programs accordingly⁴.

In Malaysia, the responsibility for dengue control activities (eg: fogging, *Aedes* surveys) in most major cities and towns is increasingly being assumed by the local authorities. The Ministry of Health maintains its role in non – council areas whilst retaining its advisory capacity in training and assisting the local councils. Through its Vector Borne Diseases Control Unit (RKPBV) of the Infectious Disease Control Division, the ministry remains the main government agency responsible for monitoring dengue disease incidence and breeding indices, evaluation of eradication,

control, and enforcement activities as well as health promotion and education programs².

The anti dengue and public awareness campaigns conducted by the RKPBV nationwide via posters, banners and media ads all homogeneously implore a decades-old, generic and unchanging theme ie. appropriate refuse disposal, burying potential breeding containers, putting abate etc. The aim as ever, is to inculcate in the general public some basic knowledge and a sense of responsibility in reducing the breeding of mosquitoes. While this is rightly so, the relevance (and thus appeal) of such traditional exhortations in today's diverse modern living deserves timely scrutiny. The ministry has taken cognizance of this fact through the adoption of the COMBI concept, which amongst others, demands not just the disease but also the people involved be studied beforehand prior to any campaign⁴.

There is also now a shift towards community empowerment as evidenced by the trial of community based programs such as COMFOG (Community based Fogging) in Perak, Selangor and Pahang, and again COMBI whose area of scope is progressively being expanded in various states¹.

This paper provides an abbreviated background of COMBI, the observation of the unifying characteristics of *Aedes* breeding in the target community of Section 3 and Section 4 of Bandar Baru Bangi, the assessment of communal makeup, traits and routines, the application of COMBI marketing principles and finally, the perceived impact on dengue incidence within the said community. It is not intended to be an exhaustive treatise of COMBI doctrine per se, the details of which can be obtained through the RKPBV unit at federal level.

COMBI (COMMUNICATION FOR BEHAVIOURAL IMPACT)

COMBI is a new approach towards tackling communicable diseases espoused by the World Health Organization (WHO). The official WHO Communicable Diseases Programme description of COMBI reads “..the task of mobilizing all societal and personal influences on an individual and family to prompt individual and family action.” It incorporates the lessons of the past 50 years in health education and communication while drawing substantially from the experience of the private sector in consumer communication (advertising)⁵.

The number of nations incorporating COMBI into their indigenous communicable disease control programs is growing exponentially. Since 2001, COMBI has been applied in the elimination of leprosy in Mozambique⁵, the control of tuberculosis (TB) in India and Nepal⁶, lymphatic filariasis control in Zanzibar⁷ and the control and prevention of dengue in Lao People's Democratic Republic and Johor Bahru, Malaysia⁸. Since 2003, the list has grown to include Bangladesh, Kenya, Sri Lanka, Sudan and a host of Latin American countries⁹.

COMBI integrates health education, information-education-communication (IEC), market research, advertising techniques and community mobilization in an effort to achieve the ultimate goal of behavioural impact in health: "someone doing something" to adopt and maintain healthy behaviours. A basic mantra of COMBI dictates "Do Nothing...make no t-shirts, no posters, no pamphlets until the precise single behavioural goal has been formulated"⁵.

For example, in the fight against lymphatic filariasis in Zanzibar, the single behavioural goal was to ensure that at a given time on a given date, all members of the population swallowed the diethylcarbamazine (DEC) tablets provided⁷. In the fight against TB, COMBI has been used to ensure the attendance TB patients at DOTS clinics, as well the provision of sputum samples in suspect cases⁶.

In contrast, formulating a single behavioural goal for combating *Aedes* and dengue is a more complicated proposition, given that i) there is no specific treatment or vaccine to form the basis of intervention ii) any preventive measures have to take into account the disparate multitude of contributory factors involved. In dengue, it is difficult to single out any one solution as being the best. Proponents of community fogging and applying abate might balk at the cost, while homeowners living next to abandoned / neglected houses can do little except report it to the authorities. Hence it is inherently more useful to view COMBI as part of an overall multifaceted anti-dengue effort rather than a standalone tool⁴.

Following the success of the COMBI program in Johor Bahru in 2001, the program was expanded to other states in Peninsular Malaysia. From 14 – 20 September 2003, a week-long training course was conducted in Melaka by visiting WHO Communications Advisor Dr. N. Everold Hosein for health representatives from selected states. Central to

the course was the identification of dengue problem localities amenable to subsequent COMBI amelioration.

The Hulu Langat District Health Office was directed by the Selangor State Health Department to spearhead the program. Based on its own 2002 data, the Hulu Langat District Health Office Vector Unit selected the Bandar Baru Bangi area for the pilot project. The reasons for selection were threefold: i) high number of dengue cases (30% of total for district) ii) increasing number of dengue cases (39% increase from the previous year) iii) consistently high *Aedes* Index (> 5). Within Bandar Baru Bangi itself, Section 3 and Section 4 were identified as the focus of the program as these two sections had been classified as Dengue Priority 1 Areas after experiencing severe outbreaks in the past. Also there was a total of 2666 household premises in the area, which was considered an appropriate and manageable figure in terms of manpower available and time for a pilot project.

