



THE THIRD  
NATIONAL HEALTH AND MORBIDITY SURVEY  
2006  
(NHMS III)

# DENGUE PREVENTION PRACTICE

INSTITUTE FOR PUBLIC HEALTH  
NATIONAL INSTITUTES OF HEALTH  
MINISTRY OF HEALTH  
MALAYSIA  
2008



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JANUARY 2008**

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## LIST OF RESEARCH TOPICS

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## **MESSAGE FROM THE DIRECTOR GENERAL OF HEALTH MALAYSIA**

Since independence, Malaysia has achieved remarkable progress economically and socially, notably in the health sector, through a well planned and comprehensive health care delivery system. However, Malaysia's health care system still has to grapple with many challenges, particularly the rising costs of health care and the increasing demands and expectations for quality care by our consumers. In this respect, the Ministry of Health formed the 'National Institutes of Health' to spearhead health research that will provide the body of evidence to help formulate health policies and create new tools to measure health impacts arising from the series of interventions made in the provision of health care. This will lead to an environment of better governance.

The first National Health & Morbidity Survey (NHMS) was conducted in 1986 by the Institute for Public Health (IPH) which is currently one of the research organizations under the umbrella of the National Institutes of Health (NIH). IPH was also given the task of conducting the second NHMS II in 1996 and the current NHMS III in 2006. Data and information gathered by these surveys are consistently and extensively been used by the Ministry of Health in formulating the Malaysian Health Plans and evaluating the intervention programmes.

The publication of the current NHMS III report would generate much interest amongst of all health care stakeholders in the country as well as international health organizations. It is my sincere wish that the data and information generated by NHMS III be fully distributed, discussed and utilized to enhance further the provision of health care in this country. The data generated on the national health and health-related prevalence would be useful in assessing the national health burden as well as allowing for international comparison of health systems achievements.

I would like to take this opportunity to congratulate all those directly involved in the conduct of the survey, namely members of the National Steering Committee, the Advisory Committee, Research Groups and the Working Committee for their untiring efforts in the planning and conduct of the survey as well as publication of the reports. I would like to specially place on record the Ministry's appreciation of the excellent work done by the Principal Investigator and his team and for their dedication and tenacious efforts in spearheading this project to fruition. The Ministry of Health is committed to conduct these National Health and Morbidity Surveys on a regular basis and hope that IPH will continue to provide the leadership in conducting future National Health and Morbidity Surveys in this country.

Thank you.



**Tan Sri Datuk Dr Hj. Mohd Ismail Merican**  
**Director General of Health, Malaysia.**

## **MESSAGE FROM THE DEPUTY DIRECTOR GENERAL OF HEALTH (RESEARCH AND TECHNICAL SUPPORT)**

The Research and Technical Support Programme of the Ministry of Health emphasizes the need for research in supporting decision making and planning the activities in the Ministry. Only then can we ensure that every decision made either in planning resources or providing services to the people is supported by evidence based information and ensuring better results and outcome. We would certainly prefer local expertise rather than depend on foreign experts to carry out local research.

Under the umbrella of the National Institutes of Health, the Institute for Public Health has actively been involved in conducting research in public health and the National Health and Morbidity Survey is one of the major research conducted by IKU. This is the third time IKU has been given the responsibility to conduct such a mammoth task. I am very pleased that a lot of improvement have been made in the way this survey was conducted based on the experience learnt during the first and second surveys. However, due to the nature of the community survey, not all diseases and health issues were able to be covered in this survey. The research teams had to conduct an extensive literature reviews for relevant and up to date information on the health status of the Malaysian population.

I believe that the information in these reports are extremely valuable to all decision makers at the National State and district levels as well as those interested in the health of the Malaysian population. It can be a tool in providing guidance in developing and implementing strategies for the disease prevention and control programme in Malaysia.

I would like to take this opportunity to congratulate the research team members who have successfully undertaken and completed this survey. I would also like to thank all individuals and agencies who directly or indirectly made the completion of this survey possible.

The Institute for Public Health again gained a feather in its cap by successfully completing the Third National Health and Morbidity Survey.



**Datuk Ir. Dr. M. S. Pillay,  
Deputy Director General of Health (Research and Technical Support).**

## **MESSAGE FROM THE DIRECTOR OF INSTITUTE FOR PUBLIC HEALTH**

This is the third time the Institute for Public Health (IPH) was given the task to conduct the National Health and Morbidity Survey. The frequency of the study is every 10 years and I am proud that the Institute is able to conduct the surveys successfully since it was first initiated in 1986.

I would like to take this opportunity to thank the Director-General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, and the Deputy-Director General of Health (Research and Technical Support), Datuk Ir Dr.M.S. Pillay, whose invaluable support and guidance were instrumental in the successful completion of the third National Health and Morbidity Survey (NHMS III). Our appreciations are also extended to all members of the Steering Committee and the Advisory Committee of NHMS III.

I would like also to take this opportunity to congratulate the Principal Investigator and his Project Team Members in completing the NHMS III study and the publication of its report. The NHMS III was made possible through the collaboration of all agencies. The meetings, workshops and conferences that were organised, met their intended objectives and the hard work put up by the field staffs, ensured the three months data collection productive and successful.

My sincere gratitude also goes to Dr.Nirmal Singh, the former Director of the Institute for Public Health, Chairman of the Advisory Committee for his continuous support and guidance which contributed towards the successful completion of the study.

I hope the documentation of this report will be beneficial for future reference.

Finally, I would like to thank all those involved in the survey for a job well done, in making the NHMS III a success and finally producing the national report of this survey.



**Dr. Yahya Baba,**  
**Director, Institute for Public Health.**

## **MESSAGE FROM THE PRINCIPAL INVESTIGATOR NHMS III**

It is indeed a challenging task when the responsibility was given to me to conduct this survey. I learned the hard way and gained a lot of valuable experience in leading the survey. The survey also taught me lots of new techniques and how it should be addressed which is not available in the textbook. In doing so, I also learned the meaning of friendship and honesty, how to manage people involved and manage properly the given budget.

I would like to take this golden opportunity to thank the Director General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, Chairman of the Steering Committee for giving me the confidence, valuable support and guidance for the success of this survey.

I would also like to thank the Deputy Director General of Health Malaysia (Research & Technical Support), Datuk Ir. Dr. M.S. Pillay as Co-chairman of the Steering Committee for his patience in seeing through the survey until its completion the production of the national report.

My sincere appreciation to current Director of Institute for Public Health (IPH), Dr. Yahya Baba and former Directors of IPH, Dr. Nirmal Singh, Dr. Sivashamugam and Dr. Sulaiman Che Rus for their trust in me to carry out this survey. Their support for the survey has resulted the smooth conduct and success of the survey.

Special thanks to all State Directors, State Liaison Officers, Field supervisors, Scouts, Data Collection Team members for their full cooperation and efforts to ensure the success of the data collection. My appreciation is also extended to the Assistant Principal Investigator, Dr. Mohd Azahadi Omar, Main Research Group members, members of the Working Committee, Data Management group members, Statistics Consultant, Research group members, Research Officers and Research Assistants for their patience and tolerance of my behaviour to ensure the success of the study. Nevertheless I acknowledge a lot more can be done in strengthening the study.

I believe this report will serve as a useful reference for future surveys and helps in improving the local data sources and also add new valuable information for the Ministry of Health to use in the planning process. I also would like to encourage all research members to participate in further analysis of the data and publish the findings in peer review journals.

Thanks to everyone.



**Dr. Hj. Ahmad Faudzi Hj. Yusoff,  
Principal Investigator, The Third National Health and Morbidity Survey,  
Institute for Public Health.**

## *A***UTHOR'S STATEMENT**

This report is the outcome of several months of collective and cooperative effort by the authors who have strived to ensure a productive output.

The findings in this report have been adjusted for the differences in population composition of the survey sample and the 2006 Malaysian population.

The authors welcome any inquiries, comments and suggestions for further improvement of this report.

## *A*CKNOWLEDGEMENT

The authors wish to acknowledge the dedication and commitment of all the field enumerators, both from the Ministry of Health and contract officers who have strived hard to ensure the success of the survey. We also wish to thank the Director-General of Health and the Ministry of Health for giving us the support for conducting this mammoth survey.

## ABSTRACT

Dengue is the most important vector-borne disease of public health importance. It is endemic in Malaysia with frequent epidemics especially in the major urban areas. Community participation is the major thrust of dengue prevention and has to be continuously emphasized. Many factors contribute to dengue transmission like environmental factors, human mobility, socio economic factors and vector behavior. A total of 35,443 respondents participated in the study with a response rate of 88.8%. Pertaining to dengue transmission, a total of 81.5% (CI: 80.9 - 82.2) of the respondents answered correctly. Most of the states had a rate of more than 80% with the exception of Sabah and Sarawak. Urban respondents seemed to have higher knowledge than rural respondents (83.5% compared to 78.0%). Most of the age groups had a rating of more than 80% and Malay topped with the rating of 88.1% while the Chinese was the lowest. Regarding attitude, a total of 95.6% (CI: 95.3 - 95.9) reported that they would allow inspection of their houses. A total of 95.4% (CI: 95.1 - 95.7) respondents agreed larviciding. An average of 92.5% (CI: 92.1 - 93.0) of respondents allowed fogging. Melaka (83.4%) and Federal Territory Kuala Lumpur (84.9%) had the lowest scores relating to fogging. As for ethnic group, the Chinese had the lowest score of allowing fogging. The highest income group (RM5000 and above) and Senior Official and Manager groups had the highest percentages of not allowing fogging. For community participation, the majority [42.1% (CI: 41.1 - 43.2)] said there were no community clean up projects in their areas. Another 13.9% (CI: 13.3 - 14.5) said they participated in community clean up projects every time, 13.8% (CI: 13.3 - 14.4) participated sometimes, 8.8% (CI: 8.4 - 9.2) seldom participated and the remaining 21.4% (CI: 20.7 - 22.0) never involved in such activities. Communities in Federal Territory Kuala Lumpur were the least involved in organizing community clean-up projects (54.6%). Regarding dengue preventive practices, 70.5% (CI: 69.7 - 71.3) self reported to have taken some form of preventive practices. Using aerosol spray was the most frequent method used among the respondents to prevent mosquito bites (43.7%). This was followed by burning mosquito coils (22.1%), using electric mosquito coils (9.4%) and mosquito nets (7.8%). Preventive practices were reported to be significantly higher in urban communities [74.3% (CI: 73.3 - 75.3)] as compared to rural communities [63.6% (CI: 62.2 - 64.9)]. Respondents from Penang [88.4% (CI: 86.0 - 90.4)] and Malacca [59.1% (CI: 55.7 - 62.4)] had the highest and lowest percentages of preventive practices respectively. Indians were found to have the highest percentage of taking preventive practices [76.4% (CI: 74.4 - 78.4)]. Those with tertiary education and with income groups RM5000 and above were found to have the highest percentages of preventive practices.

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## **ABBREVIATIONS**

CCT	Central Coordinating Team
CDC	Center for Disease Control & Prevention, Atlanta, USA
CFR	Case Fatality Rate
CI	95% Confidence Interval
COMBI	Communication for Behavioural Impact
DF	Dengue Fever
DHF	Dengue Hemorrhagic Fever
DSS	Dengue Shock Syndrome
EB	Enumeration Block
FI	Face to Face Interview
ID	Individual Identification
IMPE	Institute of Malariology, Parasitology and Entomology
KAP	Knowledge, Attitude and Practice
LFS	Labour Force Survey
LQ	Living Quarters
MOH	Ministry of Health
NGO	Non-Government Organization
NHMS II	The Second National Health and Morbidity Survey
NHMS III	The Third National Health and Morbidity Survey
OR	Odds Ratio
PPS	Probability Proportionate to Size
SQL	Structured Query Language
USA	United States of America
WHO	World Health Organization

## **1. INTRODUCTION**

Dengue is the most important vector-borne diseases of public health importance. It is endemic in Malaysia with frequent epidemics especially in the major urban areas. Community participation is the major thrust of dengue prevention and has to be continuously emphasized. World Health Organization (2003) estimated that more than 2.5 billion people now live in areas where dengue transmission occurs. The disease manifestation ranged from influenza like disease known as dengue fever (DF) to a severe sometime fatal disease characterized by haemorrhage and shock, known as dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS) which is on the increased. A nationwide survey to describe the knowledge, attitude and practice as a part of NHMS III was done. A total of 39,922 eligible respondents were interviewed. Presented below is a summary of the results of four aspects of dengue prevention. Meltzer et al. (1998) stated that the global burden of dengue could be a significant disease as compared to Malaria and Tuberculosis, with DF/DHF epidemics placing significant economic burden on communities and government. The impact of DF/DHF can be measured in tangible economic terms such as unplanned budgetary allocation to combat the epidemic, medical care cost for in patient and out patient care. Days of lost work due to illness to care for ill family member as well as intangible economic impact such as increased household income to buy mosquito repellent and medication, a decline in household income due to lost days of work and decline in tourism as a result of fear of contracting the disease.

Many factors contribute to dengue transmission like environmental factors, people movement, socio economy and vector behavior. Continue epidemics of DF/DHF highlight the lack of impact of current dengue control program strategies in controlling the mosquito vectors. A critical need for all program components to be evaluated and monitored for the ireffectiveness is needed. Currently most national program are ill equipped to manage the prevention and control aspect of a dengue program and rely heavily on chemical control methods.

## **2. LITERATURE REVIEW**

One of the most important arthropod-borne viral diseases of public health significance is dengue. WHO estimates that more than 2.5 billion people are at risk of dengue infection. First recognized in the 1950s, it has become a leading cause of child mortality in several Asian countries. Since dengue was first documented in Malaysia in 1902 and made notifiable in 1973, the disease pattern has changed from major outbreaks every four years to one of increasing trend yearly. The largest outbreak was seen in 1996 with 14,255 dengue cases reported and 32 deaths. The case fatality rate varied from the highest of 10.4% in 1985 when dengue type 3 was the predominant type to the lowest of 1.3% when dengue type 1 predominated. Severe disease patterns have been observed with dengue 2 and 3 serotypes in the country.

The average number of DF/DHF cases reported to WHO per year has risen from 908 between 1950 and 1959 to 514,139 between 1990 and 1999. The real figure is estimated to be closer to 50 million cases a year causing 24,000 deaths. Of an estimated 500,000 cases of DHF/DSS requiring hospitalization each year, roughly 5% die according to WHO statistics. Regional distribution of dengue

and its serotypes are described elsewhere (WHO 2001; WHO 1999). DF/DHF/DSS is an immediate problem in south and Southeast Asia and Central and South America. Although DF is present in the African region, there are no cases or outbreaks reported to WHO (WHO 2000).

DF and DHF/DSS are caused by the four viral serotypes transmitted from viraemic to susceptible humans mainly by bites of *Aedes aegypti* and *Aedes albopictus* mosquito species. Recovery from infection by one serotype provides lifelong immunity against that serotype but confers only partial and transient protection against subsequent infection by the other three.

A lot of efforts have been spent in carrying out prevention and control program in Malaysia. During the program, people are informed through health education, posters, cassettes and videos. The aim was to increase the people's knowledge of the disease, its preventive method and as a consequent to change their behavior. Although knowledge often increases through prevention program, it is well known that changing risk behavior remain difficult to establish.

## **2.1 Clinical Presentation**

Dengue infections may range from mild, undifferentiated fever to illness up to 7 days' duration with high fever, severe headache, retro-orbital pain, arthralgia and rash, but rarely causing death. DHF, a deadly complication, includes hemorrhagic tendencies, thrombocytopenia and plasma leakage. DSS includes all the above criteria plus circulatory failure, hypotension for age and low pulse pressure. DHF and DSS are potentially deadly but patients with early diagnosis and appropriate therapy can recover with no sequelae. Generally, case management for DF is symptomatic and supportive. Continuous monitoring of vital signs and urine output is of paramount importance in management of DF while DSS is a medical emergency that requires intensive care unit hospitalization (WHO 1999).

The appearance of DHF is critically related to viral virulence (Vaughn et al. 2000), immunological responses and increased pathogenicity of specific serotypes (Vaughn et al. 2000). This has been found for the three serotypes DEN1, DEN 2 (Guzman et al. 2002) and DEN 3 (Harris et al. 2000; Vaughn et al. 2000; Da Fonseca & Fonseca 2002; George & Lam 1997) but so far not for DEN 4 (Rico-Hesse et al. 1997).

## **2.2 Epidemiological Changes**

In health services, several shifts have been found to have major implications namely shifts in modal age, rural spread, and social and biological determinants of race and sex-related susceptibility. Besides that, factors such as population growth, rural-urban migration, inadequacy of basic urban infrastructure are also responsible in creating highly favorable condition for *Aedes aegypti* which then facilitate the viral transmission (WHO 1997). To ensure the effectiveness of control programmes, behavioral risk factors, individual determinants of outcome and leading indicators related to the severity of the illness are the most important to be clearly understood. In addition, early detection and case management practices are noted as a critical factor for survival.

### **2.3 Shift in Modal Age**

DF is typically acknowledged to be a childhood disease and is an important cause of pediatric hospitalization in Southeast Asia. There is, however, evidence of increasing incidence of DHF among older age groups. Since the early 1980s, several studies in Southeast Asia have reported a higher association of DHF with older ages. In some Southeast Asian countries where dengue has been epidemic for several years, this age shift is clearly observed, indicating an epidemiological change in dengue infection in those locations (Muto 2000; Bounlay 2000).

Three studies in Asia using surveillance data reported increasing age of infected patients. In Singapore, surveillance data showed a shift in peak dengue mortality from pediatric ages (1973–1977) to adults in 1982, where more than 50% of the deaths occurred in patients older than 15 years. From 1990–96, the highest age-specific morbidity rates were in the 15 to 34 year age groups (Goh 1997). In Indonesia, surveillance data from 1975 to 1984 showed an increase in incidence rates among young adults in Jakarta as well as in the provincial areas (Sumarmo 1987). Adults have accounted for proportions as high as 82% of all cases in the hospital-based surveillance study during the 2000 epidemic of dengue in Bangladesh (Rahman et al. 2002); the highest proportion of cases occurred in the 18 to 33 year age group.

### **2.4 Racial Predisposition**

Race-related susceptibility to dengue has been observed in a few studies and merits further investigation. In Asia, two studies reported racial differences in disease incidence. A 15-year study of the epidemiology of dengue reports a significantly higher incidence of DHF among Chinese compared to Malay males (Shekhar & Huat 1992). This finding was supported by a six-year surveillance data study in Singapore, which found the race-specific morbidity rate among the Chinese to be three times that of the Malays and 1.7 times that of Indians (Goh 1997). Although none of the above constitutes convincing evidence for the hypotheses, they highlighted a useful area for better understanding of dengue pathogenesis and health service planning.

### **2.5 Gender Differences**

Understanding male-female differences in infection rates and severity of disease is important for public health control programmes. A few hospital-based studies and surveillance data show a male-female difference in infection rates and in severity of disease. Three independent studies from epidemics in India and Singapore found nearly twice the number of male patients compared to females (Lucknow and Singapore both reported male to female ratios of 1.9:1 and Delhi 1:0.57) (Agarwal et al. 1999; Ray et al. 1999). In his hospital-based study during the 1996 epidemic in Delhi, Wali et al. (1999) reported an even higher ratio of 2.5:1. Another study during the same epidemic found a male to female ratio of 1:0.25 cases for DSS. However, of the three deaths in this sample, two were female (Ray et al. 1999). Surveillance data from Malaysia revealed a male preponderance among Indian and Malay patients (1.5:1), but the ratio was almost equal for those of Chinese origin (Shekhar & Huat 1992). The Ministry of Health, Bangladesh reported a hospital-based patient DF/DHF male to female ratio of 1.5:1 during an outbreak in Chittagong in 1997 (Ynus 2000), although in a later study of DHF only during the 2000 outbreak found no differences between sexes were observed (Rasul et al. 2002). With the exception

of the study by Shekhar, all the others were hospital-based and may represent those who sought care rather than the infected population (Shekhar & Huat 1992).

Of significance were two studies in Asia by Kabra and Shekhar where severe illness and case fatality rate were consistently higher among females despite higher incidence in males (Shekhar & Huat 1992; Kabra et al. 1999). Halstead et al. (1970) had pointed out as early as 1970 that males predominate among those with milder disease but females account for more severe illness. He suggested that either immune response in females are more competent than in males, resulting in greater production of cytokines, or the capillary bed of females is prone to increased permeability. Kaplan in Mexico suggests that an incidence bias in favor of females is related to the timing of the survey interviews, while Goh puts forward that low incidence among women occurs because they stay at home and are less exposed to infection (Kaplan et al. 1983; Goh 1995). It is widely recognized that in many of the Asian communities, lower disease incidence in women may be a statistical artifact related to lower reporting and care-seeking for women from traditional practitioners who do not report to public surveillance systems. By the same token, women are less likely to be taken for care at a hospital when ill or are taken at late stages of disease, when no other options are available. Determining sex differences, both in infection and severity of disease, requires well-designed and targeted studies to capture both biological and social factors that drive disease patterns in a community.

## **2.6 Rural Spread**

Historically, most of the DF/DHF has been reported in urban area which is more densely populated. The short distance in between the houses provides short flying distance of the vector creating the right conditions for transmission. However, the literature showed that dengue transmission and, in some cases, outbreaks occur in rural settings in both Asia and Latin America. In the WHO Western Pacific region, WHO has confirmed that disease spread into rural areas from where it had not been reported previously (Muto 2000).

Several literature have shown, the rural epidemics and in Indonesia, it occurred as early as in 1976, and in 1994 the outbreak in Laos began in a remote, rural district of Nasaithong (Eram et al. 1979; Mahadev et al. 1993). Today, It had been reported in Thailand, incidence rate is higher in rural (102.2 per 100,000) than urban areas (95.4 per 100,000). However, in India, entomological investigation showed a widespread distribution of *Aedes aegypti*, both in rural and urban areas during an outbreak in Gujarat in 1988 and 1989 (Mahadev et al. 1993).

In industrialized settings, the Centers for Disease Control and Prevention (CDC), Atlanta, USA reported an outbreak of DF among residents of the rural towns of Hana and Nahiku in Hawaii in 2001. The outbreak was historically unusual because infection occurred among residents who have no history of recent travel and the *Aedes aegypti* mosquito has not been seen in Hawaii since it was supposedly eradicated by pesticide spraying in 1943 (Strickman et al. 2000).

The most frequently cited reasons for spread of dengue to rural areas are increased transport contact; mobility and spread of peri-urbanization (Githeko et al. 2000). Standard epidemiological techniques such as spatial studies of cases and careful patient histories could shed further light into transmission patterns in rural populations. Health service structures and utilization patterns differ substantially between urban and rural areas in many tropical countries' therefore appropriate strategies will be required for effective impact.

## 2.7 Seasonality and Climate Variability

Dengue occurrences have been commonly associated with the rainy season, and the El Niño phenomenon has been incriminated in the increases of certain vector-borne diseases, including dengue (Hales et al. 1996; Keating 2001).

Despite with increasing number of studies, convincing data or models supporting these hypotheses are scarce. The relationship between temperature, rainfall and vector-borne disease are increasingly seen as over simplifications. A study modeling DF transmission and seasonal temperature on data from Puerto Rico from 1988 to 1992 revealed weak relationships between monthly mean temperature and incidence of DF (Reiter 2001).

More recently, long-term meteorological trends were studied in four high-altitude sites in East Africa, where increases in malaria have been reported in the past two decades (Hay et al. 2002). They did not observe any significant change in temperature, rainfall, vapor pressure and the number of months suitable for *P. falciparum* transmission in the past century or during the period of reported malaria resurgence. Others have questioned models linking global temperatures and disease incidence, stating that, historically, climate has rarely been the principal determinant of vector-borne disease prevalence. Neither does the literature provided an adequate evidence base establishing the impact of climate change on vector-borne disease (Kovats et al. 2001; Clarke 2002).

## 2.8 Health Systems Issues

### 2.8.1 Socio-economic context

Social and economic factors play an essential role in the incidence and prevalence of DF and DHF. Air conditioning, screens and safe water supplies in wealthier countries help prevention and better health services reduce or eliminate mortality from DHF. Unplanned urbanization and inadequate resources for vector control are factors that promote transmission and are characteristic of poor rather than richer countries. Reiter et al. (2003), (Reiter 2001) studied dengue transmission on the Mexico-USA border and found higher rates in the Mexican city compared to the American cities.

However, some anomalies persist despite the rich/poor divide in disease incidence. In spite of energetic control programs in the wealthier endemic countries of Southeast Asia such as Singapore, Malaysia and parts of China (e.g. Hong Kong), dengue continues to be a problem. Malaysia reported some of the highest numbers of cases during epidemics compared to other countries in the region. In some of these cases, particular traditional practices, such as rainwater storage on roofs, exposed people to higher risk.

In a case-control study increasing serologically-confirmed DHF patients, other infectious diseases patients and healthy children in the Children's Hospital in Bangkok showed that malnutrition amongst DHF patients was significantly lower than the other two groups of studied subjects (Thisyakorn & Nimmannitya 1993). In India, a hospital-based study found no association between nutritional status and severity of illness (Kabra et al. 1999).

Middle classes have been specifically noted as the predominant group affected during the epidemic in

Dhaka Bangladesh (Rahman et al. 2002). Confounding factors for the preponderance of DF/DHF among the upper classes or well-nourished dengue patients were not discussed in any of these studies.

In a case-control study in Taiwan, Ko also observed that patients who lived near markets and/or open sewers or ditches had a risk of contracting disease 1.8 times higher than those who did not (Von Allmen et al. 1979). Since housing near sewers and ditches is likely to be comprised of poorer families, the analysis should have tested for house site while controlling for use of screens, which were significantly associated with incidence.

## 2.9 Knowledge, Attitude and Practice (KAP)

There are much more need to be done in finding effective strategies for behavior change. Since mothers are the first-line care-givers, this is important, particularly for childhood diseases. KAP studies are rare and therefore little is known regarding knowledge and attitude of the exposed population towards dengue. However, the little that is known is encouraging.

Many studies had been carried out to measure knowledge in various ways. Some determined knowledge of dengue by the knowledge of the disease (Tram et al. 2003), some include knowledge of the vector and control measures (Sanchez et al. 2005) and finally some measure overall dengue knowledge (Winch et al. 2002). A study done in Thailand to determine the impact of knowledge and practices on *Aedes aegypti* revealed that knowledge of *Aedes aegypti* development sites have more potential breeding in and around the house compared with persons without such knowledge (Constantianus et al. 2006). The explanation was people become more knowledgeable of mosquito breeding sites when they have a lot of breeding areas around their houses. The second result was the use of mosquito coils and presence of screening on doors and windows were associated with a higher risk for houses being infested with adult *Aedes aegypti* (Constantianus et al. 2006). In this study, better knowledge does not necessarily lead to better practice because it is difficult to change people's behavior. In addition, better practices do not necessarily reduce infection risk unless it was sustained for a period of time. What is needed is a dynamic and specific target being defined and looked into before any community based integrated *Aedes aegypti* control measures can be implemented (Lee & Khadri 1997). A study done by Lee & Khadri (1997) in Kuala Lumpur on the effectiveness of household aerosol found that it was highly effective if used correctly and play an important role in the control of dengue fever vector *Aedes aegypti*.

Direct community education to reduce breeding sites for mosquitoes performed better than chemical spraying in a controlled experiment in Mexico (Espinoza-Gomez et al. 2002). However, housewives, the unemployed and the elderly had significantly lower levels of knowledge of the disease compared to students and persons of younger ages [odds ratio (OR) = 0.44, 95% confidence interval (CI): 0.31–0.64]. Other KAP studies have found that radio and television are very effective channels for knowledge dissemination. Nevertheless, these same studies found that while communities can score well in knowledge of the disease, they perform less well in attitude and practice, indicating that behavior change is one area to target in social mobilization programmes (Swaddiwudhipong et al. 1992; Rosenbaum et al. 1995).

Treatment-seeking behavior and lay symptom assessment are the first step in the chain to early



diagnosis and was found to have an impact on duration of illness in Thailand (Picquet 2001). In that context, it is discouraging to note that 45% of individuals in a population-based survey (23,970 households) in the urban municipality of Vientiane did not know what action to take when their children are diagnosed with dengue or what they should do for prevention (Bounlay 2000).

Finally, reducing mortality from DHF and strengthening its control and prevention clearly cannot be done by the population alone. In most circumstances, these are poor populations with other pressing agendas. The programme requires public sector leadership with strong intersectoral collaboration. The WHO has made important progress to determine ways and mechanisms through which to achieve collaboration between sectors and state policy directions for control.

## 2.10 Dengue Prevention Measures

A study in prevention measures for dengue indicated covering water containers was the most common practice to prevent mosquito breeding in drinking water containers whereas addition of *abate* (temephos sand granules) or changing stored water frequently was commonly used for non drinking water storage (Swaddiwudhipong et al. 1992). Larviciding in ant traps was mainly accomplished by the addition of chemicals including *abate*, salt, oil or detergent (Swaddiwudhipong et al. 1992). Covering water containers correctly with lids when used on jars for storing drinking water was found to be effective in larvae control (AOR: 0.10-0.25). However, frequent use of containers reduced the effectiveness of lids. Weekly cleaning of containers was an effective method for larval control in most types of containers. A combination of control methods increased effectiveness (Phuanukoonnon et al. 2005). Swaddiwudhipong et al. reported that the introduction of larvivoracious fish may be an effective method of larval control for non drinking water containers (Swaddiwudhipong et al. 1992). A study in Mexico demonstrated that window curtains and domestic water container covers treated with long lasting deltamethrin reduced densities of dengue vectors to low levels and potentially affect dengue transmission (Kroeger et al. 2006).

Use of the larvicide (temephos) in water containers and sleeping under mosquito net were the best known preventive measures for dengue, especially in rural sites of Thailand as reported by Van Benthem et al. (2002).

A study among Myanmar women migrant caretakers on prevention of dengue fever showed that there was a significant association between knowledge and attitude towards dengue fever (Kyu et al. 2005), consistent with a study done in Malaysia by Farizah et al. (2003). However, a similar study done in Brazil by Donalizio (2001) found that there was no correlation between knowledge and attitude.

Only 41% of the respondents in a study in Thailand by Kyu et al. protected themselves from mosquito bites during day time although nearly 57% of them knew the biting habit of dengue mosquitoes (Kyu et al. 2005). The common methods used to protect themselves and their family members from mosquito bites during day time were burning mosquito coil and using bed nets.

## **2.11 Trends in Case Fatality Rates**

Two aspects present themselves for useful discussion in this area. One relates to wide variations in case-fatality rates (CFR) between countries, sub-national units and hospitals under similar virological conditions. The other relates to differential risks of severe illness and mortality between children and adults.

