FACTORS AFFECTING KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS DENGUE INFECTION PREVENTION AND CONTROL IN A RURAL COMMUNITY OF NORTHERN THAILAND

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Abstract. Dengue, a viral infection primarily transmitted by *Aedes aegypti* mosquitoes, is an important public health problem in rural northern Thailand. In this study, we aimed to assess the knowledge, attitudes and practices (KAP) regarding dengue prevention and control and to determine the factors associated with KAP of subjects in the Makok Na Bua Village, a rural community in Lampang Province, Thailand. Study subjects were recruited using a systematic random-sampling technique. Inclusion criteria for study subjects were: being aged >18 years, being able to communicate and residing in the study village for at least 6 months. Subjects with physical disability were excluded from the study. This cross-sectional study was conducted during 20 January-15 February 2022. Subjects were assessed for their KAP by completing a questionnaire with four sections: 1) sociodemographic information, 2) knowledge about dengue, 3) attitudes about dengue prevention and control and 4) practices regarding dengue prevention and control. The questionnaire was scored. Ordinal logistic regression was used to analyze factors associated with each KAP section. A total of 199 subjects were included in the study, 55.3% female. The mean (±standard deviation) age of subjects was 56.0 (±13.1) (range: 19-84) years. The most common occupations of study subjects were: agriculturists (38.2%), employees (34.2%) and merchants (15.6%). As much as 97.5% of subjects had previously received information about dengue from a village health volunteer (VHVs) or health-care personnel while 13.6% of subjects knew the duration of the anti-larvicidal effects of Temephos granules. The lowest mean Attitude score was about the harms of Temephos granules. The lowest mean Practices score was about changing the water in flower vases and adding salt, vinegar or detergent to water-filled plates under cupboard legs. Agriculturists had

significantly (p = 0.019) higher knowledge scores than other occupations. Practices scores were significantly (p = 0.014) higher among those with higher attitude scores. In summary, health workers were major source of information about dengue but there were KAP gaps especially among those who were not agriculturists. Those with better attitudes and better practices. We conclude healthcare workers in the study area need to educate subjects regarding the areas with deficiencies, such as the safety and efficacy of Temephos granules. Further studies are needed after implementation of this change to determine the benefits in the study population.

Keywords: dengue, prevention and control, KAP, Lampang Province, Thailand

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INTRODUCTION

Dengue is a mosquito-borne viral disease found worldwide (Ferreira-de-Lima and Lima-Camara, 2018). In Thailand, dengue is hyperendemic (WHO SEARO, 2011). The incidence of dengue varies by time and location (Lauer *et al*, 2018). In 2020, there were 76.66 dengue cases per 100,000 population in Thailand with the greatest incidence being those aged 15-24 years followed by those aged 10-14 years and the region of Thailand with the greatest incidence is northern Thailand (Bureau of Epidemiology, 2021). Dengue found in both urban and rural parts of Thailand (Bureau of Communicable Diseases Led by Insect, 2021). The majority of dengue patients have mild symptoms (Yacoub and Farrar, 2014) but some may have organ damage, plasma leakage and/or severe bleeding. There is no treatment for dengue and the dengue vaccine does not offer complete protection and can only be given to those with a history of a previous dengue infection (Thomas and Yoon, 2019). The primary prevention strategy is reduction of human contact with the vector (WHO, 2009).

In 2020, Ko Kha District, Lampang Province, northern Thailand had the greatest incidence of dengue at 255.60 cases per 100,000 of population; 3.33 times greater than the national incidence (Lampang Provincial Health Office, unpublished data). The village with the greatest incidence of dengue Ko Kha District was Makok Na Bua Village, with 1,810.87 cases per 100,000 of population (Lampang Provincial Health Office, unpublished data).

This village was identified as a dengue outbreak area because the number of dengue cases exceeded the median number of cases for the preceding 5-year period. The Mae Yao Canal flows through the middle of the village and is a favorable mosquito-breeding place. People living near stagnant water, such as the Mae Yao Canal have a greater risk of contracting dengue (Toan *et al*, 2015; Lee *et al*, 2021). Although dengue surveillance, prevention, and control activities for Thailand (Bureau of Epidemiology, 2021) were being conducted in this village, the incidence of dengue remained high.

