KAP STUDY

Dengue fever in Southern of Vietnam: A survey of reported knowledge, attitudes, and practices

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Abstract

Objective: Dengue fever (DF) is an acute infectious disease with high incidence in tropical countries, such as Vietnam, where dengue prevention is a challenge for the health sector, government, and policy makers. The aim of this study was to assess the knowledge, attitudes, and practices in southern Vietnam and explore their relationships with the characteristics of the people.

Methods: A cross-sectional study was conducted, using interviews with 1,906 urban participants and 493 rural participants in southern Vietnam in July 2018.

Results: The study found a lack of knowledge regarding DF symptoms, with only 37.2% having a good level of knowledge, although 57.1% had good attitudes and 56.1% had good practices. Television (85.4 %) and the internet (69.5%) were the two main sources of information, and information provided by healthcare professionals was low. Participants with good knowledge had approximately 1.7 times the probability of having a good attitude and 5.0 times the probability of having good practices of those without. Urban participants had 1.3 times the level of knowledge than those in rural areas ($p = 0.025$), while the quality of attitude scores of rural participants was 1.3 times ($p = 0.029$) that of urban participants.

Conclusion: Improvements in knowledge of DF, as well as in attitudes and practices toward dengue, are required, such as might be achieved through increased publicity and knowledge dissemination.

Keywords: Community, Dengue, Knowledge, Attitude, Practice, Vietnam. (JPMA 69: S-118 (Suppl. 2); 2019)

Introduction

Dengue fever (DF) is a disease caused by four dengue virus serotypes and transmitted mainly through mosquito bites, especially those of *Aedes Aegypti*.[1] DF has emerged as an important problem which is prevalent in many countries worldwide, with an estimate of 2.5 billion people living in high-risk areas. In 2012, the World Health Organization (WHO) estimated that 50 to 100 million people were infected, with more than 22,000 deaths each year, mostly children.[1,2] Using a cartographic approach, Samir Bhatt et al estimated that there are 390 million dengue infections worldwide per year.[3]

Vietnam is a tropical monsoon-climate country, which offers favourable conditions for mosquito breeding, and thus for developing infectious disease like dengue.[1] The incidence of dengue has increased continuously, from 32.5 cases per 100,000 people in 2000 (24,434) to 78 cases per 100,000 people in 2011 (69,680 cases). Over 85% of cases and 90% of deaths due to dengue are in southern Vietnam,[4] making Vietnam an endemic country for dengue.

A study in Vietnam estimated that the economic burden of DF was at least 94.9 million USD, and the actual number could be much greater.[5] Due to Vietnam's dengue outbreaks, prevention is becoming a top social concern, particularly as there is no specific treatment for DF. The most promising approach, of finding vaccines against all four serotypes of dengue virus, has achieved some progress, but these are not yet available in the Vietnam market. DF-prevention programmes are therefore extremely important, much more so than treatments, and the Vietnamese government has instituted several strategies to promote the prevention of dengue by reducing dengue vectors.

The critical role of community education in the improvement of knowledge, attitudes, and practices (KAP) has been demonstrated,[6] and there were studies of interest on this issue in both high and low incidence countries, including France, India, Indonesia, Thailand, Malaysia, and Nepal.[7-13] A study conducted by Dhimal et al, in Nepal, in areas with a similar climate to Vietnam, showed that only 12% of participants had good knowledge and only 37% good practices regarding DF, although 83% had a good attitude.[7] A KAP study is

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therefore necessary to assess the effectiveness of educational efforts and to understand the KAP of people regarding the prevention of DF in light of WHO recommendations[4] and the actual conditions and socioeconomic changes occurring in Vietnam.[14-16]

The knowledge gained from this survey will guide public administrators in planning, designing, and implementing initiatives, programmes, and policies related to dengue prevention, which may help to solve the growing problem of dengue infection. To date, there have been no studies on the KAP of the Vietnamese population; this study therefore aimed to assess the KAP among the Vietnamese residents regarding DF, in order to create a basis for improving and developing policies related to DF prevention in Vietnam.

Subjects and Methods

A cross-sectional survey was conducted from July to September 2018 in Southern Vietnam to measure the KAP regarding dengue and to identify predictive factors.