The global CFR for DHF/DSS has been declining in most of the endemic countries according to government statistics. The overall CFR in the Southeast Asia region is now less than 1% (Muto 2000).

However, disaggregated data reveal a different picture. Rates vary significantly between countries, provinces and hospitals, pointing to a more complex situation.

From 1995–2000, the CFR in the countries of WHO Western Pacific Region ranged from 0.1% in Singapore and 0.2% in Malaysia to 3.4% in Cambodia. Hong Kong reported no deaths (Tayag 1998). In Vietnam, province-based 1998 data for DHF show CFR ranging from nearly 13% in Ha Tinh to 0.5% in Quang Tri (Pinheiro & Corber 1997). Although the four provinces with the highest CFR were at some distance from Ho Chi Minh City or Hanoi, the four of the lowest were not particularly closer to these centre of tertiary care. In Laos, on the other hand, CFR for DHF during 1998 reached a high of 9.7% in Champassak province compared to 1.4% in Municipality of the capital city, Vientiane (Bounlay 2000). Wide variation in CFRs ranging from 0.1% to 5% was also noted between the first administrative divisions in the Philippines (Tayag 1998).

During the 1998 epidemic in Cambodia the CFR in Kantha Bopha, a private, charitable hospital, was substantially lower (2.0%) than the national average (2.9%) (Pinheiro & Corber 1997). Inter-district and inter-hospital variation is generally indicative of quality of care. Availability of medical supplies, equipment and economic status of patients can explain some differences but analyses to distinguish between the performances of provinces and countries in comparable settings would be useful for designing more effective disease control.

Secondly, studies have postulated higher risk of DF/DHF morbidity and mortality among children compared to adults (Guzman et al. 2002). Recently, increasing reports of severe illness among adults and in some cases higher CFRs (e.g. age-specific CFRs from San Lazaro hospital over one year were 3.8% for 35–39 year olds, 8% for over 45s compared with 2% and 2.6% for 0–4 and 5–9 year age groups) merit closer look at determinants of adult mortality (Tripathi et al. 1998; Deen 2000).

## **2.12 Case Management and Early Detection**

In addition to vector control, widely recognized as a preventive strategy of choice, key health sector response for reduction of mortality and morbidity lies primarily in two areas: early detection (including care-seeking behavior change and better surveillance) and improved case management of patients. Mortality in excess of 1% may be considered the consequence of inadequate care, late diagnosis and delayed hospitalization.

A hospital-based study during the dengue outbreak in Delhi revealed that mortality could be very low in patients who came early to the hospital (Tripathi et al. 1998). Late presentation was also strongly

associated with increased mortality in children with DHF in the Philippines (Tayag 1998).

The short interval between onset of hemorrhage and death, especially in young children, makes rapid medical intervention for DHF/DSS a critical factor for survival. For most communities at highest risk of disease, intensive care facilities are only available at distant capitals requiring motorized transport, usually beyond the reach of many. Early diagnosis and leading indicators for DHF/DSS can ensure the availability of travel time to transfer the patient for effective treatment. Case-control studies have shown that low-normal hematocrit count at time of shock is a significant risk factor for hemorrhage (Lum et al. 2002) and potential predictors for clinical outcome, such as decrease in total plasma cholesterol, and high- and low-density lipoprotein, were associated with the severest cases (Van Gorp et al. 2002).

However, research into predictive factors for severe illness is neither abundant nor conclusive. Moreover, as Van Gorp concludes low capacity and lack of resources at secondary levels of health services limit the operational use of many of these findings (Van Gorp et al. 2002).

At this time, the WHO classification of dengue diseases is often not feasible in many countries because of lack of trained health professionals, inadequate laboratories, and radiological support. Neither are facilities to detect DHF by using hematocrit and plasma leakage signs readily available in many tropical countries. As successful treatment of dengue depends on symptom recognition and careful fluid management, a simpler dengue disease classification scheme, realistic in poor, provincial conditions and better training of district-level personnel is needed.

A few creative approaches to primary health care to improve quality of care and case management at primary health care levels have been reported in the literature. For example, encouraging results have been found in Vietnam where they reduced dengue mortality rates by 64% through innovative primary healthcare concepts, including pediatric priority training units for medical staff, health education for patient care givers and promotion of outpatient treatment to avoid unnecessary admissions (Anh & Tram 1995). Reduction of CFRs from 10–15% (40% in some areas) in the early 1950s to less than 0.5% today in East Asian referral hospitals have been attributed to better training of the hospital staff (WHO/TDR 2000).

### **2.13 Surveillance and Reporting**

Unreliable statistics are an extremely serious weakness from many perspectives. Estimates of DHF/DSS CFR from surveillance data are consistently lower than those from single sample study data suggesting under-reporting or misclassification of deaths. Inadequate knowledge of case definitions among district health personnel compromise complete reporting even within the public health service system. Inappropriate denominators further add to the confusion in estimating prevalence and incidences.

Reporting deviations can lead to seriously misleading CFRs in countries where reliable estimates are urgently needed for effective resource programming. In Laos, for instance, 8197 DHF cases and 24 deaths were registered by the WHO in 1996, compared to 2563 cases and 23 deaths registered by the Institute of Malariology, Parasitology and Entomology (IMPE) for a CFR of that is 3 times higher than WHO statistics (Bounlay 2000). Most national surveillance data rely only on public sector institution reporting.

An evaluation of the dengue reporting system in Bandung, Indonesia (covering private and public hospitals) found that only 31% of hospitalized DHF/DSS cases were reported to the Municipal Health Authorities (Chairulfatah et al. 2001).

Based on the above studies, a conservative estimate would be that a third of the total cases are captured by surveillance systems, indicating that the global incidence rate could be around 1.5 million cases of DHF on an average year rather than the 0.5 million estimated by WHO.

While complete surveillance data may be an unrealistic option in many affected countries, sentinel surveillance and sample surveys using reliable methodologies could be undertaken to provide more accurate estimates of the disease burden and fill in the gaps. Occasional sample surveys of the private sector could help better estimate the bias in disease burden.

### **3. OBJECTIVES**

#### **3.1 General Objective**

To describe the knowledge, attitude and practices in the general population with regard to dengue preventive practices to enable the Ministry of Health to review programme strategy and activities for planning and allocation of resources towards dengue prevention and control.

#### **3.2 Specific Objectives**

- 3.2.1 To describe the knowledge on environmental factors and dengue fever in the general population.
- 3.2.2 To describe the community practices towards dengue fever prevention in the general population.
- 3.2.3 To describe the community perception on dengue prevention practices by the relevant authorities.

### **4. METHODOLOGY**

#### **4.1 Scope of the Study**

Research problems, scopes and main issues to be included in NHMS III were obtained from discussions and feedbacks from Ministry of Health state health managers, as well as experts from the local universities and individuals. The main research team members of the NHMS III reviewed and studied closely the feasibility and practicality of the suggested research topics for this

community-based household survey. Extensive literature review was initiated. Technical and research experts in relation to the identified research areas were consulted for further advice and comments. The main research group used the following criteria in considering the suggested scopes for this survey:

- i. The issue/problem is current or has potential high prevalence.
- ii. The issue/problem is focused on disease/disorders associated with affluence, lifestyle, environment and demographic changes.
- iii. The issue/problem is causing physical, mental or social disability.
- iv. The issue/problem has important economic implications.
- v. It is feasible to implement interventions to reduce the problem.
- vi. The information related to the issue/problem is not available through the routine monitoring system or other sources.
- vii. The information is more appropriately obtained through a nation-wide community survey, and
- viii. It is feasible to obtain through a nation-wide community-based survey.

The short-listed research topics then presented to the Advisory Group Members for further deliberation and decisions. These topics were later refined by the research team members based on the decisions made at the Advisory Committee meeting. It was tabled to the Steering Committee and 18 research topics were approved to be included in the NHMS III.

## 4.2 Sampling Design and Sample Size

In calculating the sample size, stratification and sampling design, advice was sought from the Methodology Division Department of Statistics Malaysia as well as from several other biostatistics consultants.

### 4.2.1 Sampling frame

The sampling frame for this survey is an updated until 2004; an effort undertaken prior to the implementation of Labour Force Survey (LFS) 2004. In general, each selected Enumeration Blocks (EB) comprised of 8 sampled Living Quarters (LQ). The EBs were geographically contiguous areas of land with identifiable boundaries. Each contains about 80-120 LQs with about 600 persons. Generally, all EBs are formed within gazetted boundaries.

The EBs in the sampling frame were also classified by urban and rural areas. The classification into these categories was in terms of population of gazetted and built-up areas as follows:

Stratum	Population of gazetted areas and built-up
Metropolitan	75,000 and above
Urban Large	10,000 to 74,999
Urban Small	1,000 to 9,999
Rural	The rest of the country

For sampling purposes, the above broad classification was found to be adequate for all states in Peninsular Malaysia and the Federal Territories of Kuala Lumpur and Labuan. However, for Sabah and Sarawak, due to problems of accessibility, the rural stratum had to be further sub-stratified based on the time taken to reach the area from the nearest urban centre.

For the purpose of urban and rural analysis, Metropolitan and Urban Large strata are combined together thus referred to as 'urban' stratum, while for Urban Small and the various sub-divisions of the rural areas they are combined together to form to a 'rural' stratum.

#### **4.2.2 Sampling design**

A two stage stratified sampling design with proportionate allocation was adopted in this survey. The first stage sampling unit was the EB and within each sampled EB, the LQs were selected as second stage unit. One LQ was estimated to comprise of 4.4 individuals. All households (HH) and persons within a selected LQ were studied.

#### **4.2.3 Sample size**

The sample size was determined based on 95% Confidence Interval (CI) and the following factors were taken into consideration:

a) Expected prevalence rate

The prevalence rate of the health problems for Malaysia obtained from the National Health and Morbidity Survey II (NHMS II) were used to estimate the overall sample size. Using the previous finding of 10% prevalence rate, the initial sample size at the state level was calculated in order to come up with overall sample size. The size was further apportioned for each state using the probability proportionate to size (PPS) method.

b) Response rate of the NHMS II

The response rates, which ranged from 83 to 97% for the NHMS II of each state, were taken into consideration in the course of the determination of sample size.

c) Margin of error and design effect

As the factors of precision and efficient of the survey are paramount, the decision reached for the targeted margin of error is 1.2 and the design effect valued at 2. These values were used at the initial stage of the calculation of the sample size of each state.

The survey findings addressing the specific objectives of this survey are expected to be used for state level programmed planning. Thus, the calculation for the sample size has taken into consideration that the data is to be analyzed at the state level.

In addition to the major factors mentioned earlier, the availability of resources, namely, financial and human resources, and the time taken to conduct this survey also becomes part of the process of the determination of sample size.

### 4.3 Preparation of Field Areas and Logistic Support

A number of state liaison officers were recruited in preparation for the survey proper. Strong networking with state liaison officers and District Health Officers (MOH and local authorities) from the areas sampled for the survey was established. Field scouts were mobilized from these areas to identify and tag the LQ's selected for the survey, as well as to inform the community and related government agencies of the importance and schedule of the planned survey. State liaison officers were also assisting Field Supervisors in the arrangement of transportation, accommodation and other logistics for the survey teams.

### 4.4 Method of Data Collection

#### 4.4.1 The questionnaire

A bi-lingual (*Bahasa Malaysia* and English) pre-coded questionnaire was designed, pre-tested and piloted prior to the survey. All research topics for the questionnaire are arranged into modules ranging from A to Z. Topics that are similar area are arranged into sub-modules under a particular module. Questions comprised of both close ended and open ended. The questions in each module were tailored to the target group.

The face-to-face interview (FI) questionnaires consisted of two subtypes, i.e., the household questionnaire (orange) to be answered by the head of the household of the LQ selected, and the individual questionnaire to be answered by each member of the household. Two types of individual questionnaire were developed, to cater to the different age groups of 13 to less than 18 years old (yellow) and 18 years old and above (purple).

Those aged 13 years and above were required to answer their respective questionnaires directly through the interview.

All the FI questionnaires have a consent form to be read and signed by the respondent or parent / guardian of the respondent. The outside cover of all questionnaires had to be filled with a unique individual identification (ID) number by the enumerator. The enumerator also had to fill his or her ID as well as the code for the outcome of the interview as part of the quality assurance process.

#### 4.4.2 The interview

As far as possible, all adult members who qualify from the selected LQ's were interviewed by the data collection team members. Parents or guardians were expected to provide information for their children aged 12 years and below (primary school). Interviews commenced early in the morning and lasted till late in the evening. A trained non-medical or paramedical interviewer conducted the interview. Where an interview had been unsuccessful due to the absence of the respondent at the selected LQ, repeat visits were conducted after leaving messages with neighbours or by other means for an appointment at a later date. A household member can only be classified as a non-responded after 3 unsuccessful visits.

## **4.5 Field Preparations**

Two main survey implementation groups had been formed: the Central Coordinating Team (CCT) and the field team. The CCT's main role was to monitor and coordinate the progress of implementation and provide administrative support in terms of financial and logistic arrangement for the field survey. The Field Teams were responsible to oversee and manage the field data collection process as well as undertake quality control.

The field data collection was conducted throughout Malaysia simultaneously, spanning within a continuous period of 4 months starting from April 2006. Teams were organized to move into 5 regions in Peninsular Malaysia, 2 regions in Sabah and 4 regions in Sarawak for data collections.

### **4.5.1 Pilot study**

A pilot study was conducted on a sample of EB's (not included in the NHMS III) about 2 months prior to the actual nationwide survey. It was conducted in three different areas in and around the Klang Valley, namely Sepang, Klang and Bangsar. The population in these locations comprised of three distinct socio-demographic strata that are rural, semi-urban and urban respectively. The pilot study focused on the following aspects of the survey such as testing of the questionnaire, testing of the field logistic preparation, testing of the scouting activities and testing of the central monitoring and logistic support.

### **4.5.2 Training of data collection teams**

A two weeks training course was held for field supervisors, team leaders, nurses and interviewers to familiarize them with the questionnaire, develop their interpersonal communication skills and appreciate the need for good teamwork. Briefing on the questionnaire, mock interview in the classroom and individual practice under supervision was conducted during the training.

## **4.6 Quality Control**

Quality control procedures for the data collection were done at two stages, field and central. Detail description of quality control process has been described in NHMS III protocol.

## **4.7 Data Management**

### **4.7.1 Data screening**

The following data screening exercises had been conducted at field and central levels prior to data entry:

- a) Field data screen by each interviewers at the end of his/her interview.
- b) Field data screen of each question by peer interviewers through exchanging questionnaire booklets.
- c) Field data screen by team leaders and field supervisors.



- d) Central data screening of the questionnaire by the quality control team.

#### **4.7.2 Data entry**

The data entry system was developed to record the information collected during the data collection phase. It is a web based system that allows multiple simultaneous accesses to the database. The NHMS III used a double manual data entry method and any discrepancy between both entries was verified by the supervisors. The data entry started simultaneously with data collection (first week of April 2006) and was completed at the end of January 2007. The data entered was stored in the database according to the module. The databases were designed using Structured Query Language (SQL) which is a standard language for relational database management system.

#### **4.7.3 Data analysis**

Data analysis was done by exporting the data into other analysis tools such as Microsoft Excel, SPSS and STATA. The data in database (text form) was exported to the Microsoft Excel form then to the SPSS and STATA. The raw data was cleaned and analysed according to the terms, working definition and dummy table prepared by the research groups. All the analysis process were monitored and advised by the NHMS III Statistics Consultant.

### **4.8 Definition of Terms / Variables**

#### **4.8.1 Dengue fever**

A disease characterized by a sudden onset of high grade fever and associated with sign and symptoms of headache, myalgia, backache, retroorbital pain, rashes, loss of appetite and sometimes vomiting, loose stool and abdominal pain.

#### **4.8.2 Containers**

Any object or structure that can hold water inside it.

#### **4.8.3 Breeding ground/site**

Places where aedes mosquito may lay eggs in the presence of water (includes flower pot tray, fridge tray, bath tank, water tank, cistern, pail, vases, coconut shell, pond, landscape fountain, roof gutter, used tyre, polystyrene food container, bottle and cup).

#### **4.8.4 Relevant authorities**

Ministry of Health or Local Authorities responsible for the control and prevention of dengue fever.

#### **4.8.5 Larvicide**

A substance which can kill mosquito larva when put inside water container.

#### **4.8.6 Fogging**

An activity of spraying anti-mosquito chemical using a machine.

#### **4.8.7 Community clean up project**

Activity done in an area by the local residents to clean up and get rid of any objects or structures which can hold water inside.

## **5. FINDINGS**

### **5.1 Knowledge on Dengue Fever Transmission**

Respondents were asked on how dengue fever is transmitted to a person. A total of 81.5% (CI: 80.9 - 82.2) of the respondents knew that dengue is transmitted by mosquito bite while 17.6% (CI: 17.0 - 18.3) did not know how dengue fever is transmitted.

Overall more than 80% of the population in most of the states knew that dengue fever is transmitted by mosquito bite except for Sabah (lowest) only 67.0% (CI: 64.6 - 69.4) and Sarawak only 71.8% (CI: 69.3 - 74.2) knew how dengue is transmitted. By state, Terengganu had the highest proportion of respondents [87.0% (CI: 84.6 - 89.1)] who knew the mode of dengue transmission. Sabah also had the lowest proportion 31.3% (CI: 29.0 - 33.8) who did not know.

By residence, more urban residents [83.5% (CI: 82.7 - 84.3)] compared to rural residents [78.0% (CI: 76.8 - 79.2)] were aware that dengue fever is transmitted by mosquito bite.

Almost equal proportion of both the sexes knew the mode of dengue transmission with the males on a slightly higher proportion 82.4% (CI: 81.5 - 83.3) and the females 80.8% (CI: 80.1 - 81.6).

87.4% (CI: 85.8 - 88.8) of the teenagers between the age of 15 - 19 years formed the highest proportion of the respondents who knew the mode of dengue fever transmission. The older aged, those above 80 years [34.4% (CI: 29.8 - 39.4)] were the least knowledgeable regarding the mode of transmission as well as the highest proportion [64.6% (CI: 59.6 - 69.3)] who did not know.

Among the major ethnic groups, Malays [88.1% (CI: 87.5 - 88.8)] were the highest proportion who knew dengue fever is transmitted by mosquito bite while the Chinese [75.1% (CI: 73.5 - 76.6)] are the least in terms of knowledge with regards to dengue transmission and they also contributed to the highest proportion [24.2% (CI: 22.7 - 25.8)] who were not aware of the mode of transmission.

85.4% (CI: 84.7 - 86.1) of Muslims rated the highest proportion of the population who knew dengue is transmitted by mosquito bite while those belonging to the others group rated the lowest 72.4% (CI: 66.6 - 77.4).

A larger proportion of the Malaysians [83.3% (CI: 82.7 – 84.0)] were aware of the mode of dengue transmission compared to non-Malaysians [53.0% (CI: 50.2 – 55.9)]. A higher proportion of non-Malaysians [45.8% (CI: 43.0 – 48.6)] were unaware of the mode of transmission.

The unmarried sector [85.4% (CI: 84.4 – 86.4)] of the respondents were more knowledgeable of the dengue transmission rather than those married [82.1% (CI: 81.3 – 82.8)]. Widows/widowers were the least knowledgeable of the transmission of dengue [60.0% (CI: 57.7 – 62.3)] as well as the highest proportion among those who did not know the mode of dengue transmission.

Knowledge on dengue transmission was concomitant with the degree of education [97.5% (CI: 96.9 – 98.0)] of those with tertiary education were well informed of dengue transmission whereas 47.1% (CI: 45.2 – 49.0) of those with no education at all were the least knowledgeable and this group also were the highest proportion [52.3% (CI: 50.4 – 54.2)] who had no knowledge of the transmission.

Knowledge on dengue transmission was reported highest among the professionals [96.2% (CI: 95.3 – 96.9)] as compared to the lowest among the unemployed [65.7% (CI: 63.9 – 67.4)]. The unemployed were again the highest proportion [33.6% (CI: 31.8 – 35.5)] who were not aware of the transmission.

People in the higher socio-economic status seemed to be well aware that dengue fever is transmitted by mosquito bite. Those earning between RM 3000 – RM3999 formed the highest proportion [88.3% (CI: 86.8 – 89.7)] who were well aware that dengue fever is transmitted by mosquito bite while only 65.2% (CI: 63.0 – 67.4) of those earning below RM400 were aware of this. The lowest income groups were the highest proportion [33.8% (CI: 31.7 – 36.0)] who were ignorant of the mode of transmission of dengue fever.

## **5.2 Knowledge on the Type of Mosquito That Causes Dengue Fever**

Respondents were asked on the type of mosquito which causes dengue fever. Generally 88.6% (CI: 88.0 – 89.0) of the respondents knew that dengue fever is caused by Aedes mosquito. Only a very small proportion [9.4% (CI: 9.0 – 9.9)] did not know the type of mosquito which causes dengue fever.

In almost all the states more than 80% of the population knew that dengue fever is caused by the Aedes mosquito. The highest proportion [95.0% (CI: 91.8 – 96.9)] of the population were from the state of Perlis while only 79.4% (CI: 75.2 – 83.1) of the respondents in Wilayah Persekutuan Labuan knew that Aedes mosquito causes dengue fever and they were also the highest proportion [16.0% (CI: 12.5 – 20.4)] who were not aware of the type of mosquito which causes dengue fever.

Between urban and rural population there was not much variation. However urban dwellers [89.1% (CI: 88.4 – 89.7)] were on a slightly higher proportion with regards to knowledge on Aedes mosquito causing dengue fever and rural population contributed to 87.5% (CI: 86.7 – 88.4) of the population.

There was not much difference between the genders on knowledge of the type of mosquito which causes dengue fever. Almost equal proportion of males [88.3% (CI: 87.6 – 89.0)] and females [88.7% (CI: 88.2 – 89.3)] responded positively on the type mosquito which causes dengue fever.

Knowledge regarding Aedes mosquito causing dengue fever decreased with increasing age.

Only 69.1% (CI: 60.3 - 76.8) of those above 80 years were aware of the type of mosquito as compared to 91.1% (CI: 87.7 - 92.3) of teenagers in the age group 15-19 years who were the highest proportion. The oldest respondents were the highest proportion [27.0% (CI: 19.9 - 35.5)] who were ignorant of the type of mosquito.

In all the major three ethnic groups more than 80% of the population were aware that Aedes mosquito was the cause of dengue fever. However Malays formed the highest proportion [92.3% (CI: 91.8 - 92.7)] and Indians the lowest proportion [81.4% (CI: 79.3 - 83.3)] with regards to type of mosquito causing dengue fever.

Similar to the ethnic groups, Muslims [91.1% (CI: 90.6 - 91.6)] contributed to the highest proportion of the population who responded that dengue fever is caused by the Aedes mosquito while the Hindus contributed to the lowest [80.4% (CI: 78.1 - 82.5)]. Among those who were ignorant of the type of mosquito Hindus were the highest proportion [18.2% (CI: 16.2 - 20.4)].

A higher proportion of Malaysians [89.1% (CI: 88.6 - 89.6)] were well aware of the type of mosquito which causes dengue fever as compared to [74.4% (CI: 71.2 - 77.4)] non-Malaysians.

The higher the education level the higher was the proportion of the respondents who had the knowledge that Aedes mosquito causes dengue fever and vice versa. 95.3% (CI: 94.5 - 96.0) of those in the tertiary group were well aware of the type of mosquito, while only 74.5% (CI: 72.3 - 76.7) of those without any formal education knew about Aedes mosquito being the culprit of dengue fever. The highest proportion 23.0% (CI: 20.9 - 25.1) who were ignorant of the type of mosquito were those without any formal education.

In all the different occupational strata more than 80% of the population knew that Aedes mosquito causes dengue fever but professionals formed the highest proportion [94.3% (CI: 93.2 - 95.2)] while those in the skilled agricultural and fishery contributed to the lowest [82.9% (CI: 80.8 - 84.8)]. Among those who did not know the type of mosquito the highest proportion [13.8% (CI: 12.4 - 25.3)] was the unemployed.

More than 80% of the respondents in all the different strata of the marital status knew that Aedes mosquito causes dengue fever. Only 80.9% (CI: 78.4 - 83.2) of the widows/widower group of the respondents knew the correct type of mosquito that causes dengue fever as compared to 90.1% (CI: 89.3 - 90.9) of the unmarried sector of the population who contributed to the highest proportion with the correct knowledge.

In all the different income groups more than 80% of the population were aware that Aedes mosquito causes dengue fever. However knowledge regarding Aedes mosquito causing dengue fever was reported highest among those earning RM 3000 - RM3999 [92.1% (CI: 90.8 - 93.2)] and the lowest among those earning less than RM 400 [83.2% (CI: 81.3 - 84.9)].

### **5.3 Knowledge on Indoor Breeding Areas**

Respondents were asked to name the breeding areas of mosquitoes inside the house. Majority of the respondents were not aware of the breeding sites inside the house. Generally only 34.7%

(CI: 34.1 - 35.4) were able to name at least one indoor breeding site. 30.2% (CI: 29.6 - 30.8) of the population were able to name two breeding sites and those who could name four or more breeding areas contributed to the lowest proportion [2.9% (CI: 2.7 - 3.2)]. Those who could not report on any made up 15.2% (CI: 14.7 - 15.8) of the respondents.

In almost all the states more than 30% of the population managed to identify only one indoor breeding area. The proportion who were aware decreased as the number of indoor breeding areas increased. Among those who reported one correct indoor breeding area, Sabah had the highest proportion of 38.2% (CI: 36.2 - 40.1) and Johor was the lowest [30.1% (CI: 28.0 - 32.4)]. Among those who reported four or more correct indoor breeding areas Penang had the highest proportion of 5.5% (CI: 4.6 - 6.7) with Johor almost close 5.5% (CI: 4.5 - 6.6) while Perlis had the lowest proportion [1.0% (CI: 0.3 - 2.6)]. The highest proportion who did not know of any breeding site were from Sarawak [22.4% (CI: 20.5 - 24.4)] while the lowest were from Selangor [12.3% (CI: 11.2 - 13.5)].

On the urban / rural distribution with regards to reporting at least one indoor breeding area, the rural population contributed to a higher proportion [36.4% (CI: 35.4 - 37.4)] while the urban proportion was 33.8% (CI: 33.0 - 34.7). Even though the urban population rated a lower proportion in terms of knowledge regarding at least one breeding area, they contributed to a slightly higher proportion [3.3% (CI: 3.0 - 3.7)] pertaining to knowledge on four or more indoor breeding areas. A higher proportion of rural population [17.3% (CI: 16.4 - 18.3)] did not know of any indoor breeding areas.

Overall there was almost equal distribution between both sexes of those who reported at least one indoor breeding area and four or more indoor breeding areas. However there was slightly higher proportion of males [35.8% (CI: 34.9 - 36.7)] who reported at least one indoor breeding area as compared to females [33.8% (CI: 33.1 - 34.6)]. Conversely a higher proportion of females [3.2% (CI: 2.9 - 3.6)] were able to report four or more breeding areas as compared to males [2.5% (CI: 2.2 - 2.8)]. Among those who did not know of any females formed a slightly higher proportion [15.7% (CI: 15.1 - 16.4)] as compared to males [14.1% (CI: 13.4 - 14.8)].

Knowledge pertaining to one breeding site and four or more breeding sites increased with decreasing age. It is found that the younger populations seem to have better knowledge regarding indoor breeding sites than the older population. Teenagers in the lowest age group (13-15 years) contributed to the highest proportion [40.8% (CI: 36.6 - 45.2)] who reported one correct indoor breeding area while those in the oldest age group (above 80 years) contributed to the lowest [18.2% (CI: 14.7 - 22.4)]. A similar picture was seen in reporting four or more indoor breeding areas where the oldest age group (above 80 years) contributed the lowest proportion of only 2.1% (CI: 1.0 - 4.1). Adults in the 55 - 59 years age group made up the highest proportion of the population [3.1% (CI: 2.4 - 3.9)] who reported indoor breeding areas correctly. Similarly those 80 and above formed the highest proportion [56.7% (CI: 51.6 - 61.7)] who did not know of any indoor breeding areas while those aged 40 - 44 formed the lowest proportion [10.2% (CI: 9.3 - 11.3)].

Surprisingly those belonging to the Other Bumis group contributed to the highest proportion [36.1% (CI: 34.3 - 38.0)] who had knowledge of one indoor breeding area as compared to those in the others group who seem to be the lowest [33.2% (CI: 30.4 - 36.1)]. Among the three major ethnic groups who reported one indoor breeding area correctly Malays were the highest [35.3% (CI: 34.5 - 36.2)] as compared to the Chinese (33.4%) and Indians (33.5%) contributing to the lower proportion. The Chinese and Indians seem to be almost equal proportions with regards to knowledge of one indoor

breeding area. Apparently when reporting on four or more indoor breeding areas among the three major ethnic groups Malays contributed the highest proportion [3.3% (CI: 3.0 – 3.7)] and the Chinese were the lowest [2.7% (CI: 2.3 – 3.2)]. Among the three major ethnic groups, the highest proportion who did not know of any indoor breeding area were the Chinese [22.5% (CI: 21.3 – 23.9)] while the lowest were the Malays [10.1% (CI: 9.5 – 10.7)].

Muslims formed the highest proportion who were able to report on knowledge pertaining to one breeding site [35.6% (CI: 34.8 - 36.4)] and four or more indoor breeding sites [3.1% (CI: 2.8 – 3.4)] while those in the others group contributed to the lowest in reporting one breeding site [32.4% (CI: 27.7 – 37.4)]. Again those in the others group contributed to the lowest proportion [1.9% (CI: 0.9 – 3.8)] in terms of reporting four or more indoor breeding sites. The highest proportion [26.0% (CI: 22.0 – 30.5)] who did not know of any breeding area were from the others group and the lowest were the Muslims [11.5% (CI: 10.9 – 12.1)].

A higher proportion of Malaysians [35.0% (CI: 34.3 – 35.7)] were aware of one indoor breeding area as compared to only 30.9% (CI: 28.5 – 33.4) of non-Malaysians. A similar picture repeated when reporting on four or more indoor breeding areas Malaysians topped with 3.0% (CI: 2.8 – 3.3) and non-Malaysians contributing to 0.9% (CI: 0.6 – 1.5). A higher proportion of non-Malaysians [33.6% (CI: 30.8 – 36.6)] were not aware of any indoor breeding area as compared to Malaysians contributing to 14.1% (CI: 13.5 – 14.6).