The Ministry of Public Health of Thailand established a dengue control program 1973 under the Director General of the Department of Communicable Disease Control (Tongcharoen, 1999). The current strategy of the dengue control program in Thailand is environmental management and source reduction through community participation (Bureau of Communicable Diseases Led by Insect, 2021). This community-based program attempts to improve dengue vector control practices and decrease larval indices in households (Saengkae, 2015; Pengvanich, 2011). It is important to know the knowledge, attitudes and practices (KAP) regarding dengue control and prevention among subjects in areas with a high or increasing incidence of dengue in order to inform dengue control programs. There have been no previous KAP studies among subjects living in Makok Na Bua Village.

In this study, we aimed to assess KAP levels regarding dengue control and prevention and the associated factors in order to inform dengue control and prevention programs.

MATERIALS AND METHODS

Study design and setting

We conducted this cross-sectional study in rural Makok Na Bua Village, during 20 January-15 February 2022. This community consists of 729 people, all Thais.

Sample selection and sample size

Inclusion criteria for study subjects were: being aged at >18 years, being able to communicate and residing in the study village for at least 6 months. The exclusion criterion was being physically disabled. Study subjects were selected using a systematic random-sampling technique.

The minimum number of subjects needed for the study was calculated using a free on-line calculator (http://statulator.com/SampleSize/ss1P.html). We assumed a 15% non-response rate, a 5% margin of error and a 95% confidence interval (CI) giving the minimum number of subjects calculated to be necessary for the study of 201 subjects.

Study instrument

Each subject was asked to complete a questionnaire developed by reviewing previous KAP surveys regarding dengue (Chockchaichamnankit, 2004). The instrument contained 36 items with 4 domains (demographics, knowledge, attitudes and practices). The organization of the questions were as follows: (1) sociodemographic data, (8 items: study subject sex, age, marital status, education level, family income, length of time living in the study village, number household members who contracted dengue during the previous 2 years and sources of dengue-related information); (2) subject knowledge about dengue (8 items: mosquito types, biting periods, area in village of residence, mosquito breeding sites, duration of effects of Temephos granules, symptoms of dengue fever, treatment of dengue fever and frequency of destruction of breeding sites); (3) subject attitudes about dengue prevention and control (9 items: responsibility for control of mosquitoes, responsibility regarding Temephos granule use, harm of Temephos granules, insecticide fogging operations, willingness to carry out fogging, use of guppy fish, cost of destruction of breeding sites, dengue prevention and control and dengue infection); and (4) subject practices regarding dengue prevention and control (11 items: placing lids on containers, keeping the house clean, placing guppy fish in water containers, overturning containers with water, discarding items, changing water in containers with standing water, adding salt, vinegar or detergent to standing water, adding Temephos granules, using a mosquito net, seeking healthcare and participating in mosquito control activities).

The knowledge domain of the study instrument consisted of multiple-choice questions with 4 possible answers for each question. Each correct response was awarded 1 point and each incorrect response was awarded 0 point. The attitude section of the instrument consisted of questions with 3 possible answers, "agree," "not sure" and "disagree" awarding 3, 2 and 1 points, respectively, for positive questions and 1, 2 and 3 points, respectively, for negative questions. The practices section of the instrument consisted of questions with 2 possible answers, "sometimes" and "always", awarding 2 and 3 points, respectively, for those responses. The knowledge level of subjects was categorized as low (≤59.0% of questions with correct responses), average (60.0-79.0% of questions with correct responses) and high (80.0-100.0% of questions with correct responses) using a previously described cut-off points (Bloom *et al*, 1971). For subject attitudes and practices sections, the levels were categorized as low (a score of 1.0-1.6), average (a score of 1.7-2.3) or high (a score of 2.4-3.00) based on previously described cut-off points (Best, 1977).

Our study instrument was reviewed and approved by 3 experts in environmental health and epidemiology. The item-objective congruence index (IOC) was used to evaluate the content validity of the instrument. The IOC values for the KAP domains from the study ranged from 0.75 to 1.00.

We used the Cronbach's alpha to assess the internal consistency of the questionnaire (Cronbach, 1951). The Cronbach's alpha for the KAP parts of the study were 0.71, 0.72 and 0.84, respectively. These values (≥0.70) indicated acceptable reliability (Bolarinwa, 2015).