Methodology Of COMBI

The design of a COMBI plan begins with identifying the behavioural objectives. This takes the form of a statement of the overall goal followed by a statement of the behavioural goal which must be specific, appropriate, measurable and time bound.

The next step is known as the Situational Market Analysis (SMA) which is the observation and analysis of factors influencing the attainment of the overall goal and the behavioural goal. Existing and new data on factors causing or contributing to the disease problem are studied. The strategy and choice of communication techniques will also be determined by the SMA. The SMA involves listening to people and learning about their perceptions and obstacles to the proposed behaviour through techniques common to the advertising world such as TOMA (Top Of the Mind Analysis), DILO (Day In the Life Of), MILO (Moment In the Life Of) and NOSA (Number Of Steps Away).

Next, the overall strategy and plan of action is drawn up. This comprises a broad outline of the proposed actions for achieving the behavioural results. At the core of this is the 5-Pointed Star of Integrated Marketing Actions which consists of Public Relations / Public Advocacy / Administrative Mobilization, Community Mobilization, Personal Selling

(Interpersonal Communication), Advertising (Massive, Repetitive, Intensive, Persistent @ M-RIP) and finally Point – of – Service Promotion.

When the strategy and plan is in place, actual implementation can begin. A multidisciplinary team is appointed, which will collaborate with other agencies. Adherence to the planned time schedule (eg. Gant Charts etc) and budget is critical. As the program progresses, evaluation of progress via data collection and analysis is carried out.

The situational market analysis of Sections 3 dan 4, Bandar Baru Bangi was primarily based on *Aedes* breeding site data for the period of September to October 2003 which was supplied by the Vector Unit of the Hulu Langat District Health Office. This revealed that the main sources of *Aedes* breeding in the household premises were bathroom water troughs (*kolah*), flower pot bases, aquatic plant jars, urns, vases, disused aquariums / fish enclosures, multitiered motorized mini waterfalls, corridor gutters, refrigerator condensation trays etc. As these were aesthetic items of value and of a permanent / semi permanent nature, the traditional message of discard or bury was somewhat absurd.

Socioeconomically, the neighbourhood is rather homogenous, consisting mainly of Malay middle class families with corresponding educational attainment, with a number of affluent households and conversely factory workers / students occupying respective ends of the spectrum. The main dwellings are double storey link houses, with a substantial number of bungalows as well as apartment/ factory hostel type of accommodation.

Bandar Baru Bangi arose in the past 3 decades with the opening and development of the Universiti Kebangsaan Malaysia (UKM) campus. Hence the vast majority of residents are career people from various parts of Malaysia whose days are normally engaged in work commitments throughout the Klang Valley, and whose weekends are spent away from home. Hence time is at a premium, a factor which weighed heavily in our DILO and MILO deliberations.

Most of the residents were familiar with the association between dengue and their neighbourhood, and had a rudimentary grasp of the how dengue occurred, which helped tremendously in our TOMA, NOSA and other analyses.

After considering the above factors and studying the *Aedes* life cycle, the overall goal

statement was formulated as follows : *“To reduce the incidence of Aedes breeding as determined via the Aedes Index (AI), by 30 % in the designated locality of Sec.3 & 4 Bandar Baru Bangi by the end of the 16 week campaign”*. Next, the behavioural goal statement was outlined in the following statement : *“To prompt household members in 80 - 90% of homes in Sec. 3 & 4, Bandar Baru Bangi starting 25th April for 16 weeks, for approximately 10 – 15 minutes on every Sunday morning and Wednesday evening, to inspect their homes both inside and outside, for mosquito larvae, by simply shining a torch into flower pot bases, aquatic plant jars, urns, vases and bathroom water troughs. Should they notice any larvae, they are to get rid of the water, then scrub the rim and insides of the container to get rid of unhatched eggs”* .

The underlying idea was to impose as minimally as possible upon people’s daily routines while effectively disrupting the *Aedes* breeding cycle. To improve the appeal, the memorable slogan *“Suluh Suluh, Basuh Basuh”* was coined.

Due to the inherent bias and subjectivity of self reporting methods of assessment, it was decided that *Aedes* and *Breteau* Indices obtained through the fortnightly *Aedes* Surveys would serve as tracking indicators of success of the program.

The overall strategy of COMBI in tackling dengue in Sections 3 and 4 Bandar Baru Bangi was implemented as follows:

With regard to Public Relations and Advocacy cum Administrative Mobilization, the Hulu Langat Medical Officer of Health ordered the mobilization of district health staff particularly the Health Inspectors and Public Health Assistants to assist the volunteers. Government agencies with related interests in dengue prevention in Bandar Baru Bangi such as the Kajang Municipal Council (the local authority responsible for sanitation and dengue control) and Selangor State Development Corporation (as the area developer and land controller) were informed and invited to participate. Consent was sought from the District Education Office in order to enlist the cooperation of 4 local schools. We also liaised with the local police regarding security assistance.