There seems to be an increase in the number of indoor breeding areas reported with the increase in education level. 5.8% (CI: 5.0 – 6.8) of those with tertiary education formed the highest proportion who reported on four or more indoor breeding areas while the lowest was seen among those with no formal education [0.9% (CI: 0.6 – 1.3)]. When reporting on one indoor breeding area again the lowest proportion [28.6% (CI: 27.0 – 30.2)] was contributed by those with no formal education while those with secondary education formed the highest proportion of 36.2% (CI: 35.3 – 37.1). Concomitantly the highest proportion [42.9% (CI: 41.1 – 44.7)] who had no knowledge of any indoor breeding area were those with no formal education as compared to the lowest [3.0% (CI: 2.5 – 3.7)] were those with tertiary education.

Unemployed group of the population contributed to the lowest proportion who were aware of one indoor breeding area [31.4% (CI: 29.9 - 33.0)] while highest proportion [37.8% (CI: 35.7 – 39.8)] were from the skilled agriculture and fishery's group. On reporting four or more indoor breeding areas professionals were the highest [6.4% (CI: 5.4 – 7.7)] while the skilled agriculture and fishery's group the lowest [1.3% (CI: 28.0 – 1.86)]. Similarly the unemployed contributed to the highest proportion [29.7% (CI: 28.0 – 31.0)] who were not aware of any indoor breeding area whilst the lowest [4.0% (CI: 3.2 – 4.9)] were the professionals.

Highest proportion 36.8% (CI: 35.7 – 38.0) who were aware of one indoor breeding area were the unmarried while the lowest [27.3% (CI: 25.2 – 29.5)] were the widow/widower group. As for reporting four or more indoor breeding areas the married contributed the highest [3.1% (CI: 2.8 – 3.4)] while again the widow/widower group were the lowest [1.5% (CI: 1.0 – 2.2)]. Among those who were not aware of any breeding area the widow/widower group were the highest [36.4% (CI: 34.1 – 38.8)] while the unmarried were the lowest [12.7% (CI: 11.8 – 13.6)].

The lowest income group (less than RM400) seem to be the most aware of at least one indoor

breeding area [36.5% (CI: 34.7 - 38.4)] while the least aware were those earning RM5000 & above [32.5% (CI: 30.6 - 34.5)]. The picture was just the opposite for reporting four or more indoor breeding areas, the RM5000 and above group were the highest proportion [4.6% (CI: 3.8 - 5.6)] while the less than RM400 group were the lowest [6.0% (CI: 5.1 - 7.0)].

#### 5.4 Knowledge on Outdoor Breeding Areas

Respondents were asked to name potential breeding areas of mosquitoes outside the house. Majority of the respondents nearly more than 70% were not aware of the breeding sites outside the house. Overall only 28.7% (CI: 28.1 - 29.1) of the population were able to report at least one outdoor breeding area. Those who had knowledge of four or more outdoor breeding areas contributed to the lowest proportion [4.5% (CI: 4.2 - 4.8)]. About 10.9% (CI: 10.4 - 11.4) of the population were not aware of any outdoor breeding area.

In almost all the states only about more than 20% of the population managed to report at least one outdoor breeding area. The proportion who were aware of breeding areas decreased as the number of outdoor breeding areas increased. The state which had the highest proportion [34.3% (CI: 28.9 - 40.2)] who reported at least one correct outdoor breeding area was Perlis while the lowest was reported in Terengganu [21.5% (CI: 19.4 - 23.9)]. Among the states which reported four or more correct outdoor breeding areas Kelantan had the highest proportion of 9.0% (CI: 7.8 - 10.4) while Kuala Lumpur was the lowest with 2.1% (CI: 1.5 - 3.1). The highest proportion who did not know of any outdoor breeding site was again from Kuala Lumpur [16.4% (CI: 14.3 - 18.8)] while the lowest were from Terengganu 6.3% (CI: 5.1 - 7.7).

On the urban/rural distribution with regards to reporting at least one outdoor breeding area, the urban population contributed to a slightly higher proportion [29.7% (CI: 28.9 - 30.5)] while the rural proportion was 26.8% (CI: 25.9 - 27.7). Even though the rural population rated a lower proportion in terms of knowledge regarding at least one outdoor breeding area, they contributed to a slightly higher proportion [5.8% (CI: 5.3 - 6.3)] as compared to urban [3.8% (CI: 3.5 - 4.1)] pertaining to knowledge on four or more outdoor breeding areas. 11.0% (CI: 10.3 - 11.8) of the rural population did not know of any outdoor breeding areas as compared to 10.8% (CI: 10.2 - 11.5) of urban population.

Overall there was almost equal distribution between both sexes of those who reported at least one outdoor breeding area and four or more outdoor breeding areas. However there was slightly higher proportion of males [28.7% (CI: 27.9 - 29.5)] who reported at least one outdoor breeding area as compared to females [28.7% (CI: 27.9 - 29.4)]. There was a similar picture with regards to knowledge on four or more outdoor breeding areas with males contributing to 4.8% (CI: 4.4 - 5.2) and females 4.3% (CI: 3.9 - 4.6) respectively. Among those who were not aware of any outdoor breeding area females formed a slightly higher proportion [12.2% (CI: 11.6 - 12.8)] as compared to males [9.3% (CI: 8.7 - 9.9)].

Unlike knowledge on indoor breeding areas, knowledge pertaining to one outdoor breeding site was reported highest [30.5% (CI: 28.3 - 32.7)] among the 60 - 64 age group and the lowest [19.2% (CI: 15.6 - 23.3)] in the 80 years and above group. Respondents aged 45 - 49 years contributed to the highest proportion [5.2% (CI: 4.4 - 6.1)] who reported four or more outdoor breeding sites while the lowest [0.3% (CI: 0.1 - 2.2)] was the 80 years and above group. Similarly those 80 and above formed

the highest proportion [52.2% (CI: 47.1 – 57.3)] who did not know of any outdoor breeding areas while teenagers aged 15 – 19 years were the lowest proportion [7.0% (CI: 5.9 – 8.1)].

Among the major ethnic groups, knowledge of one outdoor breeding area was reported highest among Indians [29.3% (CI: 27.5 – 31.2)] and lowest among Malays [28.5% (CI: 27.7 – 29.3)]. With regards to knowledge on four or more outdoor breeding areas Malays were the highest [5.8% (CI: 5.4 – 6.2)] and the Chinese the lowest [2.3% (CI: 1.9 – 2.7)]. Among the three major ethnic groups, the highest proportion who had no knowledge of any outdoor breeding area was the Chinese [18.2% (CI: 16.2 – 19.5)] while the lowest were the Malays [6.2% (CI: 5.8 – 6.7)].

Respondents belonging to the others group formed the highest proportion [30.8% (CI: 26.4 – 35.7)] who were able to report on knowledge pertaining to one outdoor breeding site while the lowest was reported among the Hindus [28.4% (CI: 26.5 - 30.4)]. In reporting four or more outdoor breeding sites Muslims topped with 5.4% (CI: 5.0 – 5.8) while the Buddhists contributed to the lowest [2.1% (CI: 1.7 – 2.5)]. The highest proportion [21.4% (CI: 17.4 – 25.9)] who were not aware of any breeding area were from the others group and the lowest were the Muslims [7.5% (CI: 7.0 – 8.0)].

A higher proportion of Malaysians [28.9% (CI: 28.2 – 29.5)] were aware of one outdoor breeding area as compared to only 26.4% (CI: 24.1 – 28.8) of non-Malaysians. A similar picture repeated when reporting on four or more outdoor breeding areas Malaysians topped with 4.7% (CI: 4.4 – 5.0) and non-Malaysians contributing to 1.2% (CI: 0.8 – 1.8). A higher proportion of non-Malaysians [28.5% (CI: 25.8 – 31.3)] were not aware of any outdoor breeding area as compared to Malaysians contributing to 9.8% (CI: 9.3 – 10.1).

There seems to be an increase in the number of outdoor breeding areas reported with the increase in education level. 29.6 % (CI: 28.8 – 30.4) of those with secondary education formed the highest proportion who reported on one outdoor breeding area while the lowest was seen among those with no formal education [26.3% (CI: 24.8 – 27.8)]. When reporting on four or more outdoor breeding areas again the lowest proportion [1.7% (CI: 1.3 – 2.2)] was contributed by those with no formal education while those with tertiary education formed the highest proportion of 7.1% (CI: 6.2 – 8.2). Similarly the highest proportion [35.4% (CI: 33.6 – 37.1)] who had no knowledge of any outdoor breeding area were those with no formal education as compared to the lowest [2.2% (CI: 1.7 – 2.8)] were those with tertiary education.

Unemployed group of the population contributed to the lowest proportion who were aware of one outdoor breeding area [27.3% (CI: 25.9 – 28.9)] while the highest proportion [34.3% (CI: 30.8 – 38.0)] were from the senior official and manager's group. On reporting four or more outdoor breeding areas, professionals were the highest [7.5% (CI: 6.4 – 8.7)] and the unemployed the lowest [2.6% (CI: 2.1 – 3.2)]. Similarly the unemployed contributed to the highest proportion [23.0% (CI: 21.4 – 24.6)] who were not aware of any outdoor breeding area whilst the lowest [2.6% (CI: 2.0 – 3.3)] were the professionals.

Divorcees contributed the highest proportion [30.3% (CI: 27.0 – 33.8)] who were aware of one outdoor breeding area while the lowest [24.5% (CI: 22.5 – 26.6)] were the widow/widower group. As for reporting four or more outdoor breeding areas the married contributed the highest proportion [4.7% (CI: 4.4 – 5.1)] while again the widow/widower group were the lowest [2.5% (CI: 1.9 – 3.4)]. Among those who were not aware of any breeding area the widow/widower group were the highest



[30.7% (CI: 28.5 – 32.9)] while the unmarried were the lowest [8.4% (CI: 7.6 – 9.2)].

About more than 25% of the respondents in all the income groups had knowledge of one outdoor breeding area. Those earning RM5000 and above seem to be the highest proportion to be aware of both one outdoor breeding area [30.0% (CI: 28.2 – 31.8)] and four breeding areas [5.0% (CI: 4.2 – 5.9)], while the least aware of one outdoor breeding area were those earning RM3000 – RM3999 [27.6% (CI: 25.8 – 29.4)]. Those earning less than RM400 were the lowest [3.2% (CI: 2.6 – 3.9)] to report one to four outdoor breeding areas but highest [20.2% (CI: 18.6 – 21.9)] among those who were not aware of any outdoor breeding area while the lowest [8.2% (CI: 6.4 – 10.4)] not to report on any breeding area were from those earning RM4000 – RM4999.

## **5.5 Action towards a Problem of Mosquito Infestation**

Respondents were asked of what action they would take should there be a problem of mosquito infestation around their house. Overall, more than 50% of the respondents said they would use aerosol sprays to tackle the problem. About 27.0% of the respondents said they would resort to searching and destroying areas of mosquito breeding. About another 4.2% each would request for fogging and complain to the health authorities. Less than 1% each would resort to other actions. About 3.3% of respondents did not know of what action to take at all (Appendix : Table 1).

By state, Kuala Lumpur had the highest proportion (83.4%) of respondents who would use aerosol sprays while only 52.0% of respondents from Terengganu would resort to the same action. Slightly more than half of the respondents from Melaka claimed they would search and destroy mosquito breeding grounds, while only 16.9% of Sarawakians would do the same.

More urban (74.2%) than rural dwellers (64.4%) would use aerosol sprays to counter a problem of mosquito infestation while more rural (42.0%) than urban dwellers (27.5%) would search and destroy mosquito breeding grounds.

Slightly more females (72.3%) preferred aerosol spray use while slightly more men (33.7%) would conduct a search and destroy mosquito breeding activity.

Teenagers between 13 to 14 years old claimed the highest proportion (73.5%) towards aerosol spray use while those aged 35 - 39 years had the lowest proportion of 68.4%. However the reverse was true for search and destroy activity (26.4% and 36.6% respectively).

The proportion of preference towards use of aerosol sprays was highest among Indians (77.9%) and lowest among Other Bumis (64.6%). Other Bumis had the highest preference for search and destroy activity (40.4%) while Chinese had the lowest preference (20.7%).

Hindu respondents had the highest proportion of preference of aerosol spray use, while for Christian and Muslim respondents, about 69.3% of respondents from the two faiths preferred the same method to ward of mosquitoes from their surroundings. Muslim respondents preferred most (37.7%) to conduct a search and destroy activity to rid mosquitoes, while Buddhist respondents preferred least the same method.

A slightly higher proportion of Malaysians (70.8%) would resort to aerosol spray use compared to non-Malaysians (68.8%). A similar picture was seen with respondents who cited search and destroy activities (33.1% versus 26.1% respectively).

As educational level rose, the preference for use of aerosol sprays also increased from 63.9% among those with no formal education to 74.2% among those with tertiary education. Search and destroy activity was reported highest (35.7%) among those with secondary education and lowest (25.6%) among those with no formal educational at all.

Use of aerosol sprays was highest (74.9%) among professionals and lowest (62.4%) among skilled agricultural and fishery workers. The search and destroy method of ridding mosquitoes was cited most by skilled agricultural and fishery workers (41.0%), while senior officials and managers cited least (31.3%) the search and destroy method.

Respondents who were never married were most likely to use aerosol sprays (74.9%), while only 68.7% of widowed respondents would do likewise. As for the search and destroy method, married respondents had the highest proportion of preference, while widowed respondents were again the least likely (23.8%) to prefer that method.

As the monthly household income rose from less than RM 400 per month to RM 3000 - RM 3999, so did the proportion of respondents who would use aerosol sprays (63.9% - 76.1%). About 39.0% of respondents in the monthly household income bracket of RM400 - RM699 would conduct search and destroy activities while only 27.1% of respondents earning a household income of RM 5000 and more would conduct similar activities.

## **5.6 Responsibility towards Dengue Prevention**

Respondents were asked their opinion on who should be responsible for dengue prevention in their area. Overall 54.3% (CI: 54.0 - 56.1) of respondents felt the community was responsible, while 16.2% (CI: 15.3 - 16.4) felt it was their own responsibility. The rest of the respondents attributed responsibility to the health authorities, community leaders and others (Appendix : Table 2).

By state, 76.5% (CI: 73.9 – 79.0) of the Penang respondents cited the community as being responsible for dengue prevention, while only 31.7% (CI: 28.3 - 35.3) of Kelantan respondents gave the same response. However, 29.3% (CI: 26.5 - 32.3) of respondents from the same state cited the health authorities as being responsible for dengue prevention. Only 7.4% (CI: 6.3 - 8.6) of Penang respondents held the health authorities responsible for preventing dengue.

More urban [59.7% (CI: 58.4 - 61.0)] than rural dwellers [46.7% (CI: 45.0 - 48.4)] cited the community as having the responsibility of dengue prevention. More rural dwellers [19.4% (CI: 18.5 – 20.4)] than urban [13.9% (CI: 13.2 - 14.6)] felt the health authorities were responsible to prevent dengue.

About 56.4% (CI: 58.4 – 61.0) of males and 46.7% (CI: 45.0 - 48.4) of females named the community as being responsible to prevent dengue. About 16.9% of males (CI: 16.2 - 17.7) held the health authorities responsible for dengue prevention compared to 15.1% (CI: 14.4 - 15.7) of females.

Those aged 25-29 years had the highest proportion [60.0% (CI: 58.2 - 61.9)] for naming the community as having the responsibility to prevent dengue while only 31.5% (CI: 26.8 - 36.7) of the elderly aged 80 years and above gave a similar response. More than 20.0% (CI: 18.2 - 23.6) of respondents aged between 60-64 and 65-69 years old each named the health authorities as being the ones responsible for dengue prevention.

By race, the Indians had the highest proportion [58.5% (CI: 55.8 - 61.1)] for considering the community as being responsible for the prevention of dengue. About 54.1% of the Other Bumis (the lowest proportion) held a similar perception. While 17.6% (CI: 16.8 - 18.3) of Malays felt that the health authorities should be responsible in the case of dengue prevention, the Chinese had the lowest proportion or 13.2% (CI: 12.2 - 14.3) in holding a similar view.

Hindus had the highest proportion [57.0% (CI: 54.1 - 59.8)] of respondents who felt that the community was responsible for dengue prevention in the community, while the Muslims had the lowest proportion [54.4% (CI: 53.1 - 55.6)] of respondents feeling the same. As for perceiving the health authorities as having the responsibility of preventing dengue, the reverse was true for Hindus [11.8% (CI: 10.2 - 13.6)] and Muslims [17.2% (CI: 16.6 - 17.9)].

More Malaysians [55.5% (CI: 54.4 - 56.6)] compared to non-Malaysians [48.1% (CI: 45.0 - 51.2)] felt the community should be responsible for dengue prevention. More Malaysians [16.1% (CI: 15.5 - 16.7)] also felt the health authorities had to be responsible compared to non-Malaysians [12.5% (CI: 11.0 - 14.2)].

As educational level rose, the proportion of respondents who felt the community should be responsible for dengue prevention increased from 38.1% (CI: 36.0 - 40.1) among those with no formal education to 71.0% (CI: 69.0 - 72.9) among those with tertiary education. Conversely, as educational level rose from primary education to tertiary education, the proportion of respondents who held themselves the health authorities as being responsible for the prevention of dengue decreased from 18.6% (CI: 17.7 - 19.5) to 10.7% (CI: 9.7 - 11.9).

By occupational group, senior officials and managers had the highest proportion [69.0% (CI: 65.0 - 72.8)] for perceiving the community as having to bear the responsibility of dengue prevention while respondents in the skilled agricultural and fishery group had the lowest proportion [43.5% (CI: 40.9 - 46.1)] of the same perception. The proportion of senior officials and managers [9.8% (CI: 7.6 - 12.4)] who held the health authorities as being the ones responsible for dengue prevention was less than half that among the agricultural and fishery group [21.8% (CI: 20.8 - 23.7)].

Of all never married respondents, 57.4% (CI: 56.0 - 58.8) felt the responsibility of preventing dengue lied with the community while 43.1% of widowed respondents felt likewise. Conversely, widowed respondents had the highest proportion or 21.0% (CI: 17.9 - 24.4) of perceiving the health authorities as being responsible for preventing dengue while only 14.9% (CI: 14.0 - 15.8) of never married respondents felt the same.

As the monthly household income rose from less than RM 400 per month to RM 5000 and above, the proportion of respondents citing the community for being responsible of preventing dengue increased from 43.4% (CI: 41.0 - 45.8) to 66.8% (CI: 64.3 - 69.3). Likewise as the monthly household income rose from RM 400 - RM699 to RM 5000 and above the proportion of respondents who felt the health

authorities should be responsible decreased from 20.7% (CI: 19.4 - 22.0) to 10.5% (CI: 9.2 - 11.8).

## **5.7 Fine for Breeding Mosquito Larvae at Home**

All respondents aged 18 years and older were asked if they knew they could be fined for breeding mosquito larvae at home. More than two thirds [(70.4% (CI: 69.6 - 71.2))] of the respondents knew they could be fined while [23.0 % (CI: 22.2 - 23.7)] did not think they could be fined. About 6.5% of the respondents did not know whether they could be fined or not (Appendix : Table 3).

By state, 88.3% (CI: 85.9 - 90.4) of respondents from Penang knew they could be fined, while only 59.1% (CI: 55.7 - 62.4) respondents from Kelantan knew that. Kelantan also had the highest proportion of respondents who thought they could not be fined for breeding mosquito larvae.

More urban [74.2% (CI: 73.2 - 75.2)] than rural dwellers [63.5% (CI: 62.1 - 64.8)] knew they could be fined. A higher proportion of rural than urban dwellers did not think they could be fined [29.2% (CI: 28.0 - 30.6)] or did not know they could be fined [7.1% (CI: 6.6 - 7.7)].

By gender, more males [72.6% (CI: 71.6 - 73.6)] than females [68.6% (CI: 62.1 - 64.8)] knew they could be fined, while more females than males did not think they could be fined [24.0% (CI: 23.2 - 24.9)] or did not know they could be fined [7.2% (CI: 6.8 - 7.6)].

As age increased from 13-14 years to 25-29 years old, the proportion of respondents who knew they could be fined also increased from 65.6% (CI: 61.1 - 69.9) to 73.4% (CI: 71.8 - 75.0). From age 35-39 years onwards, the proportion of respondents knowing they could be fined decreased from 73.1% (CI: 71.5 - 75.0) to 44.6% (CI: 39.6 - 49.7) among those aged 80 years and above.

Of the major ethnic groups, Indians had the highest proportion [76.3% (CI: 74.3 - 78.2)] of knowing they could be fined for the offence, while Other Bumis had the lowest [67.9% (CI: 65.7 - 70.0)] proportion. Malays were the highest in proportion to think that they could not be fined [24.5% (CI: 23.5 - 25.5)] while the Chinese were the highest in proportion to not know if they could be fined or not [7.7% (CI: 7.0 - 8.5)] compared to other major ethnic groups.

The highest proportion (74.5%) of respondents knowing they could be fined was among those professing Hinduism, while the lowest proportion (9.5%) comprised of Muslims. About 24.8% of Muslims thought they could not be fined while 8.6% of Buddhist respondents did not know if they could be fined or not.

More Malaysians [71.5% (CI: 70.7 - 72.3)] than non-Malaysians knew they could be fined for breeding mosquito larvae at home. While the proportion between Malaysians and non-Malaysians did not differ much for thinking they could not be fined, the proportion of not knowing if they could or could not be fined among non-Malaysians was more than 3 times [18.9% (CI: 16.7 - 21.4)] that among Malaysians.

As educational level rose from no formal education to tertiary education, so did the proportion of respondents who knew they could be fined [50.1% (CI: 48.2 - 52.0)] – [83.1% (CI: 81.5 - 84.5)]. Conversely, the lower the educational level, the higher the proportion who thought they could not be fined or did not know if they could be fined or not.

By occupational group those in the senior official and managerial group had the highest proportion [84.2% (CI: 80.9 - 87.0)] of respondents who knew they could be fined. Those in the skilled agricultural and fishery group had the lowest proportion [60.2% (CI: 57.8 - 64.5)] of respondents knowing they could be fined. This same group of occupation also had the highest proportion [31.8% (CI: 29.7 - 34.0)] of thinking they could not be fined as well as did not have any idea if they could or could not be fined for breeding mosquitoes [8.0% (CI: 6.8 - 9.3)].

Never married respondents had the highest proportion (72.2%) of knowing they could be fined, while widowed respondents had the least proportion (54.2%) of having the same knowledge. The highest proportion (29.6%) of respondents who did not think they could be fined was those who were divorced, while the widows/widowers were the highest in proportion (16.3%) to not know if they could or could not be fined.

As the monthly household income increased from less than RM 400 to RM 5000 and above, so did the proportion of respondents knowing they could be fined [54.8% (CI: 52.6 - 57.0)] – [80.4% (CI: 78.6 - 82.2)]. Likewise as the monthly household income decreased from RM 4000 - RM4999 to less than RM 400, the proportion of respondents who thought they could not be fined also increased from 16.8% (CI: 14.6 - 19.2) to 34.7% (CI: 32.6 - 36.8). As the monthly household income increased from less than RM 400 to RM 3000 - RM 3999, the proportion of respondents who did not know if they could be fined or not decreased from 10.3% (CI: 9.2 - 11.6) to 4.7% (CI: 3.9 - 5.7).

## 5.8 Dengue Preventive Practices

The response rate for self-reported dengue preventive practices was 34,990/36,146 (96.8%). Fifteen questions on dengue preventive practices were asked among persons aged 13 years and older. Two categories of questions were enquired, that included questions on environmental sanitation and self-protective practices.

### 5.8.1 Cover tightly all water containers

A total of 33.0% (CI: 31.9 - 34.1) respondents said they covered water containers in their home while 17.0% did not do so (CI: 16.1 - 17.9). The remaining 50.0% did not have water containers in their houses (CI: 48.8 - 51.3). The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 4.

The highest percentage of respondent who cover tightly all water container was found in the state of Sabah [74.8% (CI: 71.8 - 77.5)] and the lowest was in Pulau Pinang [8.7% (CI: 7.4 - 10.2)]. Rural communities [39.1% (CI: 37.3 - 40.9)] had a significantly higher percentage of this practice as compared to urban communities [29.6% (CI: 28.2 - 31.1)]. There was no significant difference in the practice of covering all water containers tightly between male [33.4% (CI: 32.2 - 34.7)] and female [32.6% (CI: 31.4 - 33.8)] respondents.

There was no difference in the practice of covering all water containers tightly among all age groups.

By ethnic group, other Bumis [53.5% (CI: 49.5 - 57.0)] had a significantly highest percentage of practice and Indians [39.2% (CI: 35.1 - 43.5)] had the lowest percentage of practice.

Non-Malaysians [41.1% (CI: 37.0 – 45.3)] had a significantly higher percentage of covering all water containers tightly as compared to Malaysians [32.5% (CI: 31.4 – 33.6)].

A pattern of decreasing practice of covering all water containers tightly was seen with increasing educational level. Craft and related trade workers showed the lowest percentage [29.5% (CI: 26.9 - 32.2)] of covering all water containers tightly while those in the elementary occupation group showed the highest percentage of such practice [37.3% CI: 33.9 – 40.9].

Those who are not married and divorcees showed the highest [33.6% (CI: 32.0 - 35.2)] and lowest [27.4% (CI: 24.1 – 30.9)] percentages of covering all water containers tightly.

A decreasing pattern of covering all water containers tightly was seen with increasing household income from less than RM 400 group to RM 4000 - 4999 groups. The highest percentage was in the less than RM 400 group [38.5% (CI: 35.6 - 41.6)] and the lowest in the RM 4000 - 4999 group [29.5% (CI: 25.9 - 33.4)]. The difference was significant.

### **5.8.2 Keeping drain free from blockage**

A total of 36.1% respondents (CI: 34.9 - 37.3) said they kept their drains free from blockage while [14.0% (CI: 13.2 - 14.8)] did not do so. The remaining [50.0% (CI: 48.6 - 51.3)] did not have drains in their homes.

The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 5.

The highest percentage of respondent who kept their drains free from blockage was found in the state of Negeri Sembilan [59.3% (CI: 55.4 – 63.0)] and the lowest in Pulau Pinang [16.9% (CI: 14.3 – 19.9)]. There was no significant difference seen between the rural [36.5% (CI: 34.6 – 38.3)] and urban [35.9% (CI: 34.4 – 37.4)] communities in terms of keeping the drain free from blockage.

There was no significant difference in the practice of keeping their drains free from blockage between male [36.0% (CI: 34.7 – 37.23)] and female [36.2% (CI: 34.9 – 37.4)] respondents.

The highest percentage of the practice of keeping the drain free from blockage was seen in the 50-54 years old group [39.5% (CI: 37.5– 41.6)] and the lowest percentage in the > 80 years old group [21.6 (CI: 17.5 – 26.2)].

By ethnic group, Indians [39.2 (CI: 35.9 – 42.5)] had a highest percentage of practice and those in the others group [31.0% (CI: 27.3 – 34.9)] had the lowest percentage of practice.

By religion, Christian had the highest percentage of keeping drain free from blockage [40.7% (CI: 37.8 – 43.8)] while those in the others group scored the lowest percentage of such practice [28.2% (CI: 22.9 – 34.1)].

Malaysians had a higher percentage of keeping drain free from blockage as compared to non-Malaysians.

There was a significant difference seen in the said practice between those with tertiary education [40.4% (CI: 38.1 – 42.8)] and those with no formal education [28.5% (CI: 26.4 - 30.6)].

Skilled agricultural and fishery group had the lowest percentage of keeping drain free from blockage [32.6% (CI: 29.9 - 35.4)] while those in the senior official and manager group had the highest percentage of such practice [42.1% (CI: 38.0 – 46.3)].

Those who are married and divorcees had the highest [37.1% (CI: 35.9 - 38.3)] and lowest [29.7% (CI: 26.2 - 33.3)] percentages of keeping drains free from blockage.

An increasing pattern of keeping drains free from blockage was seen with increasing monthly household income up to RM 5000 and above group. The highest being those in the RM 5000 and above group [44.5% (CI: 41.4 - 47.6)] and the lowest being those in the less than RM 400 group [26.7% (CI: 24.2 - 29.4)].

### **5.8.3 Change water in plant container**

A total of 9.2% respondents (CI: 8.1 - 9.8) said they changed water in their plant container while 10.1% did not do so (CI: 9.3 - 11.0). The remaining 80.6% of the respondents did not have plants in their homes (CI: 79.6 - 81.6). The socio-demographic characteristics of respondents who answer this question were as shown in Appendix : Table 6.

The highest percentage of respondent who changed water in their plant containers was found in the state of Selangor [12.8% (CI: 11.3 – 14.4)] and the lowest in Terengganu [2.4% (CI: 1.6 – 3.7)].

There was a significant difference seen between the rural [6.7% (CI: 6.0 – 7.5)] and urban [10.6% (CI: 9.9 – 11.4)] communities in terms of changing water in plant container.

Similar, a significant difference in the practice of changing water in plant containers between male [7.9% (CI: 7.3 – 8.5)] and female [10.3% (CI: 9.7 – 11.0)] respondents were observed.

The highest percentage of the practice of changing water in plant containers was seen in the 55-59 years old group [11.2% (CI: 9.9 - 12.7)] and the lowest in the > 80 years old group [6.1% (CI: 3.9 – 9.4)].

By ethnic group, Chinese [14.1% (CI: 12.9 – 15.5)] had the highest percentage of such practice and those in the others group [6.1% (CI: 4.9 – 7.7)] scored the lowest percentage.

By religion, Buddhist [14.2% (CI: 12.8 – 15.6)] and others group [6.4% (CI: 4.2 – 9.6)] had the highest and lowest percentages of changing water in plant containers respectively.

Malaysians [9.4% (CI: 8.9 – 10.0)] had a significantly higher percentage than non-Malaysians [5.8% (CI: 4.7 – 7.2)] in terms of changing water in plant containers.

The practice of changing water in plant containers increased with educational levels. The highest was seen in those with tertiary education [13.3% (CI: 11.9 – 15.0)] while the lowest in those with no formal education [6.4% (CI: 3.9 – 10.2)].

Skilled agricultural and fishery group had the lowest percentage [4.1% (CI: 3.3 - 5.1)] of such practice while those in the senior official and manager group had the highest percentage of the practice [17.6% (CI: 14.6 – 21.1)].

Those who are married had the highest percentage [9.6% (CI: 9.0 – 10.2)] of practicing changing water in plant containers while those in the widow/widower group had the lowest percentage [8.2% (CI: 6.9 - 9.6)] of such practices.

An increasing pattern of good practice was seen along with increasing household income up to RM 5000 and above group. The highest being those in the RM 5000 and above group [16.3% (CI: 14.4 - 18.4)] and the lowest being those in the less than RM 400 group [6.0% (CI: 4.9 - 7.3)].

#### **5.8.4 Remove stagnant water from flower pot trays**

A total of 6.8% (CI: 6.3 - 7.2) respondents said they removed stagnant water from flower pot trays, 8.7% (CI: 7.9 - 9.6) did not do so. The remaining 84.5% (CI: 83.6 - 85.5) did not have flower pots in their house. The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 7.