Instrument reliability was pilot tested using 30 subjects meeting the same inclusion and exclusion criteria but living in a different village of the same district.

Data collection

We conducted face-to-face interviews to fill out the questionnaire.

Statistical analysis

We conducted statistical calculations using the Statistical Package for the Social Sciences (SPSS), version 22.0 (IBM Corp, Armonk, NY). We used percentages to describe sociodemographic data, sources of dengue-related information and knowledge scores for the KAP levels. We used mean (±standard deviations (SD)) to describe attitudes and practices scores. Ordinal logistic regression analysis was used to determine factors significantly associated with each KAP domain. Independent variables included all sociodemographic characteristics. Knowledge and attitudes were independent variables for practices. The levels of each domain of the KAP were categorized as high, average and low and were used as outcome variables on regression analyses. Factors with a p-value ≤0.25 on univariate analysis were included in the multivariate analysis. Adjusted odds ratios (aOR) with 95% confidence interval (CI) were used to assess the strengths of associations.

Ethical approval

This study was approved by the Research Ethics Committee of Boromarajonani College of Nursing, Nakhon Lampang, Thailand (E 2565-006). Written informed consent was obtained from each study subject prior to inclusion in the study.

RESULTS

Sociodemographic characteristics and sources of dengue-related information

A total of 199 subjects were included in the study, 55.3% (n = 110) female. The mean (±SD) age of subjects was 56.0 (±13.1) (range: 19-84) years. Almost half (44.2%) of subjects (n = 88) were aged ≥60 years. Slightly over one half (59.8%) of subjects (n = 119) had graduated from primary school and 66.3% (n = 132) were

married. About one-third (36.7%) of study subject households (n = 73) had a family income <USD150/month. The mean (±SD) length of time study subjects had lived in the study area was 47.7 (±18.9) years. In terms of occupation, 38.2% of subjects (n = 76) were agriculturists, 34.2% (n = 68) were employees and 15.6% (n = 31) were merchants. Up to 97.5% of subjects (n = 194) had received information about dengue from a village health volunteer (VHV) or health-care personnel during the previous 2 years and 12.6% (n = 25) had heard about dengue via the mass media. Only 3.5% of subjects (n = 7) stated a household member had been infected with dengue during the previous 2 years.

Knowledge about dengue infection

Ninety-nine percent of subjects (n = 197) knew the type of mosquitoes that carry dengue virus 96.0% (n = 191) knew the breeding sites of those mosquitoes. Some 20% of subjects (n = 40) did not know about the biting period of the mosquitoes or about the treatment of dengue fever while 13.6% of subjects (n = 27) knew the duration and the anti-larvicidal beneficial effects of Temephos granules in water-storage containers (Table 1).

Attitudes about dengue fever prevention and control

The highest mean Attitude score was about being willing to carry out mosquito fogging during

Table 1

Knowledge about dengue fever

Item		Number (%)	
		Correct answer	Incorrect answer
1.	Type of mosquitoes that carry dengue fever	197 (99.0)	2 (1.0)
2.	Biting periods of dengue mosquitoes	160 (80.4)	39 (19.6)
3.	Residential areas of dengue mosquitoes	182 (91.5)	17 (8.5)
4.	Breeding sites of dengue mosquitoes	191 (96.0)	8 (4.0)
5.	Duration of anti-larvicidal beneficial effects of Temephos granules in water-storage containers	27 (13.6)	172 (86.4)
6.	Symptoms of dengue fever	184 (92.5)	15 (7.5)
7.	Medicine used to treat dengue fever	156 (78.4)	43 (21.6)
8.	Proper frequency of destruction of mosquito breeding sites	174 (87.4)	25 (12.6)

an outbreak. The lowest mean Attitude score was for the question about the harm of Temephos granules to humans (Table 2).

Dengue control and prevention practices

The highest mean Practice score was for placing tight lids on long-term water-storage containers and keeping houses and their surroundings clean and tidy. The lowest mean Practice scores were for changing the water in flower vases, cleaning the inside of vases and adding salt, vinegar or detergent to water-filled plates under cupboard legs. The lowest mean Practices scores were for using Temephos granules and putting mosquito larvae eating guppy fish in household water-storage containers (Table 3).