As part of our Community Mobilisation efforts, we commenced the selection of approximately 150 – 200 local volunteers from the target community to form 20 “Anti Dengue

Volunteer Teams” who would visit the premises on foot fortnightly to impart the novel anti dengue message and inspect for breeding (*Aedes* Surveys). A further contingent was invited to form 1 – 2 roving “Anti Dengue Scooter Teams” to promote the same message. To recruit and oversee the activities of these volunteers, we canvassed for certain highly committed volunteers to form a Residents’ COMBI Committee.

In keeping with COMBI experience elsewhere, we concurred that students would be ideal for Personal Selling within their own homes and circle of friends. Hence the involvement of the 4 local schools ; teachers would distribute worksheets to students in Year 4 and 5, as well as Form 1 and 2 who would act as ‘personal sellers’ to spread the message in their respective families as well as perform the desired ‘suluh & basuh’ practices.

For advertising and promotion media, we used pamphlets, bunting, t-shirts, newspaper inserts, mobile public announcements etc. We also planned an Inauguration Ceremony, to be officiated by the local Member of Parliament (MP) as further means of publicity.

In comparison to the COMBI program in Johor Bahru, the Bandar Baru Bangi program was of a significantly much smaller scale. In terms of client volume , the most convenient and prominent place frequented by the residents of Sections 3 and 4 was simply the local health clinic. We therefore used Klinik Kesihatan Bandar Baru Bangi for our Point –of- Sale Promotion ie. incidental promotion of the COMBI message to patrons coming for other reasons.

Having determined the overall strategy and specific behavioural goals, the next step was designing the appropriate logo and selecting the appropriate media to carry the message. This and other budgetary considerations was purview of the Vector Unit, Selangor State Health Department. The purchase of bunting (danglers), stickers, t-shirts, pamphlets, caps, vests, kitbags, torchlights, batteries, student worksheets and stationery for distribution among an estimated 3000 households and program volunteers was accomplished from November 2003 to January 2004.

Next, a working committee at district health office level and chaired by the Hulu Langat Medical Officer of Health was set up on 25th February 2004. This committee was tasked with the distribution of the program related items and training of volunteers. The critical step of

establishing a Residents COMBI Committee was achieved on 1st March 2004 where 20 local residents were briefed by the Hulu Langat Medical Officer of Health. Training of a total of 172 volunteers was completed on 18th April 2004.

After several postponements due to national elections and various holidays, the *Aedes* Surveys finally commenced on 23rd May 2004. The distribution of student worksheets and placement of advertising media was implemented concurrently. Volunteers accompanied by health staff visited homes in their respective areas every 2nd and 4th Sunday of the month. Volunteers were issued uniforms and identification cards. Their mission was to distribute pamphlets and torches while instructing residents on the new practice, as well as to inspect the premises for larvae samples which would be sent for official analysis and confirmation. To enhance receptiveness towards the program, a temporary halt on compound fines for detected breeding was announced. The front doors of premises visited were tagged with adhesive cards which were replaced in different colours monthly, to denote successive visits and aid coverage.

The climax of the campaign was the Inauguration Ceremony held in a local school field for high visibility on 7th August 2004. Apart from the presence of the local MP, added publicity was gained through the hosting of a colourful themed run “Larian Suluh Suluh, Basuh Basuh” involving t-shirt clad schoolchildren running escorted through their neighbourhood, chanting the slogan and waving slogan embossed balloons.

RESULTS

Over the 16 weeks, a total of 2458 premises or 92.2% of the total available were visited and inspected at least once. Of those, a further 1923 (78.2%) were visited and reinspected a second time. Premises not inspected were mainly locked vacant premises awaiting tenants or buyers, while premises not reinspected were those whose occupants were out. Fig. 1 illustrates the number of premises visited per *Aedes* Survey.

The reduction in the number of premises inspected during the second, third and fourth surveys (on 23.5.04, 6.6.04 and 27.6.04 respectively) as compared to the first survey (on 23.5.04) was attributed to late starting times. This in turn resulted from the need to redistribute

the teams prior to departure in order to i) focus on problem areas arising during preceding surveys and ii) to ensure equal manpower in the event of absenteeism. Only 312 premises were

inspected on the final *Aedes* Survey on 12.9.2004 as the survey was concluded early to allow for a farewell gathering of volunteer.