Study Setting and Geographic Location

At the time this study was conducted, the total population of Vietnam was approximately 92.6 million. According to government statistics, 32 southern locations (including three central cities and 29 provinces) were considered as endemic areas for dengue in Vietnam and were therefore chosen for data collection. These 32 provinces were divided into four areas, depending on their economic and geographic situations: central coastal area (total population 9.2 million in 2016), central highlands (5.7 million), south-eastern area (16.4 million), and Mekong River Delta (17.6 million).[17]

Sample size was calculated using the following formula

$$N = \frac{Z_{\alpha/2} \times P(1-P)}{d^2} \quad (a)^{18};$$

$$N' = \frac{\text{Populationofthearea} \times 385}{5.7} \quad (b)$$

A single population proportion formula (a) was used to estimate the minimum sample size. The following assumptions were made: 90% confidence interval ($Z_{\alpha/2}$ = 1.96), 50% with good dengue-related KAP, and 5% margin of error. The calculated sample sizes were 271 for the central highlands, 440 for the central coastal area, 780 for the south-eastern area, and 840 for the Mekong River Delta, based on formula (b). In total, the study required a minimum of 2,331 participants. Assuming 20% missing or invalid results, 2,797 questionnaires were administered.

The study tool was a questionnaire used to explore the KAP regarding dengue was adapted and re-designed from two previous studies.[7,8] The initial version was pre-tested on a pilot population of 200 rural and urban residents throughout the 32 provinces to determine validity and reliability, which was demonstrated by Cronbach's α of at least 0.7 for each of the sections of the questionnaire.[19] The final 51-item questionnaire included four sections:

Section 1: Demographic characteristics of the respondent (11 items).

Section 2: Knowledge regarding symptoms of dengue and prevention methods (19 items; $\alpha = 0.7$).

Section 3: Attitudes toward DF (13 items; $\alpha = 0.8$).

Section 4: Practices in dengue prevention (8 items; $\alpha = 0.7$).

Study Subjects: The target population of this study was all adults living in southern Vietnam. Participants were recruited if they met the following inclusion criteria: i) age at least 18 years ii) Vietnamese nationality, iii) able to communicate fluently in Vietnamese, and iv) self-reporting no symptoms or diagnosis of dengue at the time of enrollment.

Volunteer participants were recruited through convenience sampling. Face-to-face interviews were conducted by ten undergraduate pharmacy students, who were trained for a week to manage the interviews confidently. To minimize collection-related bias, no overt cues or signs regarding correct answers were given to the respondents during the interview. Incomplete questionnaires were considered as missing values and excluded from data analysis.

Statistical Analysis: Answers from the questionnaires were tabulated using Microsoft Excel 2016 for Windows® to double-check input progress, then analyzed using Statistical Package for the Social Sciences (SPSS® 20.0). In Section 2 (knowledge), correct answers were marked as one point and incorrect or unknown answers were marked as zero, resulting in a "K-score" range from 0 to 19. In Section 3 (attitudes), a five-point Likert scale was used, ranging from 1 (strongly disagree) to 5 (strongly agree), with the mid-point being "not sure". Responses of 4 or 5 were marked as one point and the remainder marked as zero (''not sure'' was marked as zero because this was most commonly the response of participants who had the least knowledge or understanding of the statements[20]), resulting in an "A-score" range from 0 to 13. In Section 4 (practice), dichotomous choice (Yes/No) questions were asked; "Yes" responses were marked as one point and "No" responses were marked as zero, resulting in a "P-score" range from 0 to 8.

Table-1: Characteristics of participants involved in the study.

Code	Variables	Rural n=493	Urban %	Total n=1,906	P-value* %	N=2,399	%	
A	Age							< 0.001
	Median (Q1-Q3)	28 (22 - 37)	25(22 - 32)	25(22 - 33)				
A1	18 - <30	293	59.4	1,369	71.8	1,662	69.3	
A2	30 - <45	117	23.7	394	20.7	511	21.3	
A3	45 - <60	61	12.4	112	5.9	173	7.2	
A4	>60	22	4.5	31	1.6	53	2.2	
G	Gender							< 0.