By state, there was a vast difference in percentages of responses to remove stagnant water from flower pot trays (1.7 - 10.5%). Selangor had the highest percentage while Terengganu had the lowest percentage.

There was a significant difference seen between the rural [4.9% (CI: 4.4 – 5.5)] and urban [7.8% (CI: 7.2 – 8.4)] communities in terms of removing stagnant water from their flower pot trays.

Female respondents [7.4% (CI: 6.9 – 8.0)] removed stagnant water from flower pot trays more significantly compared to males [5.9% (CI: 5.5 – 6.5)].

An increasing pattern of removing stagnant water from flower pot trays was observe in age groups 13-14 to 50-54. After that there was a decreasing pattern of such practice till the age group of 80 and above.

By ethnic group, Chinese [9.1% (CI: 8.1 – 10.3)] had the highest percentage of the practice and other Bumis [5.2% (CI: 4.2 – 6.3)] had the lowest percentage of the practice.

By religion, Buddhist had the highest percentage [8.8% (CI: 7.8 – 10.0)] of removing stagnant water from flower pots as compared to the lowest percentage [4.3% (CI: 2.6 - 7.1)] of such practice in the others group.

Malaysians [6.9% (CI: 6.4 – 7.4)] had a significantly higher percentage than non-Malaysians [5.1% (CI: 4.1 – 6.4)] in the practice of removing stagnant water from flower pot trays.

It was observed with increasing educational level, the practice of removing stagnant water from flower pot trays increased.



The senior official and manager group had the highest percentage of good practice [14.4% (CI: 11.7 – 17.6)] while skilled agricultural and fishery group had the lowest percentage [2.8% (CI: 2.2 - 3.6)].

Those who are married had the highest percentage [7.1% (CI: 6.6 – 7.6)] of good practice while divorcees had the lowest percentage [5.6% (CI: 4.1 - 7.8)] of such practice.

Apart from the less than RM400 household income group, an increasing pattern of good practice was seen along with increasing household income up to RM 5000 and above group. The highest percentage was seen in the RM 5000 and above group [13.6% (CI: 11.8 - 15.6)] and the lowest in the RM 400 - 699 group [3.6% (CI: 3.0 - 4.3)].

#### **5.8.5 Place garbage that can accumulate stagnant water into closed bins**

A total of [33.5% (CI: 32.3 - 34.6)] respondents said they placed their garbage that could accumulate stagnant water into closed bin, [15.4% (CI: 14.5 - 16.3)] did not do so, the remaining [51.2% (CI: 49.9 - 52.5)] did not have closed bins in their homes. The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 8.

By state, Selangor and Sarawak had almost similar highest percentage of respondent placing their garbage that could accumulate stagnant water into their close bins. Kelantan had the lowest percentage of the practice.

Urban communities [39.8% (CI: 38.2 - 41.3)] had a significantly higher percentage of placing their garbage that could accumulate stagnant water into close bins as compared to the rural communities [21.9% (CI: 20.5 - 23.4)].

There was no difference in the practice of placing garbage that could accumulate stagnant water into closed bins between male [33.5% (CI: 32.2 – 34.7)] and female [33.4% (CI: 32.2 – 34.7)] respondents.

An increasing pattern of respondents placing their garbage that could accumulate stagnant water into closed bins was observed in increasing age groups from 13-14 to 40-44. There was no fixed pattern after these age groups.

By ethnic group, Chinese [43.9% (CI: 41.6 – 46.3)] had the highest percentage of respondents placing their garbage that could accumulate stagnant water into closed bins and other Bumis [25.9% (CI: 23.5 – 28.6)] had the lowest percentage of the practice.

By religion, Buddhist [41.9% (CI: 39.5 – 44.3)] and Muslims [29.6% (CI: 28.3 – 30.9)] had the highest and lowest percentages of respondents placing their garbage that could accumulate stagnant water into closed bins.

The practice of placing garbage that could accumulate stagnant water into closed bins was seen significantly higher in Malaysians [33.8% (CI: 32.6 – 34.9)] than non-Malaysians [28.4% (CI: 25.6 – 31.2)].

The practice of placing garbage that could accumulate stagnant water into closed bins increased with increasing educational levels.

The senior official and manager (47.7%) and professionals (47.3%) groups had almost similar highest percentage of respondents placing their garbage that could accumulate stagnant water into closed bins. The skilled agricultural and fishery group had the lowest percentage (17.1%).

Those who are married had the highest percentage [34.2% (CI: 33.0 – 35.4)] of placing garbage that could accumulate stagnant water into closed bins while widow/widower had the lowest percentage [30.0% (CI: 27.6 - 32.6)] of the practice.

Percentages of respondents placing their garbage that could accumulate stagnant water into closed bins increased with increasing household income groups.

#### **5.8.6 Level defective floor surfaces that can collect water**

Majority [91.9% (CI: 91.2- 92.6)] of respondents did not have defective floor surfaces that could collect water in their houses. Only [1.2% (CI: 1.1– 1.4)] of respondents had leveled defective floor surfaces that could collect water in their houses versus [6.8% (CI: 6.2– 7.6)] of respondents who did not do so. The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 9.

Respondents in Malacca [2.1% (CI: 1.2 – 3.6)] had the highest percentage of leveling defective floor surfaces that could collect water in their houses, the lowest percentage was observed among respondents in Perak [0.3% (CI: 0.2 – 0.6)].

Rural communities [1.6% (CI: 1.3 – 1.9)] had a significantly higher percentage of respondents leveling defective floor surfaces that could collect water in their houses as compared to the urban communities [1.1% (CI: 0.9 – 1.3)].

Females [1.4% (CI: 1.2 – 1.7)] seemed to practice more compared to males [1.0% (CI: 0.9 – 1.2)] in leveling defective floor surfaces that could collect water in their houses.

The highest and lowest percentages of respondents in leveling defective floor surfaces that can collect water in their houses were in the 15-19 [1.6% (CI: 1.2 – 2.2)] and 75-79 [0.5% (CI: 0.1 – 1.8)] age groups respectively.

By ethnic group, other Bumiputeras [1.8% (CI: 1.3 – 2.5)] had the highest percentage of respondents leveling defective floor surfaces that could collect water in their houses and others [0.8% (CI: 0.4 – 1.6)] had the lowest percentage of the practice.

By religion, others [2.5% (CI: 1.2 – 5.3)] and Buddhist [0.8% (CI: 0.5 – 1.2)] had the highest and lowest percentages of respondents leveling defective floor surfaces that could collect water in their houses respectively.

Malaysians [1.2% (CI: 1.1 – 1.4)] had a significantly higher percentage than non-Malaysians [1.2% (CI: 0.7 – 2.0)] in leveling defective floor surfaces that could collect water in their houses.

The practice of leveling defective floor surfaces that could collect water in their houses increased with

increasing educational levels except for respondents with tertiary education who scored the lowest [0.9% (CI: 0.6 – 1.5)].

The senior official and manager occupational group [1.8% (CI: 1.0 – 3.4)] had the highest percentage of respondents leveling defective floor surfaces that could collect water in their houses. The plant and machine operator and assembler group had the lowest percentage [1.0% (CI: 0.60 – 1.58)] of such practice.

Those who were never married [1.4% (CI: 1.2 – 1.7)] and divorcees [1.0% (CI: 0.5 - 2.0)] had the highest and lowest percentage of respondents leveling defective floor surfaces that could collect water in their houses.

The highest and lowest percentages of respondents practicing leveling defective floor surfaces that could collect water in their houses were from the RM4000 - 4999 [1.6% (CI: 0.9 - 2.9)] and RM3000 - 3999 [0.9% (CI: 0.6 - 1.4)] household income groups.

#### **5.8.7 Adding larvicide into water containers**

Only 7.8% (CI: 7.3 - 8.4) respondents had added larvicide to their water containers in their home while 32.0% did not do so (CI: 31.0 – 33.1). The remaining 60.2% (CI: 58.9 – 61.4) did not have water containers in their houses. The socio-demographic characteristics of respondents who answered this question were as shown in Appendix : Table 10.

Relatively low percentages (range 2.7 – 17.8%) of practicing adding larvicidals to water containers were observed in all states. The highest percentage was observed in the state of Perlis and the lowest in Kelantan. Rural communities [10.4% (CI: 9.4 – 11.5)] had a significantly higher percentage of this practice as compared to urban communities [6.4% (CI: 5.9 – 7.0)].

There was no significant difference in the practice of adding larvicidals to water containers between male [8.1% (CI: 7.5 – 8.7)] and female [7.6% (CI: 7.1 – 8.2)] respondents.

A difference in the practice of adding larvicidals to water containers was observed among age groups. The highest and lowest percentages were seen in the 55-59 [10.2% (CI: 8.9 - 11.7)] and 13-14 age groups [5.2% (CI: 3.5 – 7.8)] respectively.

By ethnic group, Malays [9.6% (CI: 8.9 – 10.4)] had a significantly highest percentage of adding larvicidals to water container and Chinese [5.1% (CI: 4.4 – 5.9)] had the lowest percentage of the practice.

Respondents who embrace Islam [9.5% (CI: 8.8 – 10.2)] and respondents with other religion [3.9% (CI: 2.2 – 6.8)] had the highest and lowest percentages of adding larvicidals to water containers.

There was no difference in the percentage of adding larvicidals to water containers among Malaysians and non-Malaysians.

Respondents with secondary education had the highest percentage of adding larvicidals to water containers while those with tertiary education had the lowest percentage of the said practice.

Senior officers and managers had the highest percentage [10.3% (CI: 8.0 - 13.1)] of practicing adding larvicidal to water containers while those in the service workers and shops group had the lowest percentage [6.8% (CI: 6.1 – 7.6)].

Divorces scored the highest percentage [9.5% (CI: 7.4 – 12.0)] of practicing adding larvicidal to water containers while those in the widow/widower group had the lowest percentage [6.6% (CI: 5.5 – 8.0)] of the practice.

Almost similar percentages of the above said practice were observed in the income group of RM 700 - 999 and RM 5000 and above. There was a decreasing pattern of said practice from less than RM 400 to RM 400 - 699 group and RM1000 - 1999 to RM 4000 - RM4999 groups.

## **5.9 Preventive Method Used to Prevent Mosquito Bite**

Aerosol spray was the most frequent method used among the respondents to prevent mosquito bites (43.7%). This was followed by burning mosquito coils (22.1%), using electric mosquito coils (9.4%), burning rubbish outside the house (8.7%) and sleeping under a mosquito net (7.8%) (Appendix : Table 11).

The least frequent preventive method used by respondents to prevent mosquito bites was wearing long sleeve clothing and trousers at dawn or dusk (0.5%), followed by using window netting (1.9%) and applying mosquito repellent (2.5%) (Appendix : Table 11).

Aerosol spraying was commonly practiced among the urban population with 77.6% as compared to rural population (61.2%). It is favored in areas such as Kuala Lumpur (83.8%), followed by Selangor (80.0%) and Negeri Sembilan (79.8%). Indians (81.3%) had a highest percentage of the practice and those in the other Bumiputras group (62.6%) had the lowest percentage of the practice. Using aerosol spray was commonly practiced among those with tertiary education (79.1%), followed by secondary (74.7%) and primary education level (69.1%). Malaysians (72.1%) had a higher percentage of using aerosol spray as compared to the non-Malaysians (66.6%). An increasing pattern of using aerosol spray was seen along with increasing household income up to RM 5000 and above group (Appendix : Table 12).

In describing the least common method used, the highest percentage of respondent who wear long sleeve clothing and trousers at dawn or dusk was found in the rural communities (0.8%) as compared to the urban areas (0.7%). The population of Sarawak (2.0%) commonly practices wearing long sleeve clothing and trousers at dawn or dusk followed by those residing in Kelantan (0.19%) and Negeri Sembilan (0.15%). Female respondents had a higher percentage of such practice (0.8% versus 0.7% of male respondents). By ethnic group, other Bumiputeras (1.3%) had the highest percentage of practice and Indians (0.3%) had the lowest percentage of practice. Respondents with tertiary education had the highest percentage of wearing long sleeve clothing and trousers at dawn or dusk while those with primary education had the lowest percentage of the said practice. The highest and lowest percentages of the said practice were seen in the household income groups of RM 400-699 and RM 700-999 respectively (Appendix : Table 12).

### 5.10 Allowing Inspection of Mosquito Larvae inside the House by Health Authority

A total of 95.6% reported that they allow health authority to inspect their houses for mosquito larvae (CI: 95.3 - 95.9) while 4.0% would not allow it (CI: 3.7 - 4.3). Perlis and Federal Territory Kuala Lumpur had the highest [98.9% (CI: 97.0 - 99.6)] and lowest [92.6% (CI: 91.0 - 93.9)] percentages. No significant difference was seen between rural and urban locality. Almost similar percentages were seen among all age groups; ranging from (90.2 - 96.6%). No significant difference in the practice of between male and female. Malays [97.2% (CI: 96.9 - 97.5)] had a significantly highest percentage of the practice and Others [89.6% (CI: 86.8 - 91.8)] had the lowest percentage. In term of occupation, technical and associates had the highest percentage [98.0% (CI: 97.4 - 98.5)] of the practice and the service workers and shops group had the lowest percentage [94.4% (CI: 93.7 - 95.0)]. Almost similar percentages of the above said practice were observed in all income groups; ranging from 94.7 to 96.4%. Significant difference was observed in tertiary education group [97.2% (CI: 96.5 - 97.7)] compared to those with no formal education [92.2% (CI: 91.2 - 93.2)].

### 5.11 Allowing Health Authority to Put Larvicidals in Potential Breeding Areas

95.4% allow health authority to carry out this practice (CI: 95.1 - 95.7) while 4.2% would not allow it (CI: 3.9 - 4.5). More than 90% of respondents from all states allow health authority to carry out the practice. Perlis and Federal Territory Kuala Lumpur had the highest [99.3% (CI: 97.6 - 99.8)] and lowest [91.3% (CI: 89.4 - 92.9)] percentages. More rural dwellers allow health authority to carry out the practice as compared to urban dwellers. 95.39% allow health authority to carry out this practice (CI: 95.1 - 95.7) while 4.2% would not allow it (CI: 3.9 - 4.5). Almost similar percentages were seen among younger age groups (18 - 54 years); ranging from (94.9 - 96.4%) Decreasing percentages were seen from 55 - ≥ 80 years old. There was a very small significant difference in the practice between male and female. Malays [97.5% (CI: 97.2 - 97.8)] had a significantly highest percentage of the practice and Others [90.1% (CI: 88.1 - 91.8)] had the lowest percentage. Almost similar percentages of the above said practice were observed in all occupation; ranging from 94.1 to 97.4%. Almost similar percentages of the above said practice were observed in all occupation; ranging from 94.1 to 97.4%. Almost similar percentages of the above said practice were observed in all income groups; ranging from 94.1 to 96.4%. Significant difference was observed in secondary education group [96.4% (CI: 96.0 - 96.8)] while those with no formal education [92.5% (CI: 91.5 - 93.5)].

### 5.12 Allowing Health Authority to do Fogging at the House

As high as 92.5% of respondents allow health authority to do fogging (CI: 92.1 - 93.0) while 7.1% would not allow it (CI: 6.6 - 7.5). A significant highest percentage to allow fogging was seen in Kelantan [97.5% (CI: 96.5 - 98.2)] and lowest in Federal Territory Kuala Lumpur [84.9% (CI: 82.0 - 87.4)]. Significant difference was seen between rural [96.1% (CI: 95.7 - 96.6)] and urban [90.6% (CI: 89.9 - 91.2)] communities. A significant highest percentage was seen in 18 -19 age groups [94.4% (CI: 93.0 - 95.4)] and the lowest in 75 - 79 age group years old [87.9% (CI: 84.5 - 90.7)]. A significant difference in the practice was observed between male [94.0% (CI: 93.5 - 94.5)] and female [91.3% (CI: 90.7 - 91.9)]. Other Bumis [96.9% (CI: 96.2 - 97.5)] had a significantly highest percentage of the practice and Chinese [84.6% (CI: 83.2 - 85.9)] had the lowest percentage. Fluctuating percentages were seen among all occupation; with the lowest in the senior official and managers [89.6% (CI: 86.8 - 91.8)]. The

lowest percentage was seen in the RM5000 and above group [88.3% (CI: 86.6 – 89.8)] as compared to household income of RM400 – RM699 [94.6% (CI: 93.8 – 95.4)]. Significant difference was observed in secondary education group [93.6% (CI: 93.1– 94.1)] compared to those with tertiary education [90.7% (CI: 89.4 – 91.9)].

### **5.13 Attitude towards Community Participation**

Frequency of participation in community clean up projects; 42.1% (CI: 41.1 - 43.2) answered there was no such activity in their area while 13.9% (CI: 13.3 - 14.5) said they participate every time, 13.8% participate sometimes (CI: 13.3 - 14.4) and only 8.8% (CI: 8.4 - 9.2) said they seldom participate. A total of 21.4% (CI: 20.7 - 22.0) said that they never involved in such activity.

## **6. DISCUSSION**

Majority of the respondents generally knew about the mode of transmission of dengue fever. In this study 81.5% of the respondents were aware of the mode of transmission and this finding is almost consistent with the study in India by Matta et al. (2006) where 82.4% of the respondents knew that dengue fever is transmitted by mosquito. This study was similar to another field-based study done by Swaddiwudhipong et al. (1992). The proportion in this study slightly lower than the study done in Malaysia by Amar et al. (1994) which shows that 86.1% know that dengue fever is transmitted by *Aedes* mosquito. Generally it seems that most people in Asian countries are aware of the mode of transmission.

Generally the awareness that dengue fever is transmitted by mosquito bite is high. This indicates that our present health education activities have been successful in disseminating knowledge on the mode of transmission to the general population. Some studies have shown that dengue knowledge was associated with an increased use of preventive measures against the disease (Swaddiwudhipong et al. 1992; Ayyamani et al. 1986) and a reduced number of development sites for mosquito larvae (Chiaravalloti Neto 2003). There was no correlation between knowledge of dengue and level of *Aedes aegypti* abundance as measured by larval surveys in studies done in Brazil by Degallier et al. (2000) and Trinidad and Tobago by Rosenbaum et al. (1995).

Respondents in this study were from the age of 13 years and above which indicates that they have received sufficient information regarding dengue fever in schools and the other respondents through various health promotion activities carried out by the Ministry of Health. The older age groups are less interested in health education activities and probably because of this or other factors like health are less knowledgeable.

Dengue was an urban disease and as the urban population gaining more access to better health education facilities, they became more aware of the mode of transmission of dengue fever. Malaysians in the higher socio-economic status were well informed of the dengue transmission as compared to those with no education. People in the higher socio-economic status have wider pathways to gaining knowledge while those in the lower socio-economic status have reduced means of gaining knowledge.

Overall in this study 88.54% of the respondents were able to report Aedes mosquito as the vector for dengue fever. This proportion is higher than the proportions who know the mode of transmission. This indicates that a higher proportion know that Aedes mosquito causes dengue fever as compared to those who knew that dengue fever is transmitted by mosquito bite. The majority of the younger Malaysians living in urban areas and belonging to the higher socio-economic status in most of the states were aware of Aedes as the transmitter of dengue fever. This is probably because of the conscientious efforts of the Ministry of Health through its numerous health education campaigns and activities on dengue. The emphasis given by the government and the integration and correlation of these activities with the NGO's and private sector has made an impact on knowledge of dengue fever. More than 80% of the respondents knew the mode of dengue transmission as well as the specific type of mosquito which causes dengue fever. This proportion is higher than that reported in the study done by Constantianus et al. (2006) where 77% cited Aedes mosquito as the vector for dengue fever.

Even though overall more than 80% of the respondents had knowledge on the mode of dengue transmission and Aedes mosquito as the vector of dengue fever only 34.07 % were able to report one indoor breeding area. This indicates that our health promotion activities should focus more on educating people on potential breeding grounds for mosquitoes both inside and outside the house rather than describing mosquitoes. This also probably explains why, even though knowledge on the mode of transmission and the type of mosquito is high the incidence of dengue fever is still high in Malaysia because people are ignorant of the breeding areas. Only when people are aware of what contributes to the breeding of mosquitoes, they can attempt to prevent these breeding areas. Further studies need to be done to determine the correlation of knowledge and prevention practices.

Among the three major ethnic groups Chinese and the 'oldest' respondents seem to be the least knowledgeable and are unaware of any breeding areas. More efforts on control activities of dengue fever should be targeted to this group in the future. Compared to this finding a study done by Matta et al. (2006), shows a higher proportion in which 75% of the respondents reported that discarded bottles, old tyres and coconut shells can be breeding areas for mosquitoes outside the house. In the study done by Amar et al. (1994) about 30 - 80% of the respondents were able to report most of the breeding places of mosquitoes. Most of the studies reveal that knowledge regarding breeding areas of mosquitoes is much lower as compared to knowledge on the mode of transmission and the type of mosquito. Hence there should be emphasis given to educating people on breeding areas of mosquitoes. 50% of the respondents cited coconut shells as important source of mosquito breeding in a study done by Constantianus et al. (2006). This study revealed that persons with knowledge of Aedes breeding areas had more potential breeding areas in and around the house as compared to those without such knowledge. Contrary to this study. The study done by Chiarvalloti (2003) in Brazil shows that dengue knowledge was associated with a reduction in larval breeding areas of mosquitoes. Knowledge on dengue can be measured in various ways. Knowledge of dengue can be measured by knowledge on the disease (Tram et al. 2003; Kittigul et al. 2003; Van Benthem et al. 2002) or knowledge of the vector and control measures (Sanchez et al. 2005; Lloyd et al. 1992).

Majority of the respondents in this study preferred to use aerosol sprays to rid their surroundings of mosquitoes. Slightly less than one third would conduct search and destroy activities to tackle the problem. The former method while simpler to institute, renders immediate results and would definitely incur costs to the individual, while the latter is more time consuming and effortful, but practically free of cost. Only less than 5% of respondents in our study would request for fogging to be carried out around their premises. This contradicts another study in Thailand which found mosquito coils as the

most popular method of protecting respondents from mosquitoes. Other common methods used in that study was bed nets and mosquito repellents.

Using aerosol sprays is only a temporary measure that is directed towards adult mosquitoes. The search and destroy method, as the name implies is a more permanent method of curbing mosquitoes from becoming a problem by the destruction of mosquito breeding sites. Fogging is also a temporary measure, usually instituted during an outbreak while intensifying the search and destroys method. Having the correct knowledge of how to prevent oneself from mosquito bites and prevent its breeding will definitely influence the action a respondent would take when confronted with a problem of mosquito infestation around their house.

Not surprisingly, more respondents from Kuala Lumpur, urban dwellers and females preferred aerosol sprays to other methods. Professionals, respondents with a higher level of education and income bracket also mostly preferred to use aerosol sprays. This is not surprising as one would expect the level of education to match with ones monthly income bracket. Those in the higher income bracket would be able to afford aerosol sprays comfortably and find it a more convenient means of solving the mosquito problem, perhaps due to time constraints. This argument also holds true for professionals. Conversely, the skilled agricultural workers and fishery group had the lowest proportion for preference of aerosol sprays but the highest proportion for the search and destroy method. This group of respondents is likely to fall in a much lower socio-economic bracket. They are also more likely to dwell in rural areas where there is greater community bonding and participation in clean up projects compared to in urban areas.

Aerosol sprays may not have been a significant method used in the Thailand study, because that study was conducted among migrant female caretakers, who probably could not afford it or obtain it easily as it is here.

More Malaysians compared to non-Malaysians preferred aerosol sprays. A lower proportion of foreigners compared to Malaysians also cited the search and destroy method. It could be that most foreigners in this country comprise of those in the construction, plantation and other industrial areas where they work mostly as laborers. Being lowly educated and from a lower socio-economic status, it is not surprising that aerosol sprays are not as popular among foreigners as they are among Malaysians. Also, being foreigners, and mostly from third world countries where the problem of mosquitoes is undoubtedly worse than in Malaysia, the problem of mosquito infestation here probably does not concern them much as it does to us.

The difference in preferences towards aerosol use and the search and destroy method by ethnicity, marital status, religion and age is not clear. These variables could be confounded by educational level and income level. Further studies and analyses will be required to prove or disprove the association.

In terms of attitude towards responsibility of dengue prevention, the study showed that more than half of the respondents felt that it was the collective responsibility of the community to prevent dengue. Slightly less than one fifth of respondents felt it was the health authority's responsibility. Another 19.0% of the respondents put the responsibility towards others such as neighbors and community leaders. This is a good indication of the people's awareness that dengue prevention is everyone's responsibility, in particular the community itself. Although each and every person is responsible to do his/her own bit in the prevention of dengue, only a collective action will be successful. This is because



community approaches in dengue prevention target the elimination and prevention of breeding grounds. Individual efforts are usually limited to self protection from mosquito bites such as use of aerosol sprays, other mosquito repellents, and use of bed nets. Individual efforts to prevent mosquito breeding grounds are usually limited to his/her immediate surroundings only.

The study showed that the highest proportion of respondents who felt it was the community's responsibility to prevent dengue were from Penang, urban dwellers, males, young adults aged 25-29 years, Hindus, Indians, Malaysians and never married. They were also from a higher educational level, monthly income bracket and comprised of senior officials and managers.

Having the correct knowledge on how to prevent dengue will certainly influence one in having the correct attitude. The level of knowledge will depend on one's educational level, which in turn is closely tied with the monthly income level and occupation. Knowledge on the approaches to dengue prevention is also a reflection of the effectiveness of the health educational programs by the local health authorities. The findings indicate that overall, the efforts by the health authorities are at least translating into positive attitudes in terms of responsibility towards dengue among the respondents.

It is generally known that urban dwellers and young adults have better educational and occupational opportunities. It is also expected that Malaysian compared to foreigners would be more knowledgeable and committed towards the prevention of dengue in their homeland. Most Indians in Malaysia are Hindus and this explains why a higher proportion of Hindus rather than those from other religions had a better attitude towards the responsibility of dengue prevention.

It is not clear why more Indians compared to other races had a more inclined attitude towards the community being responsible. It could be that a higher proportion of Indians in the study were more educated compared to other ethnic groups.

In term of knowledge of being fined if they are caught to breed larvae, more than two thirds of the respondents knew correctly that they could be fined for breeding larvae at home. Again such knowledge is a reflection of the effectiveness of the health authority's efforts in enforcement and educating the community. If enforcement is good, those caught committing the offence would be issued a compound on the spot in accordance with the Destruction of Disease Bearing Insects Act, 1975. Those who have been fined previously would certainly know of this as would those who have not breached the act.

The study showed that the highest proportion of respondents who knew they could be fined for breeding larvae at home were from Penang, urban dwellers, males, young adults aged 25-29 years, Indians, Hindus, Malaysians and never married. They were also from a higher educational level, monthly income bracket and comprised of senior officials and managers. Respondents from the skilled agricultural and fishery group consistently showed the poorest level of knowledge.

It is generally known that urban dwellers and young adults have better educational and occupational opportunities. Most Indians in Malaysia are Hindus and this explains why a higher proportion of Hindus rather than those from other religion had better knowledge on this subject. Why more Indians compared to other races in this study had better knowledge is not clear. It could be that a higher proportion of Indians in the study were more educated compared to other ethnic groups.

It is important in public health terms that our population have appropriate preventive practices against dengue infection. Population observing appropriate practices is essential in dengue prevention at least as long as an effective vaccine is not present. In this survey the self reported preventive practices include questions on environmental sanitation and self protective practices.

The findings of this study must be interpreted with the consideration of possible limitations and errors. This survey relies on self-reports of preventive practices and was not observed, neither was it checked in daily life. With various healthy lifestyle campaigns carried out in Malaysia, those respondents who are knowledgeable about the dengue infection, may likely to over report preventive practices.

Our study revealed that the self reported dengue preventive practice was 70.5%. This practice was high as compared to similar studies conducted elsewhere. The Department of Health, Hong Kong in 2004 noted that the dengue preventive practice was only 42%. Similarly, a survey in Thailand (Kyu HH et al. 2005) reported that only 29% of the Tak Province had good preventive practices, 48.5% had moderate practices and the remainder poor practices.

Nevertheless, the patterns of preventive practices differ across communities. The urban community were reported to take more preventive practices than the rural communities. Areas such as Penang, Selangor and Wilayah Persekutuan Kuala Lumpur observed the highest practices. Preventive practices were less seen in Kelantan, Terengganu and Perak. Similar findings were seen in a study in Thailand by Van Benthem et al. (2002). It was found that persons with knowledge of the disease more frequently report the used of preventive measures. Persons with knowledge were found more in the suburban areas of Thailand as compared to the rural population. Respondents with higher education level and higher income level were also noted to take more preventive measures.

In terms of age group, residents below the ages of 39 years old reported to take more preventive measures than those above 40 years old. Again similar findings were observed in Thailand by Van Benthem et al. (2002). The lack of preventive action among the older population is an issue that needs to be looked into. Old people are less mobile; they tend to stay at home and are at a higher risk to become infected as the majority of dengue infection occurs in and around the house (Strickman et al. 2000).

Seven specific preventive measures against dengue were studied. Females were found to practice preventive measures against dengue fever more often than males. This finding was in agreement with the Hong Kong Study. This finding was true for preventive measures of covering tightly all water containers, keeping drains free from blockage, change water in plant containers and remove stagnant water from flower pot trays, whereas male respondents were more likely to add larvicide into water containers. The proportions of male and female respondents placing garbage that can accumulate stagnant water into closed bins and levelling defective floor surfaces that can collect water were almost similar.

By ethnicity, Chinese seem to carry out the following practices more often than other ethnic groups:

- i. changing water in plant containers
- ii. removing stagnant water from flower pot trays
- iii. placing garbage that can accumulate stagnant water into closed bins
- iv. levelling defective floor surfaces

These practices contradicted with the findings that Chinese seemed to be least knowledgeable and unaware of any breeding areas for *Aedes* mosquitoes among the three major ethnic groups in Malaysia. This might showed that with regards to practices, Chinese respondents had good practices concerning cleanliness but were lacking on the knowledge of breeding sites for *Aedes* mosquitoes.

A greater proportion of Malaysians carried out the seven specific preventive measures as compared to non-Malaysians except covering tightly all water containers. This could be due to the fact most of the non-Malaysians comprised of workers from third world countries and these practices were not common in their countries. However, these foreigners might not be supplied with piped water, therefore the necessity to store water for daily usage.

Married persons were more likely to be the ones to take preventive measures against dengue fever as compared to divorcees and widows/widowers. This applied to all specific practices except adding larvicide into water containers. Similar finding was reported in the Hong Kong study.