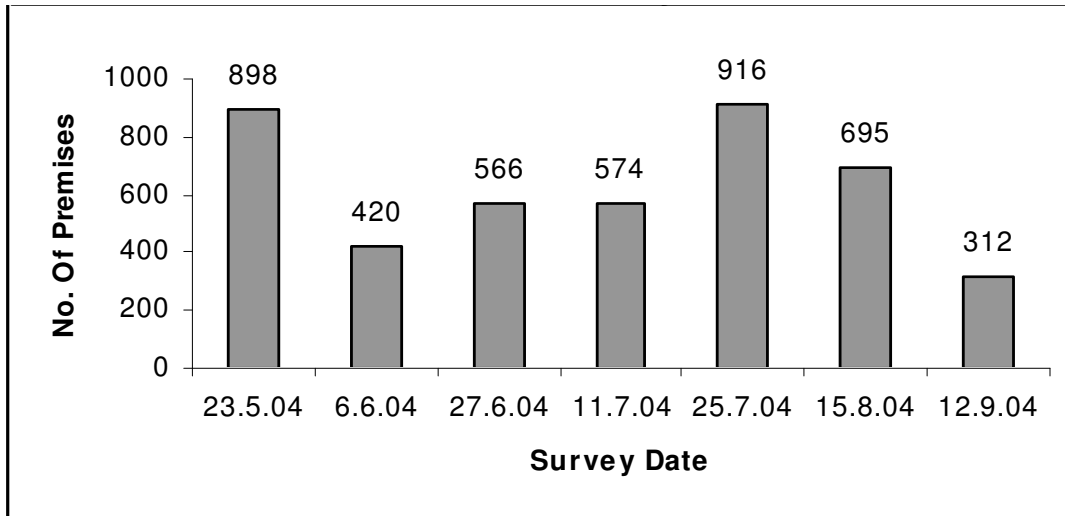


Fig.1: Number of premises inspected on each Aedes Survey

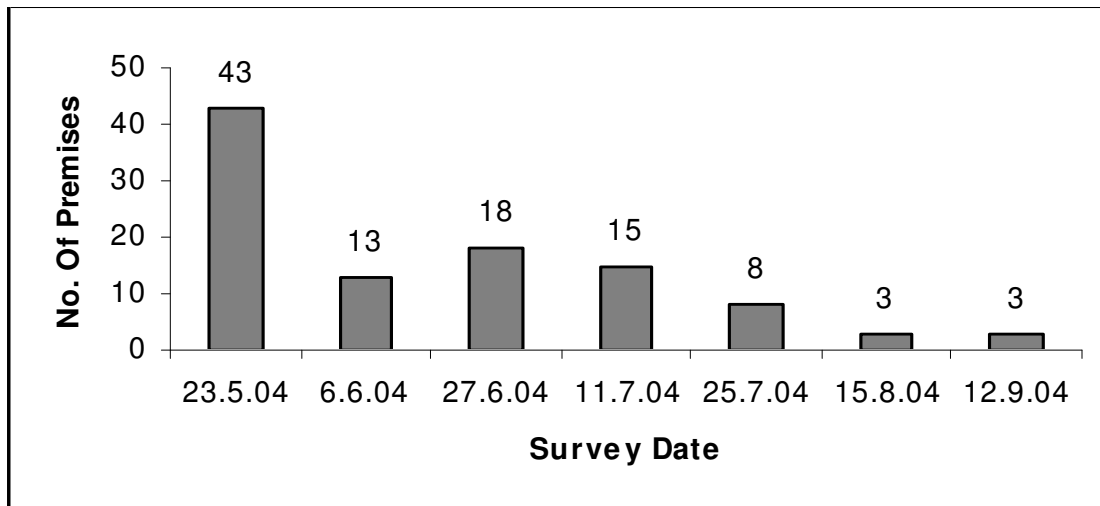


Fig.2: Number of premises with larvae breeding detected per Aedes Survey

Fig. 2 demonstrates a gradual reduction in premises found to have larvae breeding. The

reduction is most marked between the first and second surveys.

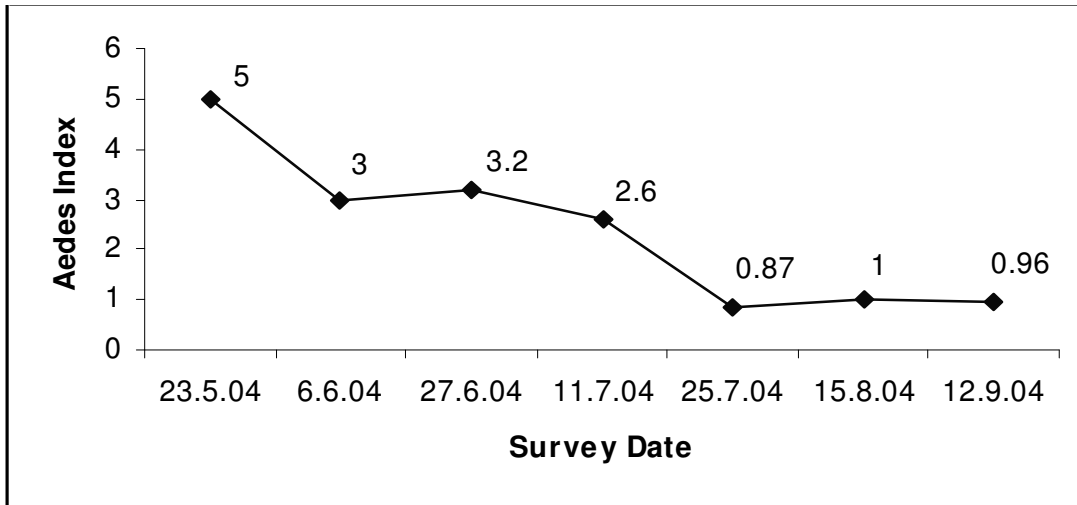


Fig.3 Reduction in Aedes Index in COMBI program area during program period

Fig. 3 displays the obvious downward trend of the *Aedes* Index with successive surveys.