KAP scores

The mean (±SD) Knowledge score was 6.4 (±0.9), the mean Attitude score was 2.6(±0.2) and the mean Practices score was 2.5 (±0.2). Fifty-seven percent of subjects had an above average Knowledge score, 92% had an above average Attitude score and 87% had an above average Practices score (Table 4). This shows a deficiency in knowledge but the prevention and control practices were still good.

Factors associated with KAP levels

On multivariate analysis we found the following. Subjects who were agriculturists had significantly greater Knowledge levels than other occupations (aOR: 2.1; 95% CI: 1.1-3.8; $p = 0.019$). No factors were significantly associated with Attitude levels. Having an above average Attitudes level was significantly associated with having an above average Practices level (aOR: 4.1; 95% CI: 1.3-12.6; p=0.014) (Table 5).

DISCUSSION

In our study, nearly all of the subjects had received dengue-related information from VHVs and health-care personnel. This shows the importance of these workers in educating the public. Mass media was not very important as an information. Our findings are similar to dengue KAP studies conducted in Udon Thani Province, Thailand (Meekhun *et al*, 2019) and Nong Khai Province, Thailand (Donla, 2019).

Only a small proportion of subjects knew how long the anti-larvicidal beneficial effects of Temephos granules in water-storage containers lasted, showing a need for education in this area. Other factors limiting the benefits of Temephos granules, such as frequent water turnover (Garelli *et al*, 2011) also need to be included in the education regarding dengue prevention. This information needs to be provided to the health workers who educate the public. Most study subjects were concerned about the safety of Temephos granules in their drinking water and need to be educated about this and the proper amount of Temephos to be used (Laws *et al*, 1967).

Table 2

Attitudes towards dengue fever prevention and control

	Item	Number (%)			Score Mean ± SD
		Agreed	Not sure	Disagreed	
1.	Believe only VHVs or health-care personnel have a responsibility to control dengue fever outbreaks.	35 (17.6)	6 (3.0)	158 (79.4)	2.6 ± 0.8
2.	Believe people should add Temephos granules to their water-storage containers themselves.	190 (95.5)	8 (4.0)	1 (0.5)	2.9 ± 0.2
3.	Believe Temephos granules are harmful to humans.	11 (5.5)	152 (76.4)	36 (18.1)	2.1 ± 0.5
4.	Believe mosquito-fogging should only be conducted when necessary.	179 (90.0)	11 (5.5)	9 (4.5)	2.9 ± 0.5
5.	Willing to carry out mosquito fogging during an outbreak.	193 (97.0)	3 (1.5)	3 (1.5)	3.0 ± 0.3
6.	Believe guppy fish should be placed in water-storage containers to kill mosquito larvae.	67 (33.7)	122 (61.3)	10 (5.0)	2.3 ± 0.6
7.	Believe destruction of mosquito-breeding sites is costly.	13 (6.5)	21 (10.6)	165 (82.9)	2.8 ± 0.6
8.	Believe the best way to prevent dengue is to eliminate mosquito breeding sites.	175 (87.9)	22 (11.1)	2 (1.0)	2.9 ± 0.4
9.	Believe if you have had dengue before you will not get it again.	15 (7.5)	138 (69.4)	46 (23.1)	2.2 ± 0.5

SD: standard deviation; VHV: village health volunteer

Table 3

Practices regarding dengue prevention and control

	Item	Number (%)			Score Mean ± SD
		Always	Sometimes	Never	
1.	Place a tight lid on long-term water-storage containers being using for water storage.	184 (92.5)	13 (6.5)	2 (1.0)	2.9 ± 0.3
2.	Keep the house and its surroundings clean and tidy.	182 (91.5)	17 (8.5)	0 (0.0)	2.9 ± 0.3
3.	Place mosquito larvae-eating guppy fish in household water-storage containers.	52 (26.1)	120 (60.3)	27 (13.6)	2.1 ± 0.6
4.	Overturn unused outdoor containers around houses.	162 (81.4)	34 (17.1)	3 (1.5)	2.8 ± 0.4
5.	Discard any items holding water, such as tires, coconut shells, cans, bottles or plastic bowls.	152 (76.4)	46 (23.1)	1 (0.5)	2.8 ± 0.4
6.	Change the water in flower vases, and clean and scrub the inner sides of the vases.	24 (12.1)	155 (77.9)	20 (10.1)	2.0 ± 0.5
7.	Add salt, vinegar or detergent to water-filled plates under cupboard legs.	21 (10.6)	152 (76.4)	26 (13.1)	2.0 ± 0.5
8.	Add Temephos granules to water-storage containers.	34 (17.1)	151 (75.9)	14 (7.0)	2.1 ± 0.5
9.	When sleeping during the day, sleep under a mosquito net or in a screened room.	169 (84.9)	22 11.1)	8 (4.0)	2.8 ± 0.5
10.	If a family member shows any signs of dengue, bring him (or her) to see a healthcare provider immediately.	145 (72.9)	46 (23.1)	8 (4.0)	2.7 ± 0.5
11.	Participate in activities with neighbors and village health volunteers to eliminate mosquito breeding sites.	40 (20.1)	151 (75.9)	8 (4.0)	2.2 ± 0.5