A total of 33.0% respondents covered tightly all water containers and 36.1% kept drains free from blockage. These practices decreased as educational levels increased. These could be explained that respondents might have better income with increasing educational level, hence they are more likely to be supplied with piped water, thus no necessity to store water in containers. The practice of removing stagnant water from flower pot trays, placing garbage that can accumulate stagnant water into closed bins and levelling defective floor surfaces that can collect water increased with increasing educational levels. The relationship of these practices was not clear; it might be due to the commitment towards dengue prevention or more for the beautification and cleanliness of their houses.

In regards to the preventive measures and household income; it was found that these practices increased as household income increased; i.e. keeping drains free from blockage, changed water in plant containers and removed stagnant water from flower pot trays, placing garbage that can accumulate stagnant water into closed bins and levelling defective floor surfaces that can collect water.

Urban communities were more likely to take preventive measure against dengue by removing stagnant water from flower pot trays, placing garbage that can accumulate stagnant water into closed bins and levelling defective floor surfaces that can collect water. Whereas rural communities were more likely to cover tightly all water containers, keeping drains free from blockage and adding larvicide into water containers. The practice of storing water in containers might be ingrained in rural communities. It is comforting to note that rural communities were practicing in keeping drains free from blockage and preventing the breeding of *Aedes* mosquitoes by adding larvicide into water containers. These preventive practices may be the results of numerous health education and promotion exercises carried out by health authorities.

Control activities are necessary whenever there is a dengue case reported. In terms of allowing inspection of mosquito larvae inside the house by health authority, majority said they would allow them to do so. No significant different was seen between rural and urban respondents. This showed that people were aware of larvae control activities as one of the ways to control dengue. However a significant difference was observed in tertiary education group compared to those with no formal education. Therefore more educational campaign on house inspection for larvae should be targeted for those with no formal education in view of their lack of awareness in control program.

In terms of allowing health authority to put larvicidals in potential breeding areas, 95.4% said they would agree to this action. Again those with no formal education contributed the least in allowing our health authorities to do so.

The study showed that as high as 92.5% of respondents said they would allow fogging to be done at their houses. Kelantan scored the highest percentage in allowing fogging inside houses. There was a significant difference between rural and urban dwellers where more rural people allowed fogging at their houses. It can be assumed here that urban people are afraid that fogging can cause damage to their belongings inside their houses. In order to overcome this thought, people should be informed that health authorities are using chemicals from synthetic pyrethroid with water based insecticides when doing fogging. This type of insecticides will not cause damage to their furniture and their other belongings. A significant difference was observed between males and females where more females would allow fogging inside their houses. It could be due to the fact that more females stayed at home and males were at the office during fogging.

## **7. CONCLUSION**

Although a large proportion (>80%) of the respondents were aware of the mode of transmission and causative vector of dengue fever, only about one third of these respondents were aware of at least one indoor and outdoor breeding site of the *Aedes* larvae respectively. Hence, it can be concluded that there is a gap in the knowledge required to take preventive actions, as although respondents were aware that dengue is a mosquito borne disease, their relative lack of knowledge on the breeding areas would prevent them from taking effective preventive actions.

Majority of the respondents preferred short term measures such as using aerosol sprays to counter the problem of mosquito infestation around their homes instead of other methods such as the search and destroy method, the use of mosquito coils and bednets. In terms of awareness of responsibility towards dengue prevention, majority of the respondents were aware that dengue prevention was the responsibility of the community and their own. More than 70% of the respondents also were aware that they could be fined for breeding mosquito larvae at home.

A bigger proportion of our respondents had taken some form of preventive measures against dengue and were aware that they could be fined if their houses were found to be positive for mosquito larvae. However, the rural communities and the older age groups need more attention in order to change their attitude and taking positive actions. More emphasis should be put on practical ways by involving community to participate in community activities such as Communication for Behavioural Impact (COMBI) which would contribute towards more sustainable control of dengue. COMBI would contribute towards the community participation in source reduction which would lead to reducing the number of potential mosquito breeding areas, thus in achieving a better dengue control.

In conclusion, there is awareness among the respondents on enforcement and responsibility towards dengue prevention, and desirable attitude towards dengue prevention by the health authorities. However, the study shows there is sizeable gap in dengue prevention knowledge. This correlates well with the lack of dengue prevention measures practiced by the respondents in the study, including poor community participation in community clean up projects.

## **8. RECOMMENDATIONS**

- 8.1 From this study it is recommended that the MOH's health promotion activities should focus more on educating people on potential breeding areas of mosquitoes and the necessary preventive measures rather than describing the mosquito.
- 8.2 This study showed that the older people seem to be less knowledgeable as regards to dengue fever prevention measures as well as the actual practices of these measures. Efforts should be made to tackle this group when disseminating information on dengue prevention practices.
- 8.3 Among the three ethnic groups Chinese seem to be least knowledgeable as regards to indoor and outdoor breeding areas. Further studies need to be done to confirm this finding and if it is found to be true again this group of the community should be given more attention with regards to health education on dengue prevention.
- 8.4 Again this study shows that Kuala Lumpur contributed to the highest proportion of the population who were unaware of any breeding area outside the house. Further studies need to be done to confirm this finding and necessary action must be taken to overcome this problem.
- 8.5 The next National Health and Morbidity survey should include the inspection of the house to confirm the practice of dengue prevention and control.
- 8.6 This study showed there is poor community participation and more emphasis should be made to enhance the community in mobilizing them towards dengue prevention measures.
- 8.7 This study showed most respondents resort to short term measures to overcome mosquito problems like the use of aerosol spray. Efforts should be to educate community on the importance of source reduction which will be more sustainable.

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# **APPENDIX**

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## APPENDIX

Table 1: Response to responsibility for dengue fever prevention

Who should act?(a)	Responses				
	N	n	%	95 % CI	
				Lower	Upper
Community participation	7,224,059	19,068	54.3	54.0	56.1
Others	2,425,839	6,655	19.0	17.8	19.2
Health authorities	2,082,739	5,686	16.2	15.3	16.4
Don't know	1,199,785	3,216	9.2	8.7	9.6
Neighbours	178,229	462	1.3	1.2	1.5
Refuse to answer	8,477	22	0.1	< 0.1	0.1

**Table 2: Response to responsibility for dengue fever prevention by socio-demography**

		Who should act?(a)				
		Community participation			95 % CI	
		N	n	%	Lower	Upper
National		7224059	19,068	54.3	54.0	56.1
State	Pulau Pinang	600,695	1,681	76.5	73.9	79.0
	WP KL	527,411	1,340	68.9	65.6	72.1
	Perak	725,788	1,731	65.8	62.3	69.1
	Selangor	1,639,085	3,954	65.3	63.1	67.5
	Sabah	717,463	2,346	58.1	54.9	61.2
	Johor	828,530	2,114	55.0	51.7	58.4
	WP Labuan	86,096	277	50.8	41.5	60.0
	Perlis	64,684	177	50.5	43.2	57.8
	Sarawak	579,668	1,448	50.4	47.5	53.4
	Kedah	413,713	1,156	43.9	40.6	47.3
	Melaka	159,473	379	42.8	37.4	48.3
	Pahang	303,295	789	40.3	36.9	43.7
	Terengganu	192,280	562	37.5	33.7	41.6
	N.Sembilan	164,237	450	33.6	30.5	36.9
	Kelantan	221,642	664	31.7	28.3	35.3
Residence	Urban	5,046,830	12,309	59.7	58.4	61.0
	Rural	2,177,229	6,759	46.7	45.0	48.4
Gender	Male	3,323,459	8,807	56.4	55.2	57.7
	Female	3,900,600	10,261	54.0	52.8	55.1
Age Group	25-29	832,524	2,187	60.0	58.2	61.9
	20-24	838,409	2,218	58.7	56.8	60.6
	30-34	775,148	2,050	58.6	56.7	60.5
	35-39	781,336	2,059	58.4	56.5	60.3
	40-44	824,797	2,161	57.6	55.7	59.4
	15-19	498,458	1,343	56.9	54.6	59.1
	45-49	730,916	1,918	55.9	54.0	57.8
	50-54	599,014	1,567	52.5	50.4	54.5
	55-59	482,325	1,260	51.8	49.4	54.1
	60-64	296,349	788	48.6	45.9	51.4
	65-69	236,088	629	45.2	42.2	48.1
	70-74	142,335	384	43.6	40.1	47.2
	13-14	75,278	208	41.7	37.2	46.4
	75-79	68,144	180	38.2	33.9	42.8
	≥ 80	42,938	116	31.5	26.8	36.7
Race	Indian	672,152	1,676	58.5	55.8	61.1
	Chinese	1,642,663	4,072	58.1	56.2	60.0
	Malays	3,897,385	10,343	54.2	52.9	55.6
	Other bumis	719,217	2,174	54.2	51.2	57.1
	Others	292,643	803	46.9	43.5	50.2



**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Community participation				
		N	n	%	95 % CI	
					Lower	Upper
Religion	Hindu	542,451	1,352	57.0	54.1	59.8
	Buddha	1,386,800	3,444	56.7	54.7	58.7
	Unclassified	8,954	22	56.2	41.3	70.1
	Christian	648,152	1,744	55.7	52.9	58.5
	Islam	4,537,060	12,245	54.4	53.1	55.6
	Others	100,642	261	51.2	45.3	57.1
	Citizenship	Unclassified	5,078	13	57.6	37.1
Malaysian		6,844,454	18,023	55.5	54.4	56.6
Non-Malaysian		374,527	1,032	48.1	45.0	51.2
Education	Tertiary	936,254	2,345	71.0	69.0	72.9
	Secondary	3,958,015	10,363	59.8	58.6	61.0
	Unclassified	51,432	135	50.9	44.3	57.5
	Primary	1,791,590	4,841	47.1	45.8	48.5
	None	486,768	1,384	38.1	36.0	40.1
Occupation	Senior Official & Manager	175,056	436	69.0	65.0	72.8
	Professionals	597,708	1,507	68.1	65.9	70.2
	Technical & Associate	647,336	1,669	64.3	62.0	66.4
	Clerical Workers	439,502	1,130	62.7	60.1	65.1
	Unclassified	561,921	1,467	56.7	54.5	59.0
	Service Workers & Shop	1,177,090	3,067	55.8	54.2	57.4
	Craft & Related Trade Workers	420,274	1,093	55.6	52.8	58.2
	Plant & Machine Operator & Assembler	383,051	1,017	55.0	52.3	57.5
	Housewife	1,556,615	4,123	52.3	50.8	53.8
	Elementary Occupations	278,249	780	49.9	47.0	52.7
	Unemployed	596,202	1,620	46.2	44.2	48.2
	Skilled Agricultural & Fishery	391,055	1,159	43.5	40.9	46.1
	Marital Status	Not married	1,787,467	4,736	57.4	56.0
Married		4,990,536	13,156	55.4	54.3	56.5
Divorcee		133,454	347	48.5	44.7	52.4
Widow/Widower		292,493	776	43.1	40.6	45.7
Unclassified		20,109	53	42.4	34.1	51.1
Household Income	RM5000 & above	796,259	1,980	66.8	64.3	69.3
	RM4000 - RM4999	326,730	825	62.2	58.9	65.3
	RM3000 - RM3999	645,780	1,628	61.3	58.9	63.6
	RM2000 - RM2999	1,220,798	3,130	59.4	57.6	61.3
	RM1000 - RM1999	1,905,361	5,047	55.4	53.8	56.9
	Unclassified	278,605	718	51.9	48.5	55.2
	RM700 - RM999	743,522	2,023	51.5	49.4	53.6
	RM400 - RM699	846,788	2,407	46.8	44.9	48.8
	Less than RM400	460,216	1,310	43.4	41.0	45.8

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Others			95 % CI	
		N	n	%	Lower	Upper
National		2425839	6,655	19.0	17.8	19.2
State	Pulau Pinang	67,036	187	8.5	7.2	10.2
	WP KL	57,464	146	7.5	6.1	9.1
	Perak	83,314	200	7.6	6.0	9.6
	Selangor	362,715	907	14.5	13.0	16.0
	Sabah	219,102	711	17.7	15.7	19.9
	Johor	336,164	895	22.3	19.8	25.1
	WP Labuan	35,689	116	21.1	15.7	27.6
	Perlis	14,753	41	11.5	8.6	15.2
	Sarawak	209,215	555	18.2	16.0	20.6
	Kedah	232,078	642	24.6	21.9	27.6
	Melaka	94,151	236	25.3	20.2	31.0
	Pahang	192,978	505	25.6	23.1	28.4
	Terengganu	154,996	453	30.3	26.9	33.9
	N.Sembilan	173,897	480	35.6	32.3	39.0
	Kelantan	192,289	581	27.5	24.6	30.7
Residence	Urban	1,368,464	3,384	16.2	15.3	17.1
	Rural	1,057,375	3,271	22.7	21.4	24.0
Gender	Male	1,068,115	2,945	18.1	17.3	19.1
	Female	1,357,724	3,710	18.8	18.0	19.6
Age Group	25-29	252,201	685	18.2	16.8	19.7
	20-24	256,904	709	18.0	16.6	19.4
	30-34	264,516	730	20.0	18.6	21.5
	35-39	261,190	719	19.5	18.1	21.0
	40-44	288,558	795	20.1	18.7	21.7
	15-19	168,220	468	19.2	17.5	21.0
	45-49	258,004	703	19.7	18.3	21.2
	50-54	227,658	619	20.0	18.4	21.6
	55-59	170,826	461	18.3	16.7	20.1
	60-64	110,324	301	18.1	16.2	20.2
	65-69	65,592	184	12.6	10.9	14.5
	70-74	37,752	102	11.6	9.5	14.0
	13-14	34,107	95	18.9	15.5	22.8
	75-79	17,944	51	10.1	7.7	13.0
	≥ 80	12,042	33	8.8	6.3	12.2
Race	Indian	198,470	507	17.3	15.4	19.3
	Chinese	357,082	914	12.6	11.5	13.8
	Malays	1,527,435	4,221	21.3	20.3	22.3
	Other bumis	241,662	722	18.2	16.3	20.3
	Others	101,190	291	16.2	14.1	18.5

Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)

		Who should act?(a)				
		Others				
		N	n	%	95 % CI	
				Lower		Upper
Religion	Hindu	157,831	403	16.6	14.5	18.9
	Buddha	303,516	778	12.4	11.3	13.6
	Unclassified	2,010	5	12.6	5.5	26.5
	Christian	205,128	567	17.6	15.8	19.7
	Islam	1,725,596	4,816	20.7	19.8	21.6
	Others	31,758	86	16.2	12.3	21.0
Citizenship	Unclassified	1,477	4	16.8	6.4	37.4
	Malaysian	2,308,914	6,317	18.7	18.0	19.5
	Non-Malaysian	115,448	334	14.8	13.0	16.8
Education	Tertiary	214,049	39	16.2	14.8	17.8
	Secondary	1,311,987	676	19.8	19.0	20.7
	Unclassified	11,001	50	10.9	7.7	15.2
	Primary	714,223	1,440	18.8	17.8	19.9
	None	174,580	1,011	13.7	12.4	15.0
Occupation	Senior Official & Manager	41,433	109	16.3	13.6	19.5
	Professionals	142,862	382	16.3	14.7	18.0
	Technical & Associate	202,201	541	20.1	18.4	21.9
	Clerical Workers	140,748	373	20.1	18.2	22.1
	Unclassified	183,297	500	18.5	16.9	20.2
	Service Workers & Shop	382,498	1,039	18.1	17.0	19.4
	Craft & Related Trade Workers	133,439	363	17.6	15.8	19.6
	Plant & Machine Operator & Assembler	134,552	365	19.3	17.5	21.3
	Housewife	561,623	1,541	18.9	17.8	20.0
	Elementary Occupations	100,089	288	17.9	16.0	20.1
	Unemployed	207,407	575	16.1	14.8	17.5
	Skilled Agricultural & Fishery	195,688	579	21.8	19.8	23.9
	Marital Status	Not married	560,916	1,543	18.0	17.0
Married		1,725,693	4,733	19.2	18.4	20.0
Divorcee		40,301	108	14.7	12.2	17.5
Widow/Widower		90,405	248	13.3	11.8	15.0
Unclassified		8,525	23	18.0	12.2	25.6
Household Income	RM5000 & above	172,868	446	14.5	12.9	16.3
	RM4000 - RM4999	84,742	220	16.1	13.9	18.6
	RM3000 - RM3999	191,308	501	18.2	16.4	20.1
	RM2000 - RM2999	393,968	1,048	19.2	17.8	20.7
	RM1000 - RM1999	670,257	1,839	19.5	18.4	20.6
	Unclassified	87,922	237	16.4	14.1	19.0
	RM700 - RM999	277,247	783	19.2	17.7	20.8
	RM400 - RM699	353,861	1,023	19.6	18.2	21.0
	Less than RM400	193,667	558	18.3	16.6	20.0

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Health authorities			95 % CI	
		N	n	%	Lower	Upper
National		2,082,739	5,686	16.2	15.3	16.4
State	Pulau Pinang	57,842	166	7.4	6.3	8.6
	WP KL	99,578	253	13.0	10.9	15.5
	Perak	185,680	445	16.8	14.9	19.0
	Selangor	249,844	615	10.0	9.0	11.0
	Sabah	191,181	620	15.5	14.0	17.1
	Johor	203,347	531	13.5	12.2	15.0
	WP Labuan	35,748	114	21.1	17.6	25.1
	Perlis	33,183	92	25.9	20.0	32.8
	Sarawak	194,103	511	16.9	15.2	18.7
	Kedah	202,769	565	21.5	19.7	23.5
	Melaka	67,792	170	18.2	15.3	21.4
	Pahang	165,643	430	22.0	19.4	24.8
	Terengganu	113,921	339	22.2	19.4	25.4
	N.Sembilan	77,238	216	15.8	13.5	18.4
	Kelantan	204,869	619	29.3	26.5	32.3
Residence	Urban	1,176,648	2,905	13.9	13.2	14.6
	Rural	906,091	2,781	19.4	18.5	20.4
Gender	Male	994,722	2,726	16.9	16.2	17.7
	Female	1,088,017	2,960	15.1	14.4	15.7
Age Group	25-29	186,961	502	13.5	12.3	14.8
	20-24	206,618	554	14.5	13.3	15.7
	30-34	180,784	492	13.7	12.5	15.0
	35-39	190,077	522	14.2	13.0	15.5
	40-44	223,647	615	15.6	14.4	16.9
	15-19	134,241	376	15.3	13.9	16.9
	45-49	201,781	552	15.4	14.2	16.7
	50-54	207,513	563	18.2	16.8	19.7
	55-59	172,685	469	18.5	16.9	20.2
	60-64	122,339	337	20.1	18.2	22.1
	65-69	110,848	304	21.2	19.0	23.6
	70-74	55,158	153	16.9	14.5	19.7
	13-14	35,871	97	19.9	16.5	23.7
	75-79	32,747	90	18.4	15.1	22.1
	≥ 80	21,469	60	15.8	12.3	19.9
Race	Indian	134,999	338	11.7	10.3	13.4
	Chinese	373,606	940	13.2	12.2	14.3
	Malays	1,262,613	3,492	17.6	16.8	18.3
	Other bumis	227,159	675	17.1	15.6	18.7
	Others	84,361	241	13.5	11.8	15.4

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Health authorities			95 % CI	
		N	n	%	Lower	Upper
Religion	Hindu	112,182	280	11.8	10.2	13.6
	Buddha	324,398	814	13.3	12.2	14.4
	Unclassified	2,125	6	13.4	6.0	27.0
	Christian	180,134	500	15.5	14.0	17.1
	Islam	1,438,080	4,016	17.2	16.6	17.9
	Others	25,819	70	13.1	9.5	17.9
Citizenship	Unclassified	1,081	3	12.3	3.9	32.3
	Malaysian	1,984,450	5,405	16.1	15.5	16.7
	Non-Malaysian	97,208	278	12.5	11.0	14.2
Education	Tertiary	141,608	564	10.7	9.7	11.9
	Secondary	990,934	3,577	15.0	14.3	15.7
	Unclassified	17,712	32	17.5	13.3	22.8
	Primary	707,336	1,984	18.6	17.7	19.5
	None	225,149	498	17.6	16.3	19.0
Occupation	Senior Official & Manager	24,754	64	9.8	7.6	12.4
	Professionals	108,129	283	12.3	11.0	13.8
	Technical & Associate	136,414	366	13.5	12.2	15.0
	Clerical Workers	97,324	258	13.9	12.3	15.6
	Unclassified	156,713	421	15.8	14.4	17.4
	Service Workers & Shop	327,479	875	15.5	14.5	16.6
	Craft & Related Trade Workers	115,983	307	15.3	13.7	17.1
	Plant & Machine Operator & Assembler	114,580	306	16.4	14.7	18.4
	Housewife	476,655	1,305	16.0	15.1	17.0
	Elementary Occupations	103,750	297	18.6	16.5	20.8
	Unemployed	224,616	627	17.4	16.0	18.9
	Skilled Agricultural & Fishery	196,342	577	21.8	20.1	23.7
Marital Status	Not married	462,868	1,253	14.9	14.0	15.8
	Married	1,441,814	3,943	16.0	15.4	16.6
	Divorcee	57,663	155	21.0	17.9	24.4
	Widow/Widower	111,350	311	16.4	14.7	18.2
	Unclassified	9,043	24	19.1	12.9	27.2
Household Income	RM5000 & above	124,533	318	10.5	9.2	11.8
	RM4000 - RM4999	67,196	170	12.8	10.8	15.0
	RM3000 - RM3999	132,629	339	12.6	11.3	14.0
	RM2000 - RM2999	275,020	725	13.4	12.4	14.5
	RM1000 - RM1999	546,147	1,482	15.9	15.0	16.8
	Unclassified	87,458	230	16.3	14.1	18.7
	RM700 - RM999	268,793	745	18.6	17.2	20.1
	RM400 - RM699	373,817	1,080	20.7	19.4	22.0
	Less than RM400	207,147	597	19.5	17.9	21.3

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Don't know			95 % CI	
		N	n	%	Lower	Upper
National		1,199,785	3,216	9.2	8.7	9.6
State	Pulau Pinang	58,228	160	7.4	5.7	9.6
	WP KL	65,730	167	8.6	7.2	10.3
	Perak	98,958	237	9.0	7.0	11.4
	Selangor	219,897	541	8.8	7.8	9.9
	Sabah	82,855	270	6.7	5.8	7.8
	Johor	120,337	308	8.0	6.8	9.4
	WP Labuan	10,461	34	6.2	3.8	9.8
	Perlis	11,272	31	8.8	5.9	13.0
	Sarawak	134,671	356	11.7	10.4	13.3
	Kedah	82,026	232	8.7	7.5	10.1
	Melaka	33,363	83	9.0	7.2	11.0
	Pahang	85,222	224	11.3	9.2	13.9
	Terengganu	48,998	148	9.6	8.1	11.2
	N.Sembilan	70,348	190	14.4	11.5	17.8
	Kelantan	77,420	235	11.1	9.3	13.1
Residence	Urban	727,590	1,771	8.6	8.1	9.2
	Rural	472,195	1,445	10.1	9.4	10.9
Gender	Male	426,283	1,141	7.2	6.7	7.8
	Female	773,502	2,075	10.7	10.2	11.3
Age Group	25-29	92,784	244	6.7	5.8	7.7
	20-24	106,650	286	7.5	6.5	8.6
	30-34	81,003	214	6.1	5.3	7.1
	35-39	85,930	232	6.4	5.6	7.4
	40-44	77,540	206	5.4	4.7	6.2
	15-19	63,421	169	7.2	6.2	8.4
	45-49	98,727	262	7.6	6.7	8.5
	50-54	89,097	235	7.8	6.9	8.9
	55-59	92,875	248	10.0	8.8	11.3
	60-64	75,986	206	12.5	10.8	14.3
	65-69	103,832	282	19.9	17.8	22.2
	70-74	86,764	234	26.6	23.6	29.8
	13-14	32,877	92	18.2	14.9	22.1
	75-79	56,602	155	31.8	27.7	36.1
	≥ 80	55,697	151	40.9	35.8	46.2
Race	Indian	122,191	312	10.6	9.5	11.9
	Chinese	404,649	1,011	14.3	13.2	15.5
	Malays	422,416	1,202	5.9	5.5	6.3
	Other bumis	116,254	331	8.8	7.6	10.0
	Others	134,274	360	21.5	18.5	24.9

Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)

		Who should act?(a)				
		N	Don't know		95 % CI	
			n	%	Lower	Upper
Religion	Hindu	122,210	313	12.8	11.0	14.9
	Buddha	386,902	969	15.8	14.6	17.2
	Unclassified	2,139	6	13.4	6.0	27.3
	Christian	106,795	288	9.2	8.0	10.5
	Islam	550,223	1,558	6.6	6.2	7.0
	Others	31,515	82	16.0	12.5	20.3
Citizenship	Unclassified	1,182	3	13.4	4.3	34.8
	Malaysian	1,022,131	2,734	8.3	7.9	8.7
	Non-Malaysian	176,472	479	22.7	20.0	25.6
Education	Tertiary	15,568	39	1.2	0.8	1.7
	Secondary	259,251	676	3.9	3.6	4.3
	Unclassified	19,397	50	19.2	13.8	26.2
	Primary	540,689	1,440	14.2	13.4	15.1
	None	364,881	1,011	28.5	26.8	30.3
Occupation	Senior Official & Manager	8,461	21	3.3	2.1	5.2
	Professionals	15,010	38	1.7	1.2	2.4
	Technical & Associate	10,712	27	1.1	0.7	1.6
	Clerical Workers	15,310	39	2.2	1.6	3.0
	Unclassified	76,823	208	7.8	6.7	9.0
	Service Workers & Shop	194,472	501	9.2	8.4	10.2
	Craft & Related Trade Workers	78,666	201	10.4	8.4	12.9
	Plant & Machine Operator & Assembler	54,754	140	7.9	6.6	9.3
	Housewife	331,154	897	11.1	10.4	12.0
	Elementary Occupations	66,155	183	11.9	10.1	13.9
	Unemployed	243,413	658	18.9	17.5	20.3
	Skilled Agricultural & Fishery	104,855	303	11.7	10.2	13.3
Marital Status	Not married	259,266	687	8.3	7.6	9.1
	Married	721,116	1,932	8.0	7.6	8.5
	Divorcee	37,737	102	13.7	11.4	16.4
	Widow/Widower	172,911	471	25.5	23.4	27.6
	Unclassified	8,755	24	18.5	11.9	27.4
Household Income	RM5000 & above	82,814	208	7.0	5.7	8.5
	RM4000 - RM4999	40,252	105	7.7	6.0	9.7
	RM3000 - RM3999	67,451	170	6.4	5.3	7.7
	RM2000 - RM2999	140,305	360	6.8	6.0	7.8
	RM1000 - RM1999	265,376	700	7.7	7.1	8.4
	Unclassified	75,092	197	14.0	12.1	16.1
	RM700 - RM999	137,257	376	9.5	8.3	10.8
	RM400 - RM699	209,178	586	11.6	10.5	12.7
	Less than RM400	182,060	514	17.2	15.6	18.9

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		N	Neighbours		95 % CI	
			n	%	Lower	Upper
National		178,229	462	1.3	1.2	1.5
State	Pulau Pinang	1,044	3	0.1	< 0.1	0.4
	WP KL	14,169	36	1.9	1.3	2.6
	Perak	9,142	21	0.8	0.5	1.4
	Selangor	34,424	81	1.4	1.1	1.8
	Sabah	24,766	80	2.0	1.5	2.7
	Johor	16,876	42	1.1	0.8	1.6
	WP Labuan	1,554	5	0.9	0.4	2.0
	Perlis	4,212	11	3.3	1.8	5.8
	Sarawak	29,784	76	2.6	1.9	3.5
	Kedah	10,426	29	1.1	0.8	1.6
	Melaka	18,123	41	4.9	3.1	7.4
	Pahang	5,881	15	0.8	0.4	1.4
	Terengganu	2,054	6	0.4	0.2	0.9
	N.Sembilan	3,076	8	0.6	0.3	1.4
	Kelantan	2,698	8	0.4	0.2	0.8
Residence	Urban	130,169	313	1.5	1.3	1.8
	Rural	48,060	149	1.0	0.8	1.3
Gender	Male	74,342	195	1.3	1.1	1.5
	Female	103,887	267	1.4	1.3	1.7
Age Group	25-29	21,432	56	1.6	1.2	2.0
	20-24	19,500	50	1.4	1.0	1.8
	30-34	20,875	54	1.6	1.2	2.1
	35-39	19,646	53	1.5	1.1	2.0
	40-44	16,418	42	1.2	0.8	1.6
	15-19	11,983	32	1.4	0.9	2.1
	45-49	18,636	49	1.4	1.1	1.9
	50-54	17,110	44	1.5	1.1	2.1
	55-59	12,064	29	1.3	0.9	1.9
	60-64	4,027	11	0.7	0.4	1.2
	65-69	5,677	14	1.1	0.7	1.8
	70-74	4,249	11	1.3	0.7	2.4
	13-14	2,431	6	1.4	0.6	3.0
	75-79	1,952	5	1.1	0.5	2.6
	≥ 80	2,229	6	1.6	0.7	3.6
Race	Indian	20,877	50	1.8	1.3	2.5
	Chinese	47,264	115	1.7	1.3	2.1
	Malays	75,434	197	1.1	0.9	1.2
	Other bumis	22,905	68	1.7	1.3	2.3
	Others	11,748	32	1.9	1.3	2.7



**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Neighbours			95 % CI	
		N	n	%	Lower	Upper
Religion	Hindu	16,819	40	1.8	1.2	2.5
	Buddha	39,236	95	1.6	1.3	2.1
	Unclassified	696	2	4.4	1.1	16.0
	Christian	21,492	59	1.9	1.4	2.5
	Islam	93,599	249	1.1	1.0	1.3
	Others	6,387	17	3.3	1.9	5.4
Citizenship	Unclassified	0	0	0.0	0.0	0.0
	Malaysian	163,530	420	1.3	1.2	1.5
	Non-Malaysian	14,699	42	1.9	1.4	2.6
Education	Tertiary	11,767	363	0.9	0.6	1.3
	Secondary	96,595	2,671	1.5	1.3	1.7
	Unclassified	1,019	52	1.0	0.3	3.2
	Primary	44,643	1,963	1.2	1.0	1.4
	None	24,205	637	1.9	1.5	2.4
Occupation	Senior Official & Manager	3,876	9	1.5	0.8	2.9
	Professionals	13,859	34	1.6	1.1	2.3
	Technical & Associate	10,916	27	1.1	0.7	1.6
	Clerical Workers	8,433	22	1.2	0.8	1.8
	Unclassified	11,131	28	1.1	0.8	1.7
	Service Workers & Shop	27,916	70	1.3	1.0	1.7
	Craft & Related Trade Workers	8,214	20	1.1	0.7	1.7
	Plant & Machine Operator & Assembler	9,764	25	1.4	1.0	2.1
	Housewife	47,385	121	1.6	1.3	1.9
	Elementary Occupations	9,520	28	1.7	1.2	2.5
	Unemployed	16,852	47	1.3	1.0	1.8
	Skilled Agricultural & Fishery	10,361	31	1.2	0.8	1.7
Marital Status	Not married	43,246	110	1.4	1.1	1.7
	Married	118,001	304	1.3	1.2	1.5
	Divorcee	5,952	18	2.2	1.4	3.4
	Widow/Widower	10,002	27	1.5	1.0	2.1
	Unclassified	1,027	3	2.2	0.7	6.7
Household Income	RM5000 & above	15,006	36	1.3	0.9	1.8
	RM4000 - RM4999	6,615	17	1.3	0.7	2.1
	RM3000 - RM3999	16,137	38	1.5	1.1	2.2
	RM2000 - RM2999	23,234	57	1.1	0.9	1.5
	RM1000 - RM1999	53,717	137	1.6	1.3	1.9
	Unclassified	5,721	15	1.1	0.6	1.9
	RM700 - RM999	18,066	47	1.3	0.9	1.7
	RM400 - RM699	22,758	65	1.3	1.0	1.6
	Less than RM400	16,975	50	1.6	1.2	2.2

**Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)**

		Who should act?(a)				
		Refuse to answer			95 % CI	
		N	n	%	Lower	Upper
National		8,477	22	0.1	< 0.1	0.1
State	Pulau Pinang	0	2,197	0.0	0.0	0.0
	WP KL	787	1,944	0.1	< 0.1	0.4
	Perak	931	2,636	0.1	< 0.1	0.3
	Selangor	2,749	6,105	0.1	0.1	0.2
	Sabah	0	4,027	0.0	0.0	0.0
	Johor	426	3,891	< 0.1	0.0	0.2
	WP Labuan	0	546	0.0	0.0	0.0
	Perlis	0	352	0.0	0.0	0.0
	Sarawak	1,838	2,951	0.2	0.1	0.4
	Kedah	1,069	2,627	0.1	< 0.1	0.4
	Melaka	0	909	0.0	0.0	0.0
	Pahang	354	1,964	0.1	< 0.1	0.3
	Terengganu	0	1,508	0.0	0.0	0.0
	N.Sembilan	0	1,344	0.0	0.0	0.0
	Kelantan	323	2,108	0.1	< 0.1	0.3
Residence	Urban	5,160	12	0.1	< 0.1	0.1
	Rural	3,317	10	0.1	< 0.1	0.1
Gender	Male	3,034	8	0.1	< 0.1	0.1
	Female	5,443	14	0.1	< 0.1	0.1
Age Group	25-29	827	2	0.1	< 0.1	0.2
	20-24	0	0	0.0	0.0	0.0
	30-34	354	1	< 0.1	0.0	0.2
	35-39	0	0	0.0	0.0	0.0
	40-44	1,542	4	0.1	< 0.1	0.3
	15-19	0	0	0.0	0.0	0.0
	45-49	290	1	< 0.1	0.0	0.2
	50-54	768	2	0.1	< 0.1	0.3
	55-59	899	2	0.1	< 0.1	0.4
	60-64	323	1	0.1	< 0.1	0.4
	65-69	716	2	0.1	< 0.1	0.6
	70-74	0	0	0.0	0.0	0.0
	13-14	0	0	0.0	0.0	0.0
	75-79	813	2	0.5	0.1	1.8
	≥ 80	1,944	5	1.4	0.6	3.4
Race	Indian	834	2	0.1	< 0.1	0.3
	Chinese	3,603	9	0.1	0.1	0.3
	Malays	2,562	7	< 0.1	< 0.1	0.1
	Other bumis	1,044	3	0.1	< 0.1	0.2
	Others	434	1	0.1	< 0.1	0.5

Table 2: Response to responsibility for dengue fever prevention by socio-demography (continue)

		Who should act?(a)				
		Refuse to answer			95 % CI	
		N	n	%	Lower	Upper
Religion	Hindu	834	2	0.1	< 0.1	0.4
	Buddha	3,156	8	0.1	0.1	0.3
	Unclassified	0	0	0.0	0.0	0.0
	Christian	1,142	3	0.1	< 0.1	0.3
	Islam	2,996	8	< 0.1	< 0.1	0.1
	Others	348	1	0.2	< 0.1	1.3
Citizenship	Unclassified	0	0	0.0	0.0	0.0
	Malaysian	8,043	21	0.1	< 0.1	0.1
	Non-Malaysian	434	1	0.1	< 0.1	0.4
Education	Tertiary	0	0	0.0	0.0	0.0
	Secondary	1,898	5	< 0.1	< 0.1	0.1
	Unclassified	465	1	0.5	0.1	3.2
	Primary	2,548	7	0.1	< 0.1	0.1
	None	3,565	9	0.3	0.1	0.5
Occupation	Senior Official & Manager	0	0	0.0	0.0	0.0
	Professionals	394	1	< 0.1	< 0.1	0.3
	Technical & Associate	0	0	0.0	0.0	0.0
	Clerical Workers	0	0	0.0	0.0	0.0
	Unclassified	465	1	0.1	< 0.1	0.3
	Service Workers & Shop	800	2	0.0	< 0.1	0.2
	Craft & Related Trade Workers	0	0	0.0	0.0	0.0
	Plant & Machine Operator & Assembler	434	1	0.1	< 0.1	0.4
	Housewife	2,692	7	0.1	< 0.1	0.2
	Elementary Occupations	290	1	0.1	< 0.1	0.4
	Unemployed	2,726	7	0.2	0.1	0.4
	Skilled Agricultural & Fishery	677	2	0.1	< 0.1	0.3
	Marital Status	Not married	724	2	< 0.1	< 0.1
Married		6,217	16	0.1	< 0.1	0.1
Divorcee		0	0	0.0	0.0	0.0
Widow/Widower		1,536	4	0.2	0.1	0.6
Unclassified		0	0	0.0	0.0	0.0
Household Income	RM5000 & above	434	1	< 0.1	< 0.1	0.3
	RM4000 - RM4999	0	0	0.0	0.0	0.0
	RM3000 - RM3999	840	2	0.1	< 0.1	0.3
	RM2000 - RM2999	742	2	< 0.1	< 0.1	0.1
	RM1000 - RM1999	1,348	4	< 0.1	< 0.1	0.1
	Unclassified	2,224	5	0.4	0.2	1.0
	RM700 - RM999	0	0	0.0	0.0	0.0
	RM400 - RM699	2,133	6	0.1	0.1	0.3
	Less than RM400	756	2	0.1	< 0.1	0.3

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography**

		Could you be fined?				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		9,234,623	24,532	70.4	69.6	71.2
State	Pulau Pinang	694,043	1,945	88.3	85.9	90.4
	Selangor	1,986,042	4,828	79.2	77.8	80.6
	WP KL	590,779	1,501	77.2	74.6	79.7
	N.Sembilan	360,270	986	73.8	69.8	77.5
	Pahang	532,628	1,385	70.9	67.8	73.7
	WP Labuan	121,551	390	71.8	65.7	77.2
	Sarawak	793,202	2,014	69.1	66.6	71.4
	Melaka	255,731	617	68.4	63.1	73.3
	Sabah	817,871	2,662	66.2	63.5	68.8
	Johor	967,575	2,490	64.3	61.6	66.9
	Kedah	603,808	1,669	64.0	61.1	66.9
	Perlis	81,913	223	64.0	56.1	71.2
	Perak	698,272	1,648	63.3	59.9	66.6
	Terengganu	317,858	931	62.1	58.1	65.9
	Kelantan	413,080	1,243	59.1	55.7	62.4
Residence	Urban	6,274,424	15,355	74.2	73.2	75.2
	Rural	2,960,200	9,177	63.5	62.1	64.8
Gender	Male	4,275,194	11,405	72.6	71.6	73.6
	Female	4,959,429	13,127	68.6	67.7	69.6
Age Group	25-29	1,017,714	2,678	73.4	71.8	75.0
	35-39	979,381	2,612	73.1	71.5	74.7
	30-34	963,988	2,561	73.0	71.3	74.7
	20-24	1,042,328	2,774	73.0	71.4	74.6
	15-19	632,656	1,722	72.2	70.2	74.1
	40-44	1,030,918	2,735	72.0	70.4	73.6
	45-49	940,389	2,484	71.8	70.1	73.4
	50-54	802,348	2,111	70.3	68.5	72.1
	55-59	652,144	1,716	69.9	68.0	71.8
	60-64	402,823	1,073	66.2	63.7	68.6
	13-14	118,678	326	65.6	61.1	69.9
	65-69	313,530	836	60.2	57.3	63.0
	70-74	186,702	502	57.4	53.9	60.8
	75-79	90,588	241	51.0	46.3	55.6
	>=80	60,438	161	44.6	39.6	49.7
Race	Indian	876,973	2,193	76.3	74.3	78.2
	Chinese	2,039,590	5,087	72.1	70.5	73.7
	Malays	5,067,016	13,591	70.5	69.4	71.6
	Other bumis	901,234	2,693	67.9	65.7	70.0
	Others	349,811	968	56.0	52.6	59.3

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Hindu	708,841	1,770	74.5	72.0	76.8
	Christian	858,630	2,313	73.8	71.8	75.8
	Unclassified	11,540	29	72.5	57.0	84.0
	Buddha	1,726,587	4,315	70.7	68.9	72.3
	Islam	5,802,996	15,777	69.5	68.5	70.5
	Others	126,030	328	64.4	59.0	69.4
Citizenship	Unclassified	6,924	18	78.5	57.2	90.9
	Malaysian	8,816,646	23,378	71.5	70.7	72.3
	Non-Malaysian	411,053	1,136	52.9	50.0	55.7
Education	Tertiary	1,096,587	2,769	83.1	81.5	84.5
	Secondary	5,039,041	13,301	76.2	75.3	77.1
	Primary	2,396,005	6,495	63.0	61.8	64.2
	Unclassified	62,382	167	62.0	54.7	68.8
	None	640,609	1,800	50.1	48.2	52.0
Occupation	Senior Official & Manager	213,521	537	84.2	80.9	87.0
	Professionals	724,515	1,842	82.6	80.8	84.2
	Technical & Associate	818,623	2,134	81.4	79.6	83.0
	Clerical Workers	556,935	1,443	79.4	77.3	81.3
	Plant & Machine Operator & Assembler	512,828	1,366	73.5	71.2	75.7
	Unclassified	722,349	1,911	73.0	71.1	74.9
	Service Workers & Shop	1,497,544	3,932	71.0	69.6	72.3
	Craft & Related Trade Workers	529,350	1,386	70.0	67.3	72.6
	Housewife	1,979,223	5,265	66.6	65.3	67.8
	Elementary Occupations	347,088	971	62.2	59.3	65.0
	Unemployed	791,204	2,151	61.3	59.5	63.0
	Skilled Agricultural & Fishery	541,444	1,594	60.2	57.8	62.5
Marital Status	Not married	2,247,228	5,989	72.2	71.0	73.3
	Married	6,417,020	17,027	71.3	70.4	72.2
	Unclassified	29,641	78	63.0	53.6	71.5
	Divorcee	172,797	454	62.7	59.0	66.3
	Widow/Widower	367,938	984	54.2	51.8	56.6
Household Income	RM5000 & above	959,584	2,402	80.4	78.6	82.2
	RM3000 - RM3999	824,718	2,092	78.2	76.2	80.1
	RM4000 - RM4999	406,611	1,032	77.6	74.7	80.2
	RM2000 - RM2999	1,571,280	4,062	76.6	75.1	78.0
	RM1000 - RM1999	2,462,962	6,575	71.6	70.3	72.8
	RM700 - RM999	962,967	2,638	66.7	64.7	68.6
	Unclassified	355,524	922	66.4	63.3	69.4
	RM400 - RM699	1,109,002	3,157	61.3	59.6	63.0
	Less than RM400	581,976	1,652	54.8	52.6	57.0

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		No			95 % CI	
		N	n	%	Lower	Upper
National		3,011,624	8,227	23.0	22.2	23.7
State	Pulau Pinang	42,966	121	5.5	4.5	6.7
	Selangor	344,456	847	13.7	12.6	14.9
	WP KL	125,162	318	16.4	17.1	18.7
	N.Sembilan	85,235	239	17.5	14.4	21.0
	Pahang	171,157	448	22.8	20.1	25.7
	WP Labuan	37,273	121	22.0	22.2	23.7
	Sarawak	257,075	679	22.4	20.2	24.8
	Melaka	102,363	255	27.4	22.5	32.9
	Sabah	337,549	1,104	27.3	24.9	29.9
	Johor	459,210	1,191	30.5	27.9	33.2
	Kedah	286,120	809	30.4	27.8	33.1
	Perlis	37,144	104	29.0	23.1	35.8
	Perak	336,266	822	30.5	27.5	33.7
	Terengganu	158,913	472	31.0	27.0	35.4
	Kelantan	230,735	697	33.0	29.8	36.4
Residence	Urban	1,648,681	4,036	19.5	18.6	20.5
	Rural	1,362,943	4,191	29.2	28.0	30.6
Gender	Male	1,275,362	3,502	21.7	20.8	22.6
	Female	1,736,262	4,725	24.0	23.2	24.9
Age Group	25-29	281,305	765	20.3	18.9	21.8
	35-39	293,639	795	21.9	20.5	23.5
	30-34	290,346	797	22.0	20.5	23.6
	20-24	291,029	789	20.4	19.0	21.9
	15-19	181,141	496	20.7	18.9	22.5
	40-44	336,066	911	23.5	22.0	25.0
	45-49	307,735	841	23.5	22.0	25.1
	50-54	283,249	770	24.8	23.2	26.6
	55-59	224,664	608	24.1	22.3	26.0
	60-64	161,831	449	26.6	24.4	28.9
	13-14	35,643	102	19.7	16.2	23.7
	65-69	153,157	426	29.4	26.9	32.1
	70-74	87,179	240	26.8	23.7	30.1
	75-79	50,510	143	28.4	24.3	32.9
	>=80	34,132	95	25.2	20.9	30.0
Race	Indian	204,343	519	17.8	16.0	19.7
	Chinese	563,529	1,410	19.9	18.6	21.3
	Malays	1,759,023	4,866	24.5	23.5	25.5
	Other bumis	324,241	979	24.4	22.5	26.5
	Others	160,489	453	25.7	23.1	28.5

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		No				
		N	n	%	95 % CI	
					Lower	Upper
Religion	Hindu	175,392	445	18.4	16.5	20.6
	Christian	220,908	617	19.0	17.3	20.9
	Unclassified	2,211	6	13.9	6.3	28.0
	Buddha	500,356	1,251	20.5	19.1	22.0
	Islam	2,065,393	5,780	24.8	23.8	25.7
	Others	47,364	128	24.2	19.7	29.3
Citizenship	Unclassified	1,894	5	21.5	9.1	42.8
	Malaysian	2,793,278	7,595	22.7	21.9	23.4
	Non-Malaysian	216,451	627	27.8	25.2	30.6
Education	Tertiary	200,817	518	15.2	13.8	16.7
	Secondary	1,306,906	3,508	19.8	18.9	20.6
	Primary	1,065,370	2,945	28.0	26.9	29.2
	Unclassified	16,025	45	15.9	11.8	21.1
	None	422,505	1,211	33.1	31.3	34.9
Occupation	Senior Official & Manager	34,178	87	13.5	10.9	16.6
	Professionals	134,552	353	15.3	13.8	17.0
	Technical & Associate	167,858	442	16.7	15.1	18.4
	Clerical Workers	124,701	328	17.8	16.0	19.7
	Plant & Machine Operator & Assembler	153,877	408	22.1	20.1	24.2
	Unclassified	185,278	496	18.7	17.1	20.4
	Service Workers & Shop	464,390	1,239	22.0	20.7	23.4
	Craft & Related Trade Workers	173,049	456	22.9	20.8	25.2
	Housewife	785,767	2,152	26.4	25.2	27.6
	Elementary Occupations	165,144	478	29.6	27.0	32.3
	Unemployed	336,814	939	26.1	24.5	27.7
	Skilled Agricultural & Fishery	286,015	849	31.8	29.7	34.0
	Marital Status	Not married	647,139	1,754	20.8	19.7
Married		2,072,214	5,671	23.0	22.2	23.9
Unclassified		11,771	32	25.0	18.0	33.7
Divorcee		81,476	221	29.6	26.1	33.3
Widow/Widower		199,024	549	29.3	27.1	31.6
Household Income	RM5000 & above	155,323	395	13.0	11.6	14.6
	RM3000 - RM3999	179,167	458	17.0	15.3	18.8
	RM4000 - RM4999	88,109	225	16.8	14.6	19.2
	RM2000 - RM2999	373,946	977	18.2	16.9	19.6
	RM1000 - RM1999	785,850	2,114	22.8	21.7	24.0
	RM700 - RM999	381,135	1,061	26.4	24.7	28.2
	Unclassified	123,278	325	23.0	20.4	25.9
	RM400 - RM699	556,774	1,608	30.8	29.2	32.5
	Less than RM400	368,043	1,064	34.7	32.6	36.8

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		Don't know			95 % CI	
		N	n	%	Lower	Upper
National		849,474	2,288	6.5	6.1	6.8
State	Pulau Pinang	48,943	134	6.2	4.6	8.3
	Selangor	169,969	410	6.8	6.1	7.6
	WP KL	47,231	120	6.2	5.1	7.4
	N.Sembilan	42,236	116	8.7	7.0	10.7
	Pahang	47,602	126	6.3	5.0	8.0
	WP Labuan	10,430	34	6.2	4.4	8.6
	Sarawak	95,576	249	8.3	7.2	9.6
	Melaka	15,074	38	4.0	2.7	6.0
	Sabah	77,610	253	6.3	5.3	7.4
	Johor	77,374	205	5.1	4.3	6.1
	Kedah	51,819	148	5.5	4.6	6.6
	Perlis	8,610	24	6.7	4.1	10.9
	Perak	66,798	160	6.1	4.7	7.9
	Terengganu	35,099	104	6.9	5.6	8.3
	Kelantan	55,103	167	7.9	6.5	9.6
Residence	Urban	518,728	1,273	6.1	5.7	6.6
	Rural	330,746	1,015	7.1	6.6	7.7
Gender	Male	330,056	890	5.6	5.1	6.1
	Female	519,418	1,398	7.2	6.8	7.6
Age Group	25-29	86,011	228	6.2	5.4	7.2
	35-39	65,112	177	4.9	4.2	5.7
	30-34	63,524	170	4.8	4.1	5.6
	20-24	93,296	251	6.5	5.7	7.5
	15-19	62,640	170	7.2	6.1	8.3
	40-44	62,352	169	4.4	3.8	5.1
	45-49	59,437	158	4.5	3.9	5.3
	50-54	54,235	146	4.8	4.1	5.6
	55-59	54,399	144	5.8	4.9	6.9
	60-64	43,399	118	7.1	5.9	8.6
	13-14	25,718	69	14.2	11.3	17.8
	65-69	53,247	145	10.2	8.7	11.9
	70-74	50,085	136	15.4	13.0	18.1
	75-79	36,194	97	20.4	16.7	24.5
	>=80	39,825	110	29.4	24.9	34.3
Race	Indian	66,448	169	5.8	4.9	6.9
	Chinese	218,088	544	7.7	7.0	8.5
	Malays	353,286	983	4.9	4.6	5.3
	Other bumis	99,208	290	7.5	6.5	8.5
	Others	112,445	302	18.0	15.5	20.8



**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		Don't know			95 % CI	
		N	n	%	Lower	Upper
Religion	Hindu	66,570	171	7.0	5.6	8.7
	Christian	80,733	224	6.9	6.0	8.0
	Unclassified	2,174	6	13.7	6.2	27.6
	Buddha	210,173	524	8.6	7.7	9.6
	Islam	468,095	1,306	5.6	5.3	6.0
	Others	21,730	57	11.1	8.4	14.6
Citizenship	Unclassified	0	0	0.0	0.0	0.0
	Malaysian	702,305	1,896	5.7	5.4	6.0
	Non-Malaysian	147,169	392	18.9	16.7	21.4
Education	Tertiary	22,958	57	1.7	1.4	2.2
	Secondary	262,713	699	4.0	3.6	4.3
	Primary	331,295	889	8.7	8.1	9.4
	Unclassified	21,942	59	21.8	15.6	29.6
	None	210,567	584	16.5	15.2	17.9
Occupation	Senior Official & Manager	5,881	15	2.3	1.3	4.0
	Professionals	18,027	47	2.1	1.5	2.8
	Technical & Associate	18,539	48	1.8	1.4	2.5
	Clerical Workers	19,687	51	2.8	2.1	3.7
	Plant & Machine Operator & Assembler	29,754	78	4.3	3.4	5.3
	Unclassified	80,823	213	8.2	7.1	9.4
	Service Workers & Shop	143,288	370	6.8	6.1	7.6
	Craft & Related Trade Workers	53,114	139	7.0	5.5	9.0
	Housewife	204,350	559	6.9	6.3	7.5
	Elementary Occupations	45,399	127	8.1	6.7	9.8
	Unemployed	158,859	433	12.3	11.2	13.5
	Skilled Agricultural & Fishery	71,754	208	8.0	6.8	9.3
Marital Status	Not married	215,820	577	6.9	6.3	7.6
	Married	496,463	1,338	5.5	5.2	5.9
	Unclassified	5,621	16	12.0	6.5	1.1
	Divorcee	21,206	56	7.7	6.0	9.9
	Widow/Widower	110,364	301	16.3	14.6	8.1
Household Income	RM5000 & above	77,257	192	6.5	5.4	7.8
	RM3000 - RM3999	49,605	126	4.7	3.9	5.7
	RM4000 - RM4999	29,162	76	5.6	4.2	7.4
	RM2000 - RM2999	102,873	269	5.0	4.4	5.7
	RM1000 - RM1999	187,746	503	5.5	5.0	6.0
	RM700 - RM999	98,413	269	6.8	5.9	7.9
	Unclassified	55,376	148	10.3	6.1	12.3
	RM400 - RM699	139,454	393	7.7	6.9	8.6
	Less than RM400	109,590	312	10.3	9.2	11.6

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		Refused to answer				
		N	n	%	95 % CI	
					Lower	Upper
National		18,374	49	0.1	0.1	0.2
State	Pulau Pinang	0	0	0.0	0.0	0.0
	Selangor	5,786	14	0.2	0.1	0.4
	WP KL	1,968	5	0.3	0.1	0.6
	N.Sembilan	332	1	0.1	< 0.1	0.4
	Pahang	425	1	0.1	< 0.1	0.4
	WP Labuan	0	0	0.0	0.0	0.0
	Sarawak	2,632	7	0.2	0.1	0.5
	Melaka	491	1	0.1	< 0.1	0.5
	Sabah	1,785	6	0.1	0.1	0.4
	Johor	1,298	4	0.1	< 0.1	0.4
	Kedah	1,069	3	0.1	< 0.1	0.3
	Perlis	338	1	0.3	< 0.1	1.7
	Perak	1,547	4	0.1	0.1	0.4
	Terengganu	379	1	0.1	< 0.1	0.5
	Kelantan	323	1	0.1	< 0.1	0.9
Residence	Urban	10,551	25	0.1	0.1	0.2
	Rural	7,823	24	0.2	0.1	0.3
Gender	Male	7,896	21	0.1	0.1	0.2
	Female	10,477	28	0.2	0.1	0.2
Age Group	25-29	1,120	3	0.1	< 0.1	0.3
	35-39	1,150	3	0.1	< 0.1	0.3
	30-34	2,161	6	0.2	0.1	0.4
	20-24	1,132	3	0.1	< 0.1	0.3
	15-19	0	0	0.0	0.0	0.0
	40-44	2,041	5	0.1	0.1	0.3
	45-49	2,387	7	0.2	0.1	0.4
	50-54	1,487	4	0.1	0.1	0.4
	55-59	1,391	4	0.2	0.1	0.4
	60-64	324	1	0.1	< 0.1	0.4
	13-14	819	2	0.5	0.1	1.8
	65-69	1,084	3	0.2	0.1	0.7
	70-74	1,596	4	0.5	0.2	1.3
	75-79	465	1	0.3	< 0.1	1.8
	>=80	1,216	3	0.9	0.3	2.8
Race	Indian	1,556	4	0.1	0.1	0.4
	Chinese	6,245	16	0.2	0.1	0.4
	Malays	6,110	16	0.1	0.1	0.1
	Other bumis	2,435	7	0.2	0.1	0.4
	Others	2,027	6	0.3	0.1	0.8

**Table 3: Response to 'can you be fined if your house is found to breed aedes mosquito larvae' by socio-demography (continue)**

		Could you be fined?				
		Refused to answer				
		N	n	%	95 % CI	
					Lower	Upper
Religion	Hindu	728	2	0.1	< 0.1	0.3
	Christian	2,776	8	0.2	0.1	0.5
	Unclassified	0	0	0.0	0.0	0.0
	Buddha	6,245	16	0.3	0.2	0.4
	Islam	7,916	21	0.1	0.1	0.2
	Others	708	2	0.4	0.1	1.4
Citizenship	Unclassified	0	0	0.0	0.0	0.0
	Malaysian	15,628	41	0.1	0.1	0.2
	Non-Malaysian	2,746	8	0.4	0.2	0.8
Education	Tertiary	0	0	0.0	0.0	0.0
	Secondary	5,527	14	0.1	0.1	0.1
	Primary	8,358	23	0.2	0.2	0.3
	Unclassified	292	1	0.3	< 0.1	2.0
	None	4,196	11	0.3	0.2	0.6
Occupation	Senior Official & Manager	0	0	0.0	0.0	0.0
	Professionals	394	1	0.0	< 0.1	0.3
	Technical & Associate	846	2	0.1	< 0.1	0.3
	Clerical Workers	434	1	0.1	< 0.1	0.4
	Plant & Machine Operator & Assembler	1,150	3	0.2	0.1	0.5
	Unclassified	1,143	3	0.1	< 0.1	0.4
	Service Workers & Shop	4,349	12	0.2	0.1	0.4
	Craft & Related Trade Workers	335	1	< 0.1	< 0.1	0.3
	Housewife	4,328	12	0.2	0.1	0.3
	Elementary Occupations	582	2	0.1	< 0.1	0.4
	Unemployed	4,142	10	0.3	0.2	0.6
	Skilled Agricultural & Fishery	671	2	0.1	< 0.1	0.3
Marital Status	Not married	4,312	11	0.1	0.1	0.3
	Married	12,342	34	0.1	0.1	0.2
	Unclassified	0.00	0	0.0	0.0	0.0
	Divorcee	0.00	0	0.0	0.0	0.0
	Widow/Widower	1,720	4	0.3	0.1	0.7
Household Income	RM5000 & above	925	2	0.1	< 0.1	0.3
	RM3000 - RM3999	1,097	3	0.1	< 0.1	0.3
	RM4000 - RM4999	361	1	0.1	< 0.1	0.5
	RM2000 - RM2999	4,037	10	0.2	0.1	0.4
	RM1000 - RM1999	4,491	13	0.1	0.1	0.2
	RM700 - RM999	1,435	4	0.1	< 0.1	0.3
	Unclassified	1,302	3	0.2	0.1	0.8
	RM400 - RM699	2,841	8	0.2	0.1	0.3
Less than RM400	1,885	5	0.2	0.1	0.4	

**Table 4: Response to cover tightly all water container by socio-demography**

		Cover container				
		Yes				
		N	n	%	95 % CI	
					Lower	Upper
National		4,293,126	11,899	33.0	31.9	34.1
State	Sabah	923,229	3,014	74.8	71.8	77.5
	WP Labuan	94,864	305	56.1	46.9	64.8
	N.Sembilan	199,910	556	41.6	36.5	46.8
	Melaka	136,685	334	36.8	32.4	41.4
	Sarawak	382,176	988	33.6	30.7	36.7
	Selangor	806,191	1,959	32.5	29.9	35.3
	Perlis	41,454	115	32.5	26.1	39.6
	Johor	478,051	1,276	32.1	29.4	35.0
	Pahang	239,002	633	31.9	28.5	35.5
	Kedah	253,899	718	27.1	24.0	30.4
	Terengganu	125,591	375	24.6	21.5	27.9
	Perak	237,030	579	21.6	18.5	25.0
	Kelantan	147,010	445	21.0	18.8	23.5
	WP KL	160,191	407	21.0	17.7	24.8
	Pulau Pinang	67,844	195	8.7	7.4	10.2
Residence	Rural	1,808,458	5,678	39.1	37.3	40.9
	Urban	2,484,668	6,221	29.6	28.2	31.1
Gender	Male	1,954,220	5,421	33.4	32.2	34.7
	Female	2,338,906	6,478	32.6	31.4	33.8
Age Group	15-19	318,049	896	36.7	34.3	39.2
	13-14	63,096	177	35.9	31.5	40.6
	30-34	449,043	1,249	34.1	32.1	36.1
	35-39	453,647	1,261	34.0	32.0	36.0
	20-24	473,501	1,328	33.5	31.6	35.6
	25-29	461,231	1,267	33.4	31.5	35.4
	60-64	201,090	558	33.2	30.6	35.8
	40-44	465,149	1,289	32.6	30.8	34.5
	45-49	425,443	1,168	32.6	30.7	34.6
	75-79	55,861	154	32.2	27.9	36.9
	50-54	365,511	1,001	32.2	30.3	34.1
	70-74	98,404	277	30.7	27.5	34.2
	65-69	154,689	432	30.0	27.4	32.7
	55-59	272,317	741	29.3	27.2	31.5
	>=80	36,094	101	28.4	23.7	33.6
Race	Other bumis	705,350	2,204	53.5	49.9	57.0
	Others	241,139	716	39.2	35.1	43.5
	Malays	2,228,092	6,164	31.2	30.0	32.4
	Chinese	840,203	2,111	30.0	28.0	32.1
	Indian	278,343	704	24.4	22.0	27.1