The *Breteau* Index (Fig.4) in sections 3 and 4 of Bandar Baru Bangi closely mirrored the *Aedes* Index .

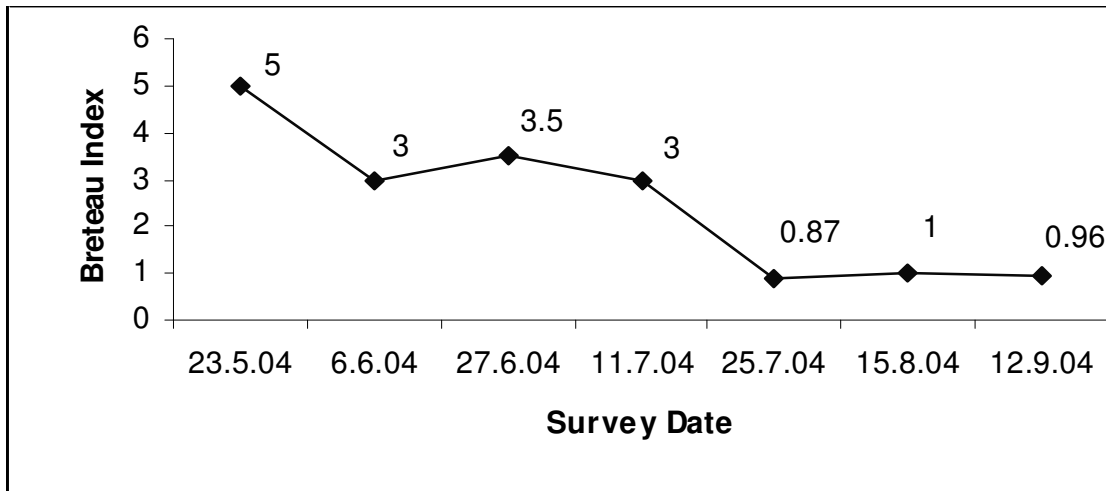


Fig.4: Reduction in Breteau Index in COMBI program area during program period

Fig. 5 provides a breakdown on number of larvae by species type. *A. Albopictus* appears to predominate. Further verification of specie types was obtained by the concomitant implementation of the Ovitrap Sentinel

Surveillance program in Section 3 Bandar Baru Bangi. Ovitrap samples despatched to the Sg. Buloh Public Health Lab confirmed the above epidemiologic distribution of *Aedes* species.