SD: standard deviation

Table 4

Knowledge, attitude and practice scores about dengue fever

Domain	Score Mean ± SD	Level		
		High, *n* (%)	Average, *n* (%)	Low, *n* (%)
Knowledge	6.4 ± 0.9	113 (56.8)	79 (39.7)	7 (3.5)
Attitude	2.6 ± 0.2	182 (91.5)	17 (8.5)	0 (0.0)
Practice	2.5 ± 0.2	173 (86.9)	25 (12.6)	1 (0.5)

SD: standard deviation

Most of our subjects covered water storage containers and kept their houses clean, similar to the findings of previous studies (Meekhun *et al*, 2019; Sornkaew, 2020). However, few of our subjects put guppy fish in water storage containers, changed the water in flower vases regularly and used Temephos in the water-filled plates under cupboard lets similar to the findings of a previous study (Nguyen *et al*, 2019). This also shows an area where education needs to be improved among subjects and health workers.

In our study, subjects had above average Knowledge levels and good Attitudes and Practices levels, similar to previous studies from Udon Thani Province, Thailand (Meekhun *et al*, 2019), Malaysia (Zamri *et al*, 2020) and Vietnam (Ky Truong *et al*, 2019). Our above average and good KAP levels are clearly due to the health workers in this area as evidenced by the great majority of subjects mentioning these workers as their sources of information. A village headman in the study area stated health-care personnel from Ko Kha District Hospital and Ban Lai Hin Subdistrict Health-Promoting Hospital frequently conducted preventive and vector-control interventions aimed at reducing dengue transmission. All the study village houses had been inspected for larval breeding by VHVs. Houses where Aedes larvae were found were fined and fines were even higher if the larvae were found in the house of a VHV or a community leader. If no larvae were found, a reward would be given to the VHV. This policy was accepted by the people in the community. However, the high incidence of dengue in the study village shows this policy was not strictly implemented. Better community participation is needed to change the incidence of dengue in the study village

In our study, agriculturalists had a greater Knowledge level, showing occupation was significantly associated with Knowledge levels, similar to

Table 5

Factors associated with knowledge, attitude and practices in regards to dengue fever prevention and control

Factors	*n* (%)	Knowledge				Attitudes				Practices			
		Univariate		Multivariate		Univariate		Multivariate		Univariate		Multivariate	
		cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value	cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value	cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value
Gender													
Male (Ref)	89 (44.7)												
Female	110 (55.3)	1.2 (0.7-2.2)	0.465			0.9 (0.3-2.3)	0.759			0.7 (0.3-1.7)	0.492		
Age in years													
<60 (Ref)	111 (55.8)												
≥60	88 (44.2)	1.1 (0.6-1.9)	0.767			0.7 (0.3-1.8)	0.451			1.6 (0.7-3.8)	0.293		
Education level													
Primary education	119 (59.8)	1.1 (0.6-2.0)	0.677			2.3 (0.8-6.3)	0.109			1.1 (0.5-2.5)	0.814		
Secondary education or above (Ref)	80 (40.2)												
Monthly family income in USD													
<150.2	73 (36.7)	1.4 (0.8-2.5)	0.293			1.1 (0.4-3.0)	0.901			1.4 (0.6-3.3)	0.503		
≥150.2 (Ref)	126 (63.3)												
Marital status													
Single/separated/ divorced	67 (33.7)	1.6 (0.9-2.9)	0.135	1.9 (1.0-3.5)	0.052	0.9 (0.3-2.6)	0.882			1.2 (0.5-2.8)	0.737		
Married (Ref)	132 (66.3)												