**Table 4: Response to cover tightly all water container by socio-demography (continue)**

		Cover container				
		Yes				
		N	n	%	95 % CI	
					Lower	Upper
Religion	Christian	442,059	1,265	38.3	35.3	41.4
	Islam	2,858,688	8,138	34.4	33.1	35.8
	Others	60,485	161	31.2	25.7	37.3
	Buddha	703,144	1,758	29.1	27.0	31.3
	Hindu	225,850	569	24.0	21.3	26.9
	Unclassified	2,900	8	18.2	9.2	32.9
Citizenship	Non-Malaysian	314,216	942	41.1	37.0	45.3
	Malaysian	3,976,828	10,951	32.5	31.4	33.6
	Unclassified	2,083	6	23.6	10.8	44.2
Education	None	448,018	1,335	35.8	33.5	38.1
	Unclassified	33,795	95	34.6	28.3	41.4
	Primary	1,258,690	3,555	33.4	32.0	34.8
	Secondary	2,144,142	5,862	32.5	31.3	33.8
	Tertiary	408,481	1,052	31.2	29.0	33.6
Occupation	Elementary Occupations	208,009	621	37.3	33.9	40.9
	Skilled Agricultural & Fishery	332,053	1,004	37.2	34.6	39.9
	Unemployed	442,948	1,264	35.0	32.9	37.1
	Senior Official & Manager	87,716	224	34.8	30.6	39.3
	Unclassified	332,375	901	34.2	32.0	36.5
	Housewife	983,781	2,752	33.2	31.8	34.7
	Plant & Machine Operator & Assembler	227,187	626	32.8	30.3	35.3
	Professionals	278,002	718	31.8	29.4	34.3
	Clerical Workers	222,072	603	31.8	29.3	34.3
	Technical & Associate	313,510	847	31.1	29.0	33.3
	Service Workers & Shop	645,001	1,746	30.8	29.1	32.5
	Craft & Related Trade Workers	220,473	593	29.5	26.9	32.2
Marital Status	Not married	1,034,519	2,868	33.6	32.0	35.2
	Married	2,974,069	8,236	33.2	32.0	34.4
	Widow/Widower	198,553	554	29.9	27.5	32.4
	Divorcee	75,207	210	27.4	24.1	30.9
	Unclassified	10,779	31	23.2	16.7	31.4
Household Income	Less than RM400	406,732	1,218	38.5	35.6	41.6
	RM400 - RM699	665,037	1,979	37.0	34.8	39.2
	RM700 - RM999	502,103	1,436	35.0	32.8	37.3
	RM1000 - RM1999	1,101,340	3,037	32.2	30.7	33.7
	RM5000 & above	372,492	942	31.8	29.0	34.7
	RM3000 - RM3999	319,281	823	30.4	27.9	33.1
	RM2000 - RM2999	616,641	1,654	30.2	28.4	32.1
	Unclassified	156,196	412	29.6	26.1	33.4
	RM4000 - RM4999	153,303	398	29.5	25.9	33.4

**Table 5: Response to keep all drains free from blockage by socio-demography**

		Keep drains free from blockage				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		4,675,340	12,560	36.1	34.9	37.3
State	N.Sembilan	281,148	775	59.3	55.4	63.0
	Melaka	213,476	542	57.6	51.6	63.3
	Sabah	561,136	1,825	45.5	41.3	49.8
	Kedah	403,597	1,104	43.5	39.5	47.6
	WP Labuan	73,283	236	43.3	34.8	52.3
	Johor	639,912	1,681	43.0	40.1	45.9
	Pahang	311,248	804	41.7	36.6	47.0
	Sarawak	441,266	1,131	39.4	35.6	43.3
	Selangor	943,368	2,312	38.5	35.9	41.1
	Perlis	35,659	97	27.9	19.1	39.0
	Perak	241,837	572	22.0	18.5	26.0
	Terengganu	107,208	308	21.0	16.9	25.7
	Kelantan	140,587	422	20.1	16.9	23.8
	WP KL	149,564	380	19.6	15.9	23.9
	Pulau Pinang	132,051	371	16.9	14.3	19.9
Residence	Rural	1,679,268	5,235	36.5	34.6	38.3
	Urban	2,996,072	7,325	35.9	34.4	37.4
Gender	Female	2,585,467	6,933	36.2	34.9	37.4
	Male	2,089,873	5,627	36.0	34.7	37.3
Age Group	50-54	447,458	1,189	39.5	37.5	41.6
	30-34	500,421	1,355	38.2	36.2	40.3
	13-14	65,624	178	37.5	32.8	42.5
	40-44	532,594	1,427	37.5	35.5	39.4
	45-49	479,228	1,283	37.0	35.0	39.0
	55-59	340,090	898	36.9	34.7	39.2
	35-39	489,903	1,324	36.9	34.9	38.9
	60-64	222,356	595	36.7	34.0	39.5
	15-19	308,455	843	35.7	33.4	38.1
	25-29	481,946	1,284	35.2	33.2	37.3
	20-24	473,673	1,287	33.7	31.7	35.7
	65-69	168,700	453	32.9	30.1	35.7
	70-74	89,535	241	27.9	24.8	31.4
	75-79	47,991	130	27.9	23.8	32.4
	>=80	27,364	73	21.6	17.5	26.2
Race	Indian	444,349	1,132	39.2	35.9	42.5
	Other bumis	484,952	1,475	37.0	34.0	40.2
	Malays	2,565,616	6,927	36.1	34.6	37.5
	Chinese	990,900	2,490	35.6	33.5	37.6
	Others	189,524	536	31.0	27.3	34.9

**Table 5: Response to keep all drains free from blockage by socio-demography (continue)**

		Keep drains free from blockage				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Christian	464,545	1,281	40.7	37.8	43.8
	Hindu	367,493	939	39.3	35.7	42.9
	Islam	2,963,079	8,123	35.8	34.5	37.2
	Buddha	822,401	2,070	34.1	32.0	36.3
	Unclassified	4,300	11	28.7	15.9	46.1
	Others	53,522	136	28.2	22.9	34.1
Citizenship	Malaysian	4,406,738	11,789	36.2	35.0	37.3
	Non-Malaysian	265,746	764	34.8	30.9	39.0
	Unclassified	2,855	7	32.4	16.3	54.1
Education	Tertiary	527,953	1,346	40.4	38.1	42.8
	Secondary	2,482,978	6,622	37.9	36.5	39.2
	Primary	1,281,368	3,501	34.1	32.7	35.6
	None	356,150	1,017	28.5	26.4	30.6
	Unclassified	26,890	74	27.7	22.3	33.8
Occupation	Senior Official & Manager	105,533	268	42.1	38.0	46.3
	Professionals	360,880	930	41.3	38.8	43.9
	Technical & Associate	412,924	1,095	41.2	38.9	43.6
	Clerical Workers	273,541	717	39.2	36.5	41.9
	Unclassified	362,887	959	37.5	35.1	40.0
	Service Workers & Shop	737,434	1,952	35.4	33.7	37.2
	Housewife	1,041,861	2,814	35.3	33.8	36.8
	Elementary Occupations	194,091	561	35.0	31.7	38.5
	Plant & Machine Operator & Assembler	238,968	638	34.7	32.2	37.3
	Craft & Related Trade Workers	248,756	654	33.3	30.6	36.2
	Skilled Agricultural & Fishery	289,581	850	32.6	29.9	35.4
	Unemployed	408,884	1,122	32.4	30.5	34.4
Marital Status	Married	3,309,313	8,888	37.1	35.9	38.3
	Not married	1,070,778	2,881	35.0	33.4	36.7
	Widow/Widower	201,121	542	30.4	28.1	32.8
	Divorcee	80,996	214	29.7	26.2	33.3
	Unclassified	13,131	35	28.1	20.3	37.5
Household Income	RM5000 & above	519,296	1,303	44.5	41.4	47.6
	RM3000 - RM3999	421,054	1,082	40.5	37.7	43.3
	RM4000 - RM4999	207,862	531	40.0	36.3	43.9
	RM2000 - RM2999	770,157	2,027	37.8	35.7	40.0
	RM1000 - RM1999	1,275,570	3,443	37.5	35.8	39.2
	RM700 - RM999	485,144	1,360	33.9	31.6	36.3
	Unclassified	163,702	428	31.2	28.0	34.7
	RM400 - RM699	552,579	1,588	30.9	28.7	33.1
	Less than RM400	279,976	798	26.7	24.2	29.4

**Table 6: Response to change the water in flower or plant containers by socio-demography**

		Change water in plant container				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		1,200,346	3,121	9.2	8.1	9.8
State	Selangor	316,618	748	12.8	11.3	14.4
	Melaka	46,465	106	12.6	10.0	15.7
	Johor	177,450	459	11.9	10.1	14.0
	WP KL	90,132	229	11.8	9.2	15.1
	Pulau Pinang	85,147	236	11.0	9.4	12.8
	Sarawak	113,667	288	10.0	8.5	11.8
	WP Labuan	14,799	48	8.7	6.3	12.0
	Sabah	98,297	318	8.0	6.6	9.7
	Kedah	74,094	203	7.9	6.4	9.8
	N.Sembilan	35,448	97	7.4	5.8	9.6
	Pahang	44,494	115	5.9	4.6	7.7
	Perak	55,144	130	5.0	3.8	6.6
	Kelantan	32,639	98	4.7	3.2	6.8
	Perlis	3,481	10	2.7	1.7	4.4
	Terengganu	12,472	36	2.4	1.6	3.7
Residence	Urban	889,544	2,160	10.6	9.9	11.4
	Rural	310,803	961	6.7	6.0	7.5
Gender	Female	740,563	1,926	10.3	9.7	11.0
	Male	459,783	1,195	7.9	7.3	8.5
Age Group	55-59	103,904	271	11.2	9.9	12.7
	60-64	63,634	166	10.5	8.9	12.2
	40-44	148,824	385	10.4	9.4	11.6
	45-49	134,885	347	10.3	9.2	11.6
	50-54	116,501	296	10.3	9.1	11.6
	35-39	126,119	325	9.5	8.4	10.6
	65-69	47,674	125	9.3	7.7	11.1
	15-19	75,392	201	8.7	7.5	10.1
	70-74	26,151	70	8.2	6.4	10.4
	30-34	106,784	278	8.1	7.1	9.2
	25-29	111,265	290	8.1	7.1	9.2
	20-24	107,934	287	7.7	6.7	8.7
	13-14	12,866	33	7.3	5.0	10.4
	75-79	10,682	28	6.2	4.3	8.9
	>=80	7,730	19	6.1	3.9	9.4
Race	Chinese	395,154	975	14.1	12.9	15.5
	Indian	100,015	247	8.8	7.4	10.3
	Malays	577,285	1,526	8.1	7.4	8.8
	Other bumis	90,241	272	6.8	5.7	8.2
	Others	37,652	101	6.1	4.9	7.7



**Table 6: Response to change the water in flower or plant containers by socio-demography (continue)**

		Change water in plant container				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Buddha	341,855	843	14.2	12.8	15.6
	Unclassified	1,603	4	10.9	4.1	25.9
	Christian	106,090	278	9.2	8.0	10.6
	Hindu	80,600	198	8.6	7.1	10.3
	Islam	657,848	1,767	7.9	7.3	8.6
	Others	12,351	31	6.4	4.2	9.6
Citizenship	Malaysian	1,155,837	3,003	9.4	8.9	10.0
	Non-Malaysian	44,509	118	5.8	4.7	7.2
	Unclassified	0	0	0.0	0.0	0.0
Education	Tertiary	174,895	434	13.3	11.9	15.0
	Secondary	648,974	1,679	9.9	9.2	10.5
	Primary	289,892	771	7.7	7.0	8.4
	None	80,357	221	6.4	5.6	7.4
	Unclassified	6,228	16	6.4	3.9	10.2
Occupation	Senior Official & Manager	44,261	107	17.6	14.6	21.1
	Professionals	118,887	296	13.6	11.9	15.4
	Technical & Associate	106,713	276	10.6	9.4	12.0
	Housewife	304,486	797	10.3	9.5	11.2
	Unclassified	96,200	245	9.9	8.6	11.4
	Clerical Workers	68,494	178	9.8	8.4	11.5
	Service Workers & Shop	184,685	475	8.8	8.0	9.7
	Unemployed	107,309	289	8.5	7.5	9.6
	Plant & Machine Operator & Assembler	52,397	136	7.6	6.3	9.1
	Craft & Related Trade Workers	47,214	123	6.3	5.2	7.6
	Elementary Occupations	32,768	91	5.9	4.7	7.3
	Skilled Agricultural & Fishery	36,932	108	4.1	3.3	5.1
Marital Status	Married	857,139	2,221	9.6	9.0	10.2
	Divorcee	24,370	62	8.9	6.9	11.4
	Unclassified	4,070	11	8.7	4.6	16.0
	Not married	260,543	684	8.5	7.7	9.3
	Widow/Widower	54,224	143	8.2	6.9	9.6
Household Income	RM5000 & above	191,731	472	16.3	14.4	18.4
	RM4000 - RM4999	75,025	189	14.5	12.2	17.2
	RM3000 - RM3999	108,010	273	10.3	8.9	11.9
	RM2000 - RM2999	200,685	513	9.9	8.8	11.0
	Unclassified	49,374	125	9.4	7.7	11.4
	RM1000 - RM1999	300,595	797	8.8	8.0	9.7
	RM700 - RM999	101,856	276	7.1	6.1	8.3
	RM400 - RM699	109,682	305	6.1	5.3	7.0
	Less than RM400	63,387	171	6.0	4.9	7.3

**Table 7: Response to remove stagnant water from flower pot trays by socio-demography**

		Remove stagnant water				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		880,653	2,293	6.8	6.3	7.2
State	Selangor	260,064	615	10.5	9.2	12.0
	Melaka	35,471	85	9.6	7.1	12.8
	WP KL	68,485	174	9.0	6.8	11.7
	N.Sembilan	37,648	102	7.9	6.2	10.1
	Pulau Pinang	59,339	166	7.6	6.2	9.4
	Johor	109,075	288	7.3	6.1	8.8
	WP Labuan	11,722	38	6.9	4.7	10.0
	Sarawak	73,272	188	6.4	5.3	7.8
	Sabah	73,408	238	6.0	4.8	7.4
	Kedah	48,972	134	5.2	4.0	6.9
	Pahang	30,471	77	4.1	3.0	5.5
	Perak	43,071	100	3.9	3.0	5.2
	Kelantan	17,683	53	2.5	1.5	4.1
	Perlis	3,143	9	2.5	1.4	4.2
	Terengganu	8,829	26	1.7	1.2	2.6
Residence	Urban	653,215	1,584	7.8	7.2	8.4
	Rural	227,438	709	4.9	4.4	5.5
Gender	Female	534,507	1,393	7.4	6.9	8.0
	Male	346,146	900	5.9	5.5	6.5
Age Group	50-54	98,052	249	8.7	7.6	9.9
	55-59	78,458	205	8.5	7.3	9.8
	60-64	48,746	127	8.0	6.7	9.7
	45-49	101,583	262	7.8	6.8	8.9
	40-44	103,458	267	7.2	6.4	8.2
	35-39	91,761	236	6.9	6.0	7.9
	15-19	55,144	147	6.4	5.4	7.6
	65-69	32,630	83	6.4	5.1	7.9
	25-29	83,628	221	6.1	5.3	7.0
	70-74	18,523	51	5.8	4.4	7.6
	20-24	77,618	210	5.5	4.7	6.4
	30-34	71,684	186	5.5	4.7	6.4
	13-14	7,918	20	4.5	2.9	7.0
	75-79	7,307	19	4.2	2.7	6.6
	>=80	4,144	10	3.3	1.8	6.0
Race	Chinese	255,817	631	9.1	8.1	10.3
	Indian	73,051	180	6.4	5.3	7.8
	Malays	451,346	1,192	6.3	5.8	6.9
	Others	32,267	85	5.3	4.1	6.7
	Other bumis	68,172	205	5.2	4.2	6.3

**Table 7: Response to remove stagnant water from flower pot trays by socio-demography (continue)**

		Remove stagnant water				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Unclassified	1,603	4	10.9	4.1	25.9
	Buddha	213,416	526	8.8	7.8	10.0
	Christian	85,802	224	7.4	6.3	8.7
	Islam	513,506	1,375	6.2	5.7	6.7
	Hindu	58,078	143	6.2	5.0	7.6
	Others	8,249	21	4.3	2.6	7.1
Citizenship	Malaysian	841,260	2,189	6.9	6.4	7.4
	Non-Malaysian	39,393	104	5.1	4.1	6.4
	Unclassified	0	0	0.0	0.0	0.0
Education	Tertiary	138,927	346	10.6	9.3	12.1
	Secondary	484,201	1,254	7.4	6.8	7.9
	Unclassified	5,589	14	5.7	3.4	9.5
	Primary	202,288	541	5.4	4.8	6.0
	None	49,648	138	4.0	3.3	4.7
Occupation	Senior Official & Manager	36,186	87	14.4	11.7	17.6
	Professionals	97,390	243	11.1	9.7	12.8
	Technical & Associate	83,760	216	8.3	7.2	9.6
	Clerical Workers	53,880	141	7.7	6.5	9.2
	Unclassified	71,433	182	7.3	6.2	8.6
	Housewife	210,490	550	7.1	6.4	7.8
	Service Workers & Shop	133,312	347	6.4	5.6	7.2
	Unemployed	79,507	215	6.3	5.5	7.2
	Plant & Machine Operator & Assembler	32,934	84	4.8	3.8	6.0
	Elementary Occupations	24,517	70	4.4	3.4	5.7
	Craft & Related Trade Workers	32,273	84	4.3	3.5	5.4
	Skilled Agricultural & Fishery	24,972	74	2.8	2.2	3.6
Marital Status	Married	631,924	1,635	7.1	6.6	7.6
	Not married	192,993	511	6.3	5.7	6.9
	Widow/Widower	38,818	103	5.8	4.8	7.1
	Divorcee	15,471	40	5.6	4.1	7.8
	Unclassified	1,446	4	3.1	1.2	8.0
Household Income	RM5000 & above	159,225	392	13.6	11.8	15.6
	RM4000 - RM4999	54,666	137	10.5	8.6	12.9
	RM3000 - RM3999	82,669	209	7.9	6.8	9.2
	RM2000 - RM2999	155,836	402	7.6	6.8	8.6
	Unclassified	35,115	88	6.7	5.1	8.6
	RM1000 - RM1999	215,564	573	6.3	5.7	7.0
	RM700 - RM999	71,334	196	5.0	4.2	5.9
	Less than RM400	41,834	114	4.0	3.1	5.1
	RM400 - RM699	64,410	182	3.6	3.0	4.3

**Table 8: Response to place garbage that can accumulate stagnant water into closed bins by socio-demography**

		Close bins				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		4,323,047	11,109	33.5	32.3	34.6
State	Selangor	1,188,150	2,844	47.9	45.2	50.7
	Sarawak	529,281	1,306	47.3	43.0	51.7
	WP KL	302,671	769	39.7	34.6	45.1
	Johor	563,976	1,415	37.9	34.1	41.8
	Melaka	131,740	307	35.6	29.5	42.3
	WP Labuan	52,442	171	33.1	25.6	41.6
	N.Sembilan	146,755	393	31.1	25.9	36.8
	Kedah	257,955	706	27.6	24.3	31.2
	Pulau Pinang	202,497	563	26.1	23.2	29.3
	Sabah	311,004	1,000	25.9	22.9	29.2
	Perak	280,082	656	25.5	22.0	29.3
	Pahang	148,182	372	19.8	16.4	23.8
	Perlis	22,215	59	19.4	12.9	28.2
	Terengganu	81,141	234	16.0	13.2	19.2
	Kelantan	104,956	314	15.1	12.6	17.8
Residence	Urban	3,320,822	8,006	39.8	38.2	41.3
	Rural	1,002,225	3,103	21.9	20.5	23.4
Gender	Male	1,939,947	5,010	33.5	32.2	34.7
	Female	2,383,100	6,099	33.4	32.2	34.7
Age Group	40-44	519,585	1,337	36.7	34.8	38.7
	55-59	332,294	846	36.1	33.8	38.5
	50-54	403,806	1,027	35.7	33.6	37.9
	35-39	470,665	1,213	35.6	33.6	37.6
	60-64	207,759	536	34.5	31.9	37.2
	45-49	439,124	1,119	34.0	32.0	35.9
	30-34	426,917	1,104	32.7	30.8	34.7
	25-29	443,292	1,134	32.4	30.4	34.4
	75-79	55,080	142	32.1	27.8	36.6
	20-24	446,761	1,151	31.9	29.9	33.9
	65-69	157,152	405	30.7	28.0	33.5
	15-19	255,206	662	29.7	27.5	32.0
	70-74	91,645	238	28.6	25.3	32.0
	>=80	33,957	88	26.8	22.1	32.1
	13-14	39,803	107	22.9	18.9	27.4
Race	Chinese	1,226,884	3,033	43.9	41.6	46.3
	Indian	446,368	1,104	39.2	36.4	42.1
	Malays	2,145,057	5,555	30.2	28.9	31.6
	Others	173,086	462	28.3	25.3	31.5
	Other bumis	331,652	955	25.9	23.5	28.6

**Table 8: Response to place garbage that can accumulate stagnant water into closed bins by socio-demography (continue)**

		Close bins				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Buddha	1,011,017	2,500	41.9	39.5	44.3
	Christian	450,070	1,175	39.9	37.0	42.9
	Hindu	362,069	897	38.5	35.4	41.7
	Islam	2,436,335	6,379	29.6	28.3	30.9
	Others	60,196	149	31.4	25.3	38.2
	Unclassified	3,361	9	23.1	12.3	39.1
Citizenship	Malaysian	4,104,195	10,524	33.8	32.6	34.9
	Unclassified	2,692	7	30.5	15.1	52.1
	Non-Malaysian	216,160	578	28.4	25.6	31.2
Education	Tertiary	616,486	1,530	47.2	44.7	49.7
	Secondary	2,309,936	5,894	35.4	34.1	36.7
	Unclassified	32,649	83	33.5	27.8	39.8
	Primary	1,079,388	2,828	28.8	27.5	30.2
	None	284,587	774	22.9	21.1	24.8
Occupation	Senior Official & Manager	120,194	299	47.7	43.2	52.2
	Profesionals	412,194	1,029	47.3	44.6	49.9
	Clerical Workers	276,233	693	40.0	37.3	42.8
	Technical & Associate	390,827	995	39.3	36.9	41.6
	Service Workers & Shop	725,996	1,855	34.8	33.1	36.5
	Unclassified	326,708	828	34.0	31.5	36.5
	Plant & Machine Operator & Assembler	229,368	590	33.3	30.8	35.9
	Housewife	963,706	2,477	32.8	31.3	34.3
	Unemployed	375,831	983	29.9	28.0	31.8
	Craft & Related Trade Workers	212,429	539	28.6	26.1	31.1
	Elementary Occupations	138,622	381	25.2	22.7	27.7
	Skilled Agricultural & Fishery	150,939	440	17.1	15.3	19.1
Marital Status	Married	3,039,174	7,810	34.2	33.0	35.4
	Not married	990,698	2,551	32.4	30.8	34.0
	Divorcee	83,422	209	30.5	26.7	34.5
	Widow/Widower	198,450	509	30.0	27.6	32.6
	Unclassified	11,304	30	24.6	17.5	33.4
Household Income	RM5000 & above	582,618	1,432	49.5	46.4	52.6
	RM4000 - RM4999	225,975	567	44.0	40.1	47.9
	RM3000 - RM3999	436,010	1,085	41.9	39.1	44.7
	RM2000 - RM2999	771,413	1,951	38.1	36.2	40.2
	Unclassified	194,971	487	37.1	33.5	40.8
	RM1000 - RM1999	1,121,107	2,897	33.0	31.4	34.7
	RM700 - RM999	379,731	1,013	26.7	24.7	28.7
	RM400 - RM699	392,335	1,083	22.0	20.4	23.8
	Less than RM400	218,886	594	21.0	18.9	23.2

**Table 9: Response to level defective ground surface by socio-demography**

		Level defective floor surface				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		161,557	443	1.2	1.1	1.4
State	Melaka	7,638	16	2.1	1.2	3.6
	Sabah	23,460	77	1.9	1.4	2.6
	Sarawak	20,065	54	1.8	1.1	2.8
	Johor	23,099	64	1.6	1.1	2.2
	Pahang	11,405	30	1.5	1.1	2.2
	Selangor	33,274	82	1.3	0.9	1.9
	WP Labuan	2,138	7	1.3	0.6	2.8
	Kedah	11,226	31	1.2	0.8	1.9
	Terengganu	5,857	17	1.2	0.7	2.0
	N.Sembilan	4,556	13	0.9	0.4	2.2
	Kelantan	5,982	18	0.9	0.5	1.5
	Perlis	677	2	0.5	0.2	1.9
	Pulau Pinang	4,001	11	0.5	0.3	0.9
	Perak	3,454	9	0.3	0.2	0.6
	WP KL	4,723	12	0.6	0.3	1.2
Residence	Rural	72,649	225	1.6	1.3	1.9
	Urban	88,908	218	1.1	0.9	1.3
Gender	Female	101,561	278	1.4	1.2	1.7
	Male	59,996	165	1.0	0.9	1.2
Age Group	15-19	13,899	40	1.6	1.2	2.2
	20-24	20,765	57	1.5	1.1	1.9
	13-14	2,458	7	1.4	0.7	2.9
	45-49	17,847	47	1.4	1.0	1.9
	25-29	18,592	52	1.4	1.0	1.8
	55-59	11,388	30	1.2	0.8	1.8
	50-54	13,256	37	1.2	0.8	1.6
	>=80	1,477	4	1.2	0.4	3.1
	30-34	15,083	41	1.2	0.9	1.6
	40-44	16,073	42	1.1	0.8	1.5
	65-69	5,834	16	1.1	0.7	1.8
	35-39	14,972	42	1.1	0.8	1.6
	70-74	3,449	10	1.1	0.5	2.1
	60-64	5,661	16	0.9	0.6	1.6
	75-79	803	2	0.5	0.1	1.8
Race	Other bumis	24,087	72	1.8	1.3	2.5
	Malays	92,668	255	1.3	1.1	1.5
	Indian	12,758	33	1.1	0.7	1.8
	Chinese	26,995	69	1.0	0.7	1.4
	Others	5,050	14	0.8	0.4	1.6

**Table 9: Response to level defective ground surface by socio-demography (continue)**

		Level defective floor surface				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Unclassified	1,560	4	10.3	4.0	24.0
	Others	4,932	14	2.5	1.2	5.3
	Christian	19,593	53	1.7	1.1	2.6
	Islam	108,011	301	1.3	1.1	1.5
	Hindu	8,717	23	0.9	0.6	1.5
	Buddha	18,744	48	0.8	0.5	1.2
Citizenship	Malaysian	152,222	415	1.2	1.1	1.4
	Non-Malaysian	9,335	28	1.2	0.7	2.0
	Unclassified	0	0	0.0	0.0	0.0
Education	Secondary	89,054	240	1.4	1.2	1.6
	Primary	46,166	130	1.2	1.0	1.5
	Unclassified	1,126	3	1.1	0.4	3.5
	None	13,007	39	1.0	0.7	1.5
	Tertiary	12,204	31	0.9	0.6	1.5
Occupation	Senior Official & Manager	4,517	11	1.8	1.0	3.4
	Unclassified	15,830	42	1.6	1.2	2.2
	Housewife	44,053	121	1.5	1.2	1.8
	Skilled Agricultural & Fishery	11,766	35	1.3	0.9	2.0
	Elementary Occupations	7,049	21	1.3	0.8	2.0
	Professionals	10,217	26	1.2	0.8	1.8
	Clerical Workers	8,106	22	1.2	0.8	1.8
	Craft & Related Trade Workers	8,646	23	1.2	0.7	1.8
	Technical & Associate	10,431	29	1.0	0.7	1.5
	Unemployed	13,222	38	1.0	0.8	1.5
	Service Workers & Shop	20,986	57	1.0	0.8	1.3
	Plant & Machine Operator & Assembler	6,734	18	1.0	0.6	1.6
Marital Status	Not married	43,853	124	1.4	1.2	1.7
	Married	108,251	293	1.2	1.0	1.4
	Widow/Widower	6,521	18	1.0	0.6	1.6
	Divorcee	2,610	7	1.0	0.5	2.0
	Unclassified	323	1	0.7	0.1	4.8
Household Income	RM4000 - RM4999	8,192	20	1.6	0.9	2.9
	RM5000 & above	17,905	45	1.5	1.0	2.4
	RM400 - RM699	25,265	71	1.4	1.1	1.9
	RM1000 - RM1999	46,010	128	1.3	1.1	1.7
	Less than RM400	13,866	40	1.3	0.9	1.9
	RM700 - RM999	16,714	49	1.2	0.9	1.6
	RM2000 - RM2999	22,699	61	1.1	0.8	1.5
	RM3000 - RM3999	9,564	25	0.9	0.6	1.4
	Unclassified	1,341	4	0.3	0.1	0.8

**Table 10: Response to apply larvicidals in water container by socio-demography**

		Add larvicidal				
		Yes			95 % CI	
		N	n	%	Lower	Upper
National		992,718	2,747	7.8	7.3	8.4
State	Perlis	22,303	61	17.8	12.1	25.6
	Johor	215,454	599	14.6	12.5	16.9
	N.Sembilan	51,953	144	11.3	8.8	14.3
	Sabah	125,775	410	11.2	9.0	13.9
	Pahang	75,856	204	10.4	8.5	12.7
	WP Labuan	16,168	53	10.0	6.7	14.6
	Melaka	29,349	73	8.2	5.9	11.1
	Selangor	196,784	501	8.1	7.1	9.2
	Kedah	67,494	187	7.4	6.0	9.1
	Sarawak	56,808	150	5.3	4.1	6.8
	Pulau Pinang	32,529	91	4.2	3.1	5.7
	Perak	42,465	105	3.9	3.0	5.0
	WP KL	26,764	68	3.5	2.4	5.2
	Terengganu	14,423	45	2.8	1.9	4.3
	Kelantan	18,592	56	2.7	2.0	3.7
Residence	Rural	466,236	1,450	10.4	9.4	11.5
	Urban	526,482	1,297	6.4	5.9	7.0
Gender	Male	462,574	1,283	8.1	7.5	8.7
	Female	530,144	1,464	7.6	7.1	8.2
Age Group	55-59	92,578	252	10.2	8.9	11.7
	60-64	58,981	161	9.9	8.4	11.7
	65-69	44,364	124	8.9	7.3	10.7
	70-74	27,096	76	8.7	6.9	11.0
	50-54	94,970	262	8.5	7.5	9.7
	45-49	102,864	282	8.1	7.2	9.1
	40-44	111,013	304	8.0	7.0	9.0
	30-34	101,045	279	7.9	6.9	9.0
	>=80	9,335	27	7.5	5.1	11.1
	35-39	92,721	257	7.1	6.2	8.1
	15-19	58,580	166	7.0	6.0	8.3
	20-24	93,148	261	6.8	5.9	7.8
	75-79	11,107	31	6.6	4.6	9.5
	25-29	86,281	241	6.4	5.6	7.4
	13-14	8,634	24	5.2	3.5	7.8
Race	Malays	673,726	1,877	9.6	8.9	10.4
	Other bumis	82,522	257	6.7	5.4	8.3
	Indian	65,633	166	5.8	4.9	7.0
	Others	32,356	94	5.5	4.3	7.1
	Chinese	138,481	353	5.1	4.4	5.9



Table 10: Response to apply larvicidals in water container by socio-demography (continue)