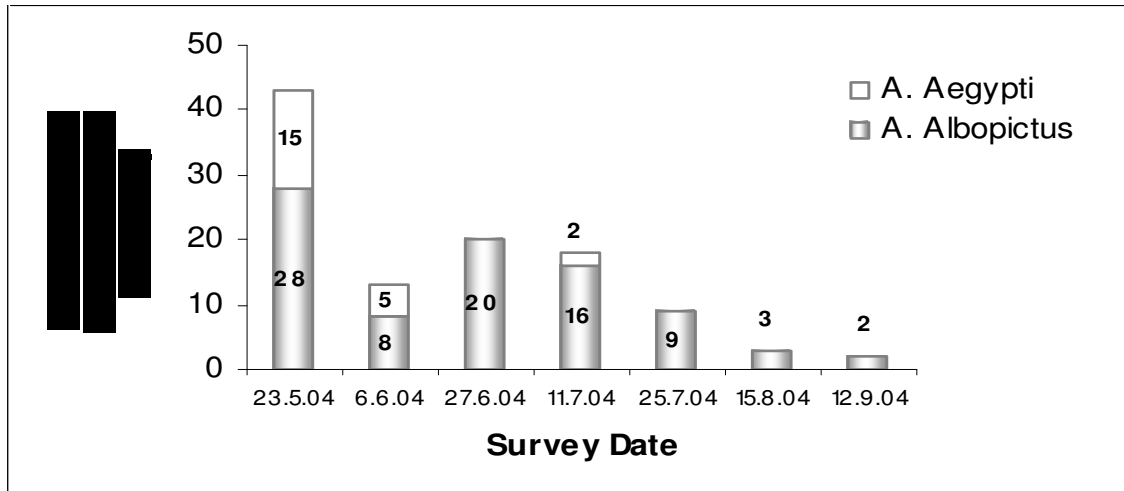


Fig.5: Number of samples of Aedes larvae (by species) detected per Aedes Survey

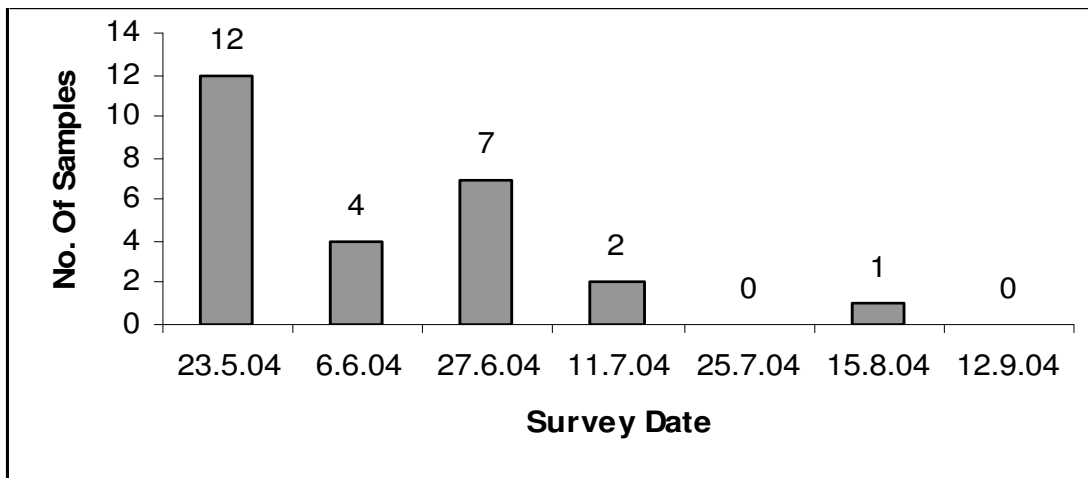


Fig.6: Number of samples of indoor breeding detected per Aedes Survey

Figs. 6 and 7 illustrate the distribution of breeding within the visited households. Total number of breeding cases was 107. Of these, 24.3 % (n = 26) or 1 in 4 affected households had breeding inside the house. Examples of the types of containers implicated are provided by Tables 1 and 2.

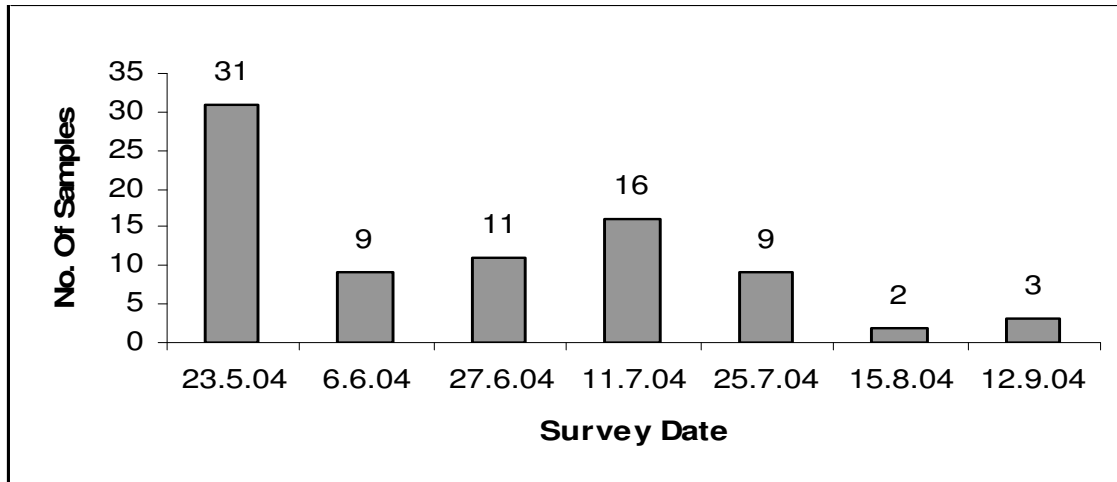


Fig. 7: Number of samples of outdoor breeding detected per Aedes Survey

Table 1. Number Of Outdoor Breeding Cases By Type Of Container

Container Type	Flower Pots / Bases / Aquatic Plants	Plastic Water Storage Containers (various)	Gardening Items (various)	Hardware And Painting Items (various)	Landscape / Mini waterfall	Unused Tyres	Others
No. Of Breeding Cases	33	24	7	6	4	3	4
% of Total (n=81)	40.7	29.6	8.6	7.4	4.9	3.7	4.9

Table 2. Number Of Indoor Breeding Cases By Type of Container

Container Type	Bathroom water trough (kolah)	Flower Pots / Bases / Aquatic Plants	Plastic Water Storage Containers (various)	Refrigerator Condensation Trays	Toilet Cisterns	Others
No. Of Breeding Cases	13	6	3	2	1	1
% of Total (n=26)	50.0	23.0	11.5	7.7	3.8	3.8

Fig. 8 describes the attendance of volunteers as recorded at each survey. Note that the figures do not necessarily represent the same people each week as substitutions were allowed

so long as volunteers produced their Identity Cards for registration and were attired in the official uniform.