Table 5 (cont)

Factors	*n* (%)	Knowledge				Attitudes				Practices			
		Univariate		Multivariate		Univariate		Multivariate		Univariate		Multivariate	
		cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value	cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value	cOR (95%CI)	*p*-value	aOR (95%CI)	*p*-value
Length of time living in the study area in years													
<40 (Ref)	65 (32.7)												
≥40	134 (67.3)	1.2 (0.7-2.2)	0.560			1.1 (0.4-3.2)	0.809			1.6 (0.7-3.8)	0.264		
Occupation													
Agriculture	76 (38.2)	1.8 (1.0-3.3)	0.045*	2.1 (1.1-3.8)	0.019*	1.1 (0.4-3.2)	0.797			1.2 (0.5-2.8)	0.688		
Others (Ref)	123 (61.8)												
Household member experienced dengue during the previous 2 years													
Yes (Ref)	7 (3.5)												
No	192 (96.5)	3.4 (0.6-18.1)	0.147	4.0 (0.7-21.8)	0.112	1.8 (0.2-16.2)	0.585			1.1 (0.1-9.6)	0.922		
Knowledge about dengue fever													
Low (Ref)	7 (3.5)									1	-		
Average	79 (39.7)									2.0 (0.4-11.6)	0.426	1.5 (0.2-9.5)	0.663
High	113 (56.8)									3.7 (0.6-21.4)	0.143	2.7 (0.4-17.2)	0.292
Attitudes regarding dengue fever prevention and control													
Average (Ref)	17 (8.5)									1	-		
High	182 (91.5)									4.4 (1.5-13.2)	0.008*	4.1 (1.3-12.6)	0.014*

aOR: adjusted odds ratio; cOR: crude odds ratio; CI: confidence interval; Ref: reference; USD: United States dollars
* significant difference at $p<0.05$

previous studies from Indonesia (Harapan *et al*, 2018) and Malaysia (Selvarajoo *et al*, 2020). The greater knowledge level among agriculturists in our study may be their familiarity with water and dengue larvae breeding sites.

In our study Knowledge levels was not significantly associated with Practices level, showing educating regarding dengue may not be adequate to change behavior. Our finding is similar to those of a study from Samut Prakan Province, Thailand (Intasri *et al*, 2017) but in contrast to the findings of studies from Nakhon Si Thammarat and Samut Sakhon Provinces, Thailand (Tunyarak and Chuaikhlai, 2019; Mattavangkul *et al*, 2017) and from Malaysia (Hamfadi *et al*, 2019), where a significant association between Knowledge and the Practices was found.

In our study we did find a significant association between Attitudes and Practices as was theorized by previous studies (Kim *et al*, 1969; Ajzen, 2002). In our study, a minority of subjects felt VHVs and health-care personnel had the sole responsibility for controlling dengue outbreaks. However, most felt they should add Temephos granules on their own. Most subjects also felt destruction of mosquito breeding sites was effective for controlling dengue and not costly. Thus, they participated in destroying these breeding sites. This clearly shows the link between Attitudes and Practices. Control programs should emphasize the advantages of control measures for preventing dengue. Our findings are similar to previous studies from Saraburi Province, Thailand (Saminpanya *et al*, 2017) and Udon Thani Province, Thailand (Meekhun *et al*, 2019) but are in contrast to the results of a study from Nakhon Si Thammarat and Nong Khai Provinces, Thailand, which did not find significant association between Attitudes and Practices (Sornkaew, 2020; Donla, 2019).

Our study had some limitations. All the information was self-reported and not confirmed by site examinations. A social-desirability bias might have existed in answering some survey questions. Almost half (44.2%) of subjects were elderly, since they were at home at the time of their interviews. Many of the elderly in this village had good Practices levels but these may not reflect those of other age groups.

In summary, health workers were major source of information about dengue but there were KAP gaps especially among those who were not agriculturists. Those with better attitudes and better practices. We conclude healthcare workers in the study area need to educate subjects regarding the areas with deficiencies, such as the safety and efficacy of Temephos granules. Further studies are needed after implementation of this change to determine the benefits in the study population.

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CONFLICT OF INTEREST DISCLOSURE

The authors declare no conflict of interest.

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