		Add larvicidal				
		Yes			95 % CI	
		N	n	%	Lower	Upper
Religion	Islam	762,949	2,150	9.5	8.8	10.2
	Hindu	52,502	132	5.7	4.7	6.9
	Buddha	118,663	303	5.0	4.2	5.9
	Christian	51,130	142	4.6	3.6	6.0
	Others	7,139	19	3.9	2.2	6.8
	Unclassified	335	1	2.5	0.3	15.6
Citizenship	Malaysian	949,402	2,615	8.0	7.5	8.5
	Non-Malaysian	42,923	131	6.0	4.4	8.1
	Unclassified	392	1	4.5	0.6	25.7
Education	Secondary	523,819	1,433	8.1	7.6	8.7
	Primary	293,185	824	8.0	7.3	8.8
	None	82,072	245	6.9	5.8	8.0
	Tertiary	88,252	228	6.8	5.9	7.9
	Unclassified	5,390	17	5.7	3.3	9.7
Occupation	Senior Official & Manager	25,719	66	10.3	8.0	13.1
	Skilled Agricultural & Fishery	76,966	229	8.9	7.5	10.5
	Elementary Occupations	46,010	137	8.7	7.0	10.8
	Professionals	73,247	193	8.4	7.2	9.9
	Technical & Associate	79,926	215	8.1	7.0	9.3
	Craft & Related Trade Workers	58,907	161	8.0	6.7	9.6
	Housewife	227,541	635	7.9	7.2	8.7
	Unclassified	73,078	196	7.9	6.7	9.2
	Plant & Machine Operator & Assembler	51,663	141	7.6	6.4	9.1
	Clerical Workers	50,513	136	7.4	6.1	8.8
	Unemployed	89,325	256	7.3	6.4	8.4
	Service Workers & Shop	139,823	382	6.8	6.1	7.6
	Marital Status	Divorcee	25,446	69	9.5	7.4
Married		720,524	1,991	8.2	7.7	8.8
Not married		201,622	562	6.8	6.1	7.5
Widow/Widower		42,504	117	6.6	5.5	8.0
Unclassified		2,622	8	5.7	2.8	11.2
Household Income	RM5000 & above	104,885	269	9.1	7.7	10.6
	RM700 - RM999	126,016	362	9.0	7.8	10.4
	Less than RM400	80,161	235	8.1	6.7	9.6
	RM1000 - RM1999	263,286	738	7.9	7.1	8.7
	RM400 - RM699	133,252	390	7.7	6.6	8.9
	RM3000 - RM3999	78,087	205	7.6	6.3	9.1
	RM2000 - RM2999	143,723	383	7.2	6.3	8.2
	RM4000 - RM4999	35,491	93	7.0	5.5	8.9
Unclassified	27,816	72	5.4	4.2	7.1	

**Table 11: Preventive method(s) use to prevent mosquito bite**

Preventive method(s) use to prevent mosquito bite	Responses		
	N	n	%
Use aerosol spray	9,421,089	24,904	43.7
Burn mosquito coils	4,769,125	13,392	22.1
Use electric mosquito coils	2,016,484	5,190	9.4
Burn rubbish outside the house	1,871,354	5,314	8.7
Use mosquito net	1,682,441	4,820	7.8
Others	744,955	1,986	3.5
Apply mosquito repellent	533,401	1,391	2.5
Use window netting	408,687	1,049	1.9
Wear long sleeve clothings & trousers at dawn or dusk	97,687	259	0.5
<b>Total</b>	<b>21,545,223</b>	<b>58,305</b>	<b>100.0</b>

Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography

		Preventive method(s) use to prevent mosquito bite					
		Use aerosol spray			Burn mosquito coils		
		N	n	%	N	n	%
National		9,421,089	24,904	43.7	4,769,125	13,392	22.1
State	WP KL	643,126	1,634	83.8	71,240	181	9.3
	Selangor	2,005,404	4,864	80.0	555,665	1,434	22.2
	N.Sembilan	389,565	1,067	79.8	182,937	517	37.5
	Pulau Pinang	623,785	1,744	79.3	228,321	654	29.0
	Johor	1,183,040	3,038	78.5	559,075	1,491	37.1
	Melaka	269,846	659	72.3	108,692	272	29.1
	Perlis	91,822	252	71.9	77,093	216	60.4
	WP Labuan	119,447	385	70.5	54,714	175	32.3
	Perak	755,252	1,786	68.4	348,102	874	31.5
	Sabah	836,849	2,709	67.7	614,920	2,025	49.8
	Sarawak	774,998	1,971	67.3	522,872	1,389	45.4
	Kedah	609,260	1,670	64.5	452,567	1,288	47.9
	Pahang	476,201	1,226	63.2	332,981	889	44.2
	Terengganu	299,561	870	58.5	275,106	822	53.8
	Kelantan	342,933	1,029	49.1	384,842	1,165	55.1
Residence	Urban	6,567,559	16,065	77.6	2,222,500	5,532	26.3
	Rural	2,853,530	8,839	61.2	2,546,625	7,860	54.6
Gender	Female	5,227,280	13,769	72.3	2,518,034	7,065	34.8
	Male	4,193,809	11,135	71.2	2,251,091	6,327	38.2
Age Group	45-49	970,939	2,559	74.2	461,406	1,287	35.3
	40-44	1,063,029	2,804	74.1	493,083	1,391	34.4
	30-34	974,483	2,575	73.7	488,682	1,371	37.0
	55-59	685,761	1,794	73.6	319,878	894	34.3
	50-54	834,346	2,187	73.0	380,551	1,062	33.3
	25-29	1,007,040	2,648	72.5	475,726	1,325	34.3
	60-64	441,478	1,172	72.3	213,929	607	35.0
	35-39	958,196	2,535	71.5	484,123	1,364	36.1
	20-24	1,020,636	2,700	71.5	562,720	1,570	39.4
	15-19	615,926	1,659	70.2	376,882	1,066	42.9
	13-14	121,623	331	67.4	82,381	236	45.7
	65-69	348,909	930	67.0	200,060	567	38.4
	70-74	204,798	548	62.9	117,735	334	36.2
	75-79	106,523	283	60.0	63,482	181	35.8
	>=80	67,404	179	50.3	48,488	137	36.2
Race	Indian	934,589	2,341	81.3	296,573	771	25.8
	Chinese	2,181,497	5,443	77.1	456,808	1,174	16.1
	Malays	5,066,310	13,541	70.4	3,081,814	8,646	42.8
	Others	407,638	1,121	65.3	232,766	683	37.3
	Other bumis	831,055	2,458	62.6	701,164	2,118	52.8

**Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)**

		Preventive method(s) use to prevent mosquito bite					
		Use aerosol spray			Burn mosquito coils		
		N	n	%	N	n	%
Religion	Hindu	768,343	1,923	80.8	250,661	650	26.4
	Buddha	1,892,757	4,726	77.4	397,615	1,022	16.3
	Islam	5,830,369	15,776	69.8	3,611,920	10,273	43.2
	Christian	807,943	2,166	69.5	425,126	1,218	36.5
	Others	114,180	294	58.4	79,902	218	40.8
	Unclassified	7,498	19	50.0	3,901	11	26.0
Citizenship	Unclassified	6,565	17	74.5	3,208	9	36.4
	Malaysian	8,897,199	23,460	72.1	4,482,177	12,540	36.3
	Non-Malaysian	517,325	1,427	66.6	283,741	843	36.5
Education	Tertiary	1,043,623	2,642	79.1	254,252	671	19.3
	Secondary	4,946,148	12,982	74.7	2,336,804	6,485	35.3
	Unclassified	71,659	194	70.6	33,664	98	33.2
	Primary	2,625,510	7,045	69.1	1,560,669	4,439	41.1
	None	734,149	2,041	57.5	583,737	1,699	45.7
Occupation	Professionals	704,203	1,793	80.0	190,038	509	21.6
	Clerical Workers	547,532	1,418	78.0	206,485	561	29.4
	Senior Official & Manager	198,048	497	78.0	48,967	127	19.3
	Technical & Associate	785,176	2,043	77.8	291,652	794	28.9
	Plant & Machine Operator & Assembler	521,371	1,373	74.8	260,482	722	37.4
	Service Workers & Shop	1,548,067	4,036	73.3	708,331	1,947	33.6
	Unclassified	722,929	1,895	73.1	360,890	1,002	36.5
	Housewife	2,151,350	5,698	72.3	1,101,102	3,111	37.0
	Craft & Related Trade Workers	530,931	1,379	70.2	309,799	844	41.0
	Elementary Occupations	381,758	1,071	68.3	253,827	745	45.4
	Unemployed	838,930	2,266	65.0	498,684	1,424	38.7
	Skilled Agricultural & Fishery	490,795	1,435	54.6	538,869	1,606	59.9
	Marital Status	Married	6,542,421	17,282	72.6	3,203,271	9,010
Not married		2,233,588	5,915	71.7	1,188,495	3,325	38.2
Divorcee		184,655	481	67.0	109,363	306	39.7
Widow/Widower		430,461	1,147	63.6	248,109	695	36.6
Unclassified		29,965	79	63.1	19,887	56	41.9
Household Income	RM3000 - RM3999	853,319	2,166	80.7	260,540	680	24.6
	RM4000 - RM4999	417,963	1,058	79.8	114,762	304	21.9
	RM5000 & above	949,197	2,384	79.7	199,858	516	16.8
	RM2000 - RM2999	1,611,036	4,158	78.4	584,498	1,578	28.4
	RM1000 - RM1999	2,548,233	6,755	74.0	1,278,028	3,557	37.1
	RM700 - RM999	1,000,527	2,727	69.2	646,027	1,842	44.7
	Unclassified	365,685	943	68.3	170,036	469	31.7
	RM400 - RM699	1,094,251	3,090	60.5	958,570	2,812	53.0
Less than RM400	580,878	1,623	54.8	556,806	1,634	52.5	

Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)

		Preventive method(s) use to prevent mosquito bite					
		Use electric mosquito coils			Burn rubbish outside the house		
		N	n	%	N	n	%
National		2,016,484	5,190	9.4	1,871,354	5,314	8.7
State	WP KL	124,768	317	16.3	17,318	44	2.3
	Selangor	448,694	1,070	17.9	110,549	283	4.4
	N.Sembilan	95,808	258	19.6	96,349	277	19.7
	Pulau Pinang	111,283	309	14.2	32,661	94	4.2
	Johor	342,449	848	22.7	208,887	575	13.9
	Melaka	50,361	124	13.5	53,659	133	14.4
	Perlis	11,566	31	9.1	34,678	97	27.2
	WP Labuan	23,934	76	14.1	49,026	159	28.9
	Perak	140,297	329	12.7	156,205	383	14.2
	Sabah	77,156	246	6.3	251,049	834	20.3
	Sarawak	122,007	297	10.6	204,472	536	17.8
	Kedah	112,339	302	11.9	138,667	395	14.7
	Pahang	138,125	345	18.3	165,515	448	22.0
	Terengganu	87,932	250	17.2	160,880	477	31.4
	Kelantan	129,765	388	18.6	191,438	579	27.4
Residence	Urban	1,564,325	3,797	18.5	776,256	1,932	9.2
	Rural	452,159	1,393	9.7	1,095,099	3,382	23.5
Gender	Female	1,126,327	2,897	15.6	1,071,549	3,029	14.8
	Male	890,157	2,293	15.1	799,805	2,285	13.6
Age Group	45-49	200,930	512	15.4	194,222	546	14.8
	40-44	241,096	616	16.8	217,451	620	15.2
	30-34	248,305	640	18.8	186,230	531	14.1
	55-59	131,078	339	14.1	126,080	351	13.5
	50-54	175,540	451	15.4	165,248	465	14.5
	25-29	256,061	659	18.4	180,140	507	13.0
	60-64	74,353	194	12.2	95,062	275	15.6
	35-39	226,184	585	16.9	194,037	557	14.5
	20-24	214,684	545	15.0	191,018	543	13.4
	15-19	106,567	281	12.1	145,371	412	16.6
	13-14	18,946	51	10.5	29,927	85	16.6
	65-69	63,294	161	12.2	79,111	227	15.2
	70-74	35,381	94	10.9	38,292	111	11.8
	75-79	13,111	34	7.4	19,642	56	11.1
	>=80	10,953	28	8.2	9,523	28	7.1
Race	Indian	145,221	359	12.6	79,094	205	6.9
	Chinese	522,467	1,287	18.5	146,718	376	5.2
	Malays	1,177,846	3,077	16.4	1,299,056	3,664	18.1
	Others	67,609	174	10.8	70,897	213	11.4
	Other bumis	103,341	293	7.8	275,589	856	20.8

**Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)**

		Preventive method(s) use to prevent mosquito bite						
		Use electric mosquito coils			Burn rubbish outside the house			
		N	n	%	N	n	%	
Religion	Hindu	115,781	286	12.2	65,669	170	6.9	
	Buddha	434,779	1,076	17.8	119,845	307	4.9	
	Islam	1,287,634	3,377	15.4	1,501,046	4,300	18.0	
	Christian	152,875	387	13.1	150,804	445	13.0	
	Others	24,019	60	12.3	30,790	84	15.7	
	Unclassified	1,395	4	9.3	3,200	8	21.3	
Citizenship	Unclassified	1,717	4	19.5	819	2	9.3	
	Malaysian	1,944,030	5,007	15.8	1,787,126	5,061	14.5	
	Non-Malaysian	70,737	179	9.1	83,409	251	10.7	
Education	Tertiary	384,959	973	29.2	112,392	306	8.5	
	Secondary	1,122,706	2,884	16.9	962,307	2,707	14.5	
	Unclassified	13,848	35	13.7	12,089	34	11.9	
	Primary	410,531	1,071	10.8	581,801	1,667	15.3	
	None	84,441	227	6.6	202,766	600	15.9	
Occupation	Professionals	228,816	580	26.0	80,523	221	9.2	
	Clerical Workers	151,471	382	21.6	84,958	232	12.1	
	Senior Official & Manager	61,787	152	24.3	18,682	51	7.4	
	Technical & Associate	228,058	587	22.6	130,983	359	13.0	
	Plant & Machine Operator & Assembler	91,712	236	13.2	99,070	281	14.2	
	Service Workers & Shop	334,350	852	15.8	256,935	719	12.2	
	Unclassified	151,660	391	15.3	146,728	411	14.8	
	Housewife	422,167	1,086	14.2	478,138	1,367	16.1	
	Craft & Related Trade Workers	91,854	236	12.1	101,099	274	13.4	
	Elementary Occupations	48,293	127	8.6	93,850	279	16.8	
	Unemployed	147,960	392	11.5	182,884	528	14.2	
	Skilled Agricultural & Fishery	58,356	169	6.5	197,505	592	22.0	
	Marital Status	Married	1,477,227	3,801	16.4	1,291,443	3,677	14.3
		Not married	423,597	1,093	13.6	444,133	1,252	14.3
Divorcee		34,427	88	12.5	37,469	106	13.6	
Widow/Widower		73,363	189	10.8	90,913	258	13.4	
Unclassified		7,870	19	16.6	7,397	21	15.6	
Household Income	RM3000 - RM3999	224,308	568	21.2	108,901	289	10.3	
	RM4000 - RM4999	110,574	277	21.1	48,296	130	9.2	
	RM5000 & above	295,477	741	24.8	85,300	227	7.2	
	RM2000 - RM2999	381,885	967	18.6	242,449	665	11.8	
	RM1000 - RM1999	517,639	1,340	15.0	524,430	1,481	15.2	
	RM700 - RM999	170,641	450	11.8	237,257	681	16.4	
	Unclassified	76,332	192	14.3	54,244	153	10.1	
	RM400 - RM699	170,268	466	9.4	370,422	1,094	20.5	
	Less than RM400	69,360	189	6.5	200,055	594	18.9	

Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)

		Preventive method(s) use to prevent mosquito bite					
		Use mosquito net			Others		
		N	n	%	N	n	%
National		1,682,441	4,820	7.8	744,955	1,986	3.5
State	WP KL	17,318	44	2.3	35,817	91	4.7
	Selangor	91,041	246	3.6	116,468	291	4.7
	N.Sembilan	32,738	93	6.7	11,101	30	2.3
	Pulau Pinang	49,145	143	6.3	62,533	172	8.0
	Johor	155,561	410	10.3	86,929	226	5.8
	Melaka	15,607	40	4.2	22,445	53	6.0
	Perlis	54,015	153	42.3	5,128	14	4.0
	WP Labuan	6,599	21	3.9	12,307	40	7.3
	Perak	170,937	441	15.5	83,094	193	7.5
	Sabah	156,744	524	12.7	41,533	134	3.4
	Sarawak	218,665	609	19.0	42,105	110	3.7
	Kedah	305,494	882	32.4	105,259	293	11.2
	Pahang	110,619	302	14.7	46,981	119	6.2
	Terengganu	90,329	280	17.7	37,007	110	7.2
	Kelantan	207,627	632	29.7	36,247	110	5.2
Residence	Urban	516,902	1,281	6.1	482,971	1,179	5.7
	Rural	1,165,539	3,539	25.0	261,984	807	5.6
Gender	Female	970,460	2,774	13.4	392,694	1,045	5.4
	Male	711,981	2,046	12.1	352,261	941	6.0
Age Group	45-49	160,869	458	12.3	82,668	221	6.3
	40-44	175,404	502	12.2	85,395	222	6.0
	30-34	155,684	444	11.8	65,839	178	5.0
	55-59	135,697	388	14.6	50,766	132	5.5
	50-54	163,119	462	14.3	64,177	175	5.6
	25-29	142,499	403	10.3	85,342	222	6.1
	60-64	106,220	306	17.4	31,377	84	5.1
	35-39	156,444	455	11.7	76,242	204	5.7
	20-24	131,726	375	9.2	87,663	234	6.1
	15-19	104,277	301	11.9	47,361	132	5.4
	13-14	20,525	62	11.4	8,454	24	4.7
	65-69	94,579	275	18.2	22,044	59	4.2
	70-74	59,269	172	18.2	19,734	52	6.1
	75-79	40,698	115	22.9	10,762	28	6.1
	>=80	35,431	102	26.4	7,131	19	5.3
Race	Indian	37,822	95	3.3	67,551	168	5.9
	Chinese	104,500	260	3.7	188,995	475	6.7
	Malays	1,175,476	3,372	16.3	403,104	1,101	5.6
	Others	52,622	156	8.4	36,212	95	5.8
	Other bumis	312,221	937	23.5	49,093	147	3.7

**Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)**

		Preventive method(s) use to prevent mosquito bite					
		Use mosquito net			Others		
		N	n	%	N	n	%
Religion	Hindu	32,879	84	3.5	57,333	142	6.0
	Buddha	97,008	243	4.0	160,842	408	6.6
	Islam	1,296,309	3,753	15.5	457,129	1,252	5.5
	Christian	211,859	617	18.2	61,312	163	5.3
	Others	43,402	120	22.2	6,717	17	3.4
	Unclassified	984	3	6.6	1,621	4	10.8
Citizenship	Unclassified	306	1	3.5	769	2	8.7
	Malaysian	1,622,224	4,638	13.2	704,555	1,879	5.7
	Non-Malaysian	59,911	181	7.7	39,631	105	5.1
Education	Tertiary	63,555	168	4.8	87,462	222	6.6
	Secondary	723,452	2,055	10.9	377,330	1,000	5.7
	Unclassified	9,578	29	9.4	6,847	18	6.8
	Primary	586,104	1,687	15.4	207,103	562	5.5
	None	299,751	881	23.5	66,212	184	5.2
Occupation	Profesionals	59,827	162	6.8	60,448	155	6.9
	Clerical Workers	53,879	150	7.7	41,277	105	5.9
	Senior Official & Manager	12,732	33	5.0	19,530	50	7.7
	Technical & Associate	83,566	227	8.3	66,227	172	6.6
	Plant & Machine Operator & Assembler	65,524	186	9.4	38,413	103	5.5
	Service Workers & Shop	191,878	542	9.1	133,864	361	6.3
	Unclassified	110,383	316	11.2	58,191	155	5.9
	Housewife	460,611	1,316	15.5	138,320	368	4.7
	Craft & Related Trade Workers	91,754	253	12.1	47,196	122	6.2
	Elementary Occupations	81,680	244	14.6	27,154	75	4.9
	Unemployed	188,617	551	14.6	65,985	178	5.1
	Skilled Agricultural & Fishery	281,991	840	31.4	48,350	142	5.4
	Marital Status	Married	1,207,276	3,458	13.4	486,444	1,298
Not married		304,283	870	9.8	199,112	530	6.4
Divorcee		47,071	134	17.1	20,597	54	7.5
Widow/Widower		119,795	347	17.7	36,994	99	5.5
Unclassified		4,016	11	8.5	1,807	5	3.8
Household Income	RM3000 - RM3999	66,272	176	6.3	55,627	143	5.3
	RM4000 - RM4999	22,209	60	4.2	27,781	71	5.3
	RM5000 & above	40,946	107	3.4	80,388	203	6.8
	RM2000 - RM2999	168,852	466	8.2	118,395	304	5.8
	RM1000 - RM1999	392,637	1,107	11.4	183,441	497	5.3
	RM700 - RM999	229,521	661	15.9	81,791	222	5.7
	Unclassified	64,177	184	12.0	34,257	89	6.4
	RM400 - RM699	406,574	1,198	22.5	102,395	288	5.7
	Less than RM400	291,254	861	27.5	60,879	169	5.7



Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)

		Preventive method(s) use to prevent mosquito bite					
		Apply mosquito repellent			Use window netting		
		N	n	%	N	n	%
National		533,401	1,391	2.5	408,687	1,049	1.9
State	WP KL	53,528	136	7.0	14,956	38	2.0
	Selangor	113,256	269	4.5	56,555	134	2.3
	N.Sembilan	22,263	60	4.6	17,438	48	3.6
	Pulau Pinang	27,331	75	3.5	10,763	30	1.4
	Johor	78,413	201	5.2	23,325	60	1.6
	Melaka	29,124	73	7.8	21,746	47	5.8
	Perlis	4,888	13	3.8	4,310	11	3.4
	WP Labuan	7,323	24	4.3	12,630	41	7.5
	Perak	43,210	103	3.9	55,772	130	5.1
	Sabah	39,014	128	3.2	26,690	87	2.2
	Sarawak	55,900	144	4.9	96,967	240	8.4
	Kedah	22,058	62	2.3	30,844	81	3.3
	Pahang	22,314	59	3.0	20,472	54	2.7
	Terengganu	6,775	20	1.3	6,688	19	1.3
	Kelantan	8,006	24	1.2	9,531	29	1.4
Residence	Urban	375,738	904	4.4	284,575	674	3.4
	Rural	157,663	487	3.4	124,112	375	2.7
Gender	Female	315,712	817	4.4	209,257	532	2.9
	Male	217,689	574	3.7	199,429	517	3.4
Age Group	45-49	46,207	118	3.5	43,658	112	3.3
	40-44	42,697	113	3.0	56,177	144	3.9
	30-34	44,701	117	3.4	38,067	101	2.9
	55-59	33,400	85	3.6	35,495	90	3.8
	50-54	40,437	104	3.5	43,928	111	3.8
	25-29	59,365	155	4.3	41,535	107	3.0
	60-64	20,876	55	3.4	25,752	65	4.2
	35-39	52,865	141	4.0	43,109	113	3.2
	20-24	61,349	159	4.3	25,860	67	1.8
	15-19	38,278	101	4.4	14,765	38	1.7
	13-14	6,729	17	3.7	1,519	4	0.8
	65-69	23,077	60	4.4	17,790	44	3.4
	70-74	25,147	65	7.7	10,758	27	3.3
	75-79	15,645	41	8.8	7,625	19	4.3
	>=80	22,630	60	16.9	2,649	7	2.0
Race	Indian	50,577	127	4.4	25,412	61	2.2
	Chinese	182,439	454	6.5	201,391	493	7.1
	Malays	206,289	546	2.9	130,641	349	1.8
	Others	47,307	124	7.6	10,397	28	1.7
	Other bumis	46,789	140	3.5	40,845	118	3.1

**Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)**

		Preventive method(s) use to prevent mosquito bite					
		Apply mosquito repellent			Use window netting		
		N	n	%	N	n	%
Religion	Hindu	45,907	116	4.8	17,884	43	1.9
	Buddha	166,081	413	6.8	136,408	334	5.6
	Islam	260,197	700	3.1	153,894	416	1.8
	Christian	51,085	135	4.4	85,699	218	7.4
	Others	7,496	20	3.8	14,510	37	7.4
	Unclassified	2,634	7	17.6	292	1	2.0
Citizenship	Unclassified	361	1	4.1	0	0	0.0
	Malaysian	471,011	1,226	3.8	394,323	1,011	3.2
	Non-Malaysian	62,030	164	8.0	14,364	38	1.9
Education	Tertiary	43,904	112	3.3	77,721	193	5.9
	Secondary	237,046	614	3.6	217,009	557	3.3
	Unclassified	11,441	29	11.3	4,388	12	4.3
	Primary	150,632	395	4.0	89,545	234	2.4
	None	90,379	241	7.1	20,023	53	1.6
Occupation	Professionals	25,546	66	2.9	55,113	137	6.3
	Clerical Workers	24,222	64	3.5	19,844	51	2.8
	Senior Official & Manager	9,466	23	3.7	20,668	53	8.1
	Technical & Associate	32,306	83	3.2	49,616	130	4.9
	Plant & Machine Operator & Assembler	25,128	64	3.6	19,425	51	2.8
	Service Workers & Shop	80,856	208	3.8	63,120	159	3.0
	Unclassified	45,745	118	4.6	24,700	61	2.5
	Housewife	111,880	289	3.8	85,960	220	2.9
	Craft & Related Trade Workers	37,133	95	4.9	11,904	31	1.6
	Elementary Occupations	24,369	67	4.4	9,069	25	1.6
	Unemployed	90,223	238	7.0	34,040	88	2.6
	Skilled Agricultural & Fishery	26,527	76	3.0	15,229	43	1.7
	Marital Status	Married	338,629	881	3.8	314,998	811
Not married		130,746	340	4.2	68,907	176	2.2
Divorcee		11,448	29	4.2	4,496	11	1.6
Widow/Widower		48,311	129	7.1	17,801	45	2.6
Unclassified		4,268	12	9.0	2,486	6	5.2
Household Income	RM3000 - RM3999	41,849	106	4.0	44,055	109	4.2
	RM4000 - RM4999	30,957	79	5.9	21,449	56	4.1
	RM5000 & above	71,258	175	6.0	73,636	179	6.2
	RM2000 - RM2999	77,088	196	3.8	84,286	216	4.1
	RM1000 - RM1999	137,350	359	4.0	96,607	254	2.8
	RM700 - RM999	54,178	147	3.8	25,908	66	1.8
	Unclassified	24,767	62	4.6	14,595	35	2.7
	RM400 - RM699	54,742	150	3.0	32,164	91	1.8
	Less than RM400	41,211	117	3.9	15,987	43	1.5

**Table 12: Preventive method(s) use to prevent mosquito bite by socio - demography (continue)**

		<b>Preventive method(s) use to prevent mosquito bite</b>		
		<b>Wear long sleeve clothings &amp; trousers at down or dusk</b>		
		<b>N</b>	<b>n</b>	<b>%</b>
National		97,687	259	0.5
State	WP KL	2,755	7	0.4
	Selangor	20,544	51	0.8
	N.Sembilan	724	2	0.2
	Pulau Pinang	3,501	10	0.5
	Johor	12,190	31	0.8
	Melaka	983	2	0.3
	Perlis	677	2	0.5
	WP Labuan	615	2	0.4
	Perak	3,769	9	0.3
	Sabah	10,600	35	0.9
	Sarawak	22,931	58	2.0
	Kedah	8,621	24	0.9
	Pahang	6,024	15	0.8
	Terengganu	2,433	7	0.5
	Kelantan	1,320	4	0.2
Residence	Urban	61,760	148	0.7
	Rural	35,926	111	0.8
Gender	Female	56,946	147	0.8
	Male	40,741	112	0.7
Age Group	45-49	9,414	25	0.7
	40-44	7,424	19	0.5
	30-34	14,349	39	1.1
	55-59	4,644	12	0.5
	50-54	6,494	17	0.6
	25-29	11,587	31	0.8
	60-64	3,752	10	0.6
	35-39	7,340	20	0.6
	20-24	15,512	39	1.1
	15-19	11,744	32	1.3
	13-14	1,040	3	0.6
	65-69	1,743	5	0.3
	70-74	739	2	0.2
	75-79	735	2	0.4
	>=80	1,170	3	0.9
Race	Indian	3,240	8	0.3
	Chinese	18,960	47	0.7
	Malays	53,398	140	0.7
	Others	4,678	13	0.8
	Other bumis	17,411	51	1.3

**Table 12: Preventive method(s) use to prevent mosquito bite by socio-demography (continue)**

		Preventive method(s) use to prevent mosquito bite		
		Wear long sleeve clothings & trousers at down or dusk		
		N	n	%
Religion	Hindu	2,040	5	0.2
	Buddha	16,188	40	0.7
	Islam	60,977	163	0.7
	Christian	16,314	45	1.4
	Others	2,168	6	1.1
	Unclassified	0	0	0.0
Citizenship	Unclassified	0	0	0.0
	Malaysian	93,271	247	0.8
	Non-Malaysian	4,416	12	0.6
Education	Tertiary	13,787	34	1.0
	Secondary	51,800	137	0.8
	Unclassified	1,220	3	1.2
	Primary	23,022	63	0.6
	None	7,857	22	0.6
Occupation	Profesionals	6,082	15	0.7
	Clerical Workers	8,542	21	1.2
	Senior Offical & Manager	2,464	6	1.0
	Technical & Associate	10,147	27	1.0
	Plant & Machine Operator & Assembler	2,556	7	0.4
	Service Workers & Shop	11,369	30	0.5
	Unclassified	11,501	29	1.2
	Housewife	20,257	54	0.7
	Craft & Related Trade Workers	5,159	13	0.7
	Elementary Occupations	4,046	12	0.7
	Unemployed	9,013	25	0.7
	Skilled Agricultural & Fishery	6,549	20	0.7
	Marital Status	Married	57,340	154
Not married		36,214	95	1.2
Divorcee		434	1	0.2
Widow/Widower		3,253	8	0.5
Unclassified		446	1	0.9
Household Income	RM3000 - RM3999	8,636	21	0.8
	RM4000 - RM4999	4,076	10	0.8
	RM5000 & above	9,466	23	0.8
	RM2000 - RM2999	15,632	40	0.8
	RM1000 - RM1999	26,652	71	0.8
	RM700 - RM999	6,452	18	0.5
	Unclassified	3,651	10	0.7
	RM400 - RM699	15,347	43	0.9
	Less than RM400	7,775	23	0.7