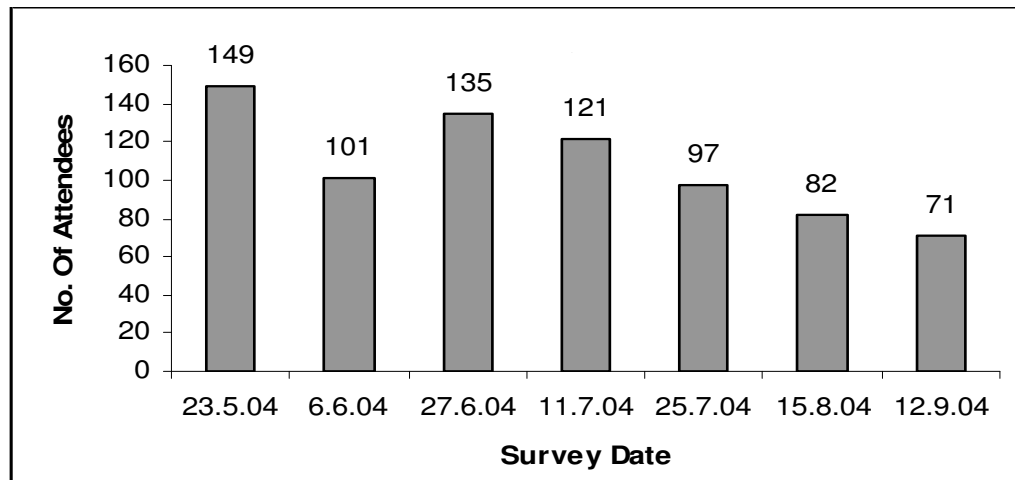


Fig. 8 Attendance of ADVT members per Aedes Survey

DISCUSSION

Ideally, it would have been appropriate to be able to compare the Aedes Index trend in Sections 3 and 4 during the specific 16 week program period with the Aedes Index trend for the same sections during the same period in 2003 or 2002. However, there had been no previous Aedes Survey pertaining specifically to Sections 3 and 4 for that particular 16 week period to produce such data.

Likewise, it was not possible to obtain data on *Aedes* Indices for the other neighbouring sections of Bandar Baru Bangi for purposes of comparison against sections 3 and 4 during the program period. This is because, with most available manpower committed to *Aedes* Surveys in the two sections every fortnight, it was not feasible to assemble additional teams for ancillary purposes. This takes into account other ongoing labour intensive activities including fogging, Food Quality Control operations and Sanitary Water Supply and Environmental Hygiene activities.

In terms of VEKPRO data for clinically reported cases of dengue fever/ dengue haemorrhagic fever, it was not possible to retrospectively isolate the number of cases specifically from Sections 3 and 4 for the same 16 week period in 2003 or 2002. This is because all cases from individual sections, once reported

and investigated, are recorded generically under the general category of Bandar Baru Bangi only.

Devising a single behavioural goal for dengue control which is universal enough to be applicable to as wide a range of premises and a large a geographical area as possible is a mammoth challenge. We were fortunate in being able to identify a fairly common theme recurring throughout the target households and use it to good effect. Although we believe it is possible to extend the same, unmodified goal to other sections of Bandar Baru Bangi, the same may not necessarily be true of the entire Hulu Langat district, especially in industrial and manufacturing areas, where high rates of worker transmigration and different infrastructure / building composition exist.

In accounting for human nature it would be difficult to discount the possibility of the confounding properties of the Hawthorne Effect¹⁰ as being partially responsible for the initial decline in breeding indices. The Hawthorne Effect in its simplest form states that when people know they are being measured, they modify their behaviour. The sharp decline in number of premises found to have larvae with each subsequent week (see Fig. 2), particularly between the first Aedes Survey (23.5.04, n = 43) and the second (6.6.04, n = 13) may indeed be due to people hastily ridding their homes of larvae in anticipation of the arrival of the

ADVTs, rather than eager acceptance of the new behaviour. Despite the moratorium on the issuing of compound fines, the perceived embarrassment of having one's volunteer neighbour discovering *Aedes* in one's home would motivate most people. However it is viewed though, the final indisputable outcome remains that there was a persistent decline in breeding detected after the first survey because something motivated the residents to inspect their homes, and continue inspecting for 15 weeks afterwards, as per the stated goal. Therefore only sustainability remains the issue.

The near term success of the program is succinctly reflected in Figs. 4 and 5. The total reduction in breeding incidence at the culmination of the 16 week period was approximately 80%, far in excess of the 30% target set out as the initial goal. While the short term success of COMBI appears to be amply demonstrated, its sustainability in the long term remains to be seen. It is premature to draw any long term conclusions from the Bandar Baru Bangi experience. However, given the receptiveness of the community to the program thus far, it should be fair to presume that the campaign has had a positive influence on the awareness threshold of the residents, and only occasional reminders in the form of periodic announcements, flyers or ADVT visits are needed to prompt the continuation of the "Suluh Suluh, Basuh Basuh" habit.

It is interesting to note, that during the COMBI program period, there was a total of 50 cases of clinically suspected dengue fever/dengue hemorrhagic fever reported from the Bandar Baru Bangi area. The surrounding residential sections all had several cases reported in each but only one was reported from Section 4 and none from Section 3. This correlates exceedingly well with the reduction of the *Aedes* and *Breteau* Indices in these two sections.

Confirmation regarding the commonest source containers of breeding larvae as identified during our situational market analysis is given in Tables 1 and 2. For outdoor breeding, flower pots / bases / aquatic plants (n = 33 or 40.7%) was the main source followed by plastic water storage containers (n = 24 or 29.6%). The need to store water in such containers by the residents is the result of past experience with the disruption in water supply. For indoor breeding, the *kolah* accounted for half of all cases (n = 13 or 50%) followed by flower pots/ bases / aquatic plants (n = 6 or 23%). These figures further

strengthen the case for the approach adopted by the "Suluh Suluh, Basuh Basuh" theme.

One of the greatest difficulties encountered with such a major community-based volunteer-dependent program lasting over a protracted period is regular attendance. At no time was the program able to muster its full complement of 172 volunteers. As shown in Fig. 8, attendance began declining after the third survey onwards. The final attendance (n = 71) was less than half of that on the first day (n = 149). Most volunteers averaged 3 – 4 surveys. The fact of the matter is that any COMBI program is a long drawn out affair and demands heavily on the sacrifices of those involved. When one considers that the majority of Bandar Baru Bangi residents are extremely busy citizens for whom weekends especially Sundays may be the only leisure time available to spend with loved ones, visiting relatives or pursuing some recreation, then the sacrifice of 3 – 4 alternate Sundays appears generous indeed. When the distractions of intervening school and public holidays are factored into the 16 week period, the ability of the program to maintain its momentum deserves acknowledgement.

The frequent migration of temporary residents such as college students, factory contract workers, and young working adults in and out of the Bandar Baru Bangi remains a threat to the long term viability of COMBI. Such migrations would dilute the pool of initial responders to the program. To allow for such unavoidable attrition, the message of the COMBI program would have to be redelivered to these particular groups at scheduled intervals, in order to sensitize the newly arrived individuals.

Given this scenario, it is conceivable that the regular repetition of the COMBI message via periodic campaigns will be necessary to 'keep the flame alive' in the targeted community. Such activity would need to become an obligatory component of the calendar and budget for the Health Education Unit (HEU) of the district health office in charge of that selected area or locality. Seen in a positive vein, COMBI confers upon each district HEU a tremendous degree of autonomy. Because each district's COMBI solution is supposedly unique to itself, each HEU can and should act proactively, without recourse to state or central impetus. Being ground level personnel, the HEUs can observe any changing trends and detect waning enthusiasm in the community early, and thus adapt their COMBI message and

redefine campaign goals, without the encumbrance of central bureaucratic machinery.

Communities require motivation to perform, such is the effort – reward equation. Failure to provide the community with tangible evidence that what they're doing is making a difference will wither support. Because COMBI in essence is affirmative action at the individual household level, there must exist a means to relay information in understandable form to those individual households that lives are being spared and morbidity reduced. The traditional channel of Village / Neighbourhood Health and Safety Committees (JKKK / JKKT) has been used to varying degrees of success. However, in keeping with the proactive nature of COMBI, perhaps a more direct route in the form of mailbox leaflets and such, containing monthly disease figures (and breeding cases if available) should be considered in future. In order to preserve the sensitivity of such data, explicit details such as dates, addresses and names could remain classified.

Any one effort spearheaded by a particular government agency needs to be given solid support by other government bodies with vested interests in the same field. Public confidence and cooperation for a campaign such as COMBI by one agency will be undermined if their basic needs have yet to be met by another. The common complaint of dissatisfaction regarding the efficiency of council services for which rates or assessments have been levied has to surmounted before the public can be asked to toil further. Community effort must be matched if not exceeded by prompt sanitary services. Community receptiveness to campaigns will only be commensurate to the level of responsiveness to comment and criticism displayed by the authority in question.

CONCLUSION

In its immediate assessment, the COMBI program in the prevention and control of dengue in Sections 3 and 4 of Bandar Baru Bangi was successfully implemented. The reduction in number of larvae breeding cases within the targeted premises was successfully achieved, as evidenced by the decline in Aedes Index from 5 to 0.96. In addition, there were no clinically confirmed cases of dengue fever and dengue haemorrhagic fever reported in these two sections throughout the program period.

The sustainability of the achievements described above must now be the subject of

observation, for continued confirmation that the stated behavioural goal has truly been adopted as desired by the targeted community.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the cooperation and generosity of the following agencies and bodies in the implementation of this program :

The Kajang Municipal Council, The Selangor State Development Corporation, The Public Works Department, The Bandar Baru Bangi Police Station, The Hulu Langat District Education Office, Sek. Men. Keb. Jalan Tiga, Sek. Keb. Jalan Tiga, Sek. Men Keb. Jalan Empat, Sek. Kebangsaan Jalan Empat, The Bandar Baru Bangi Fire and Rescue Station and finally the Honourable Chairman and Members of the Residents' COMBI Committee Bandar Baru Bangi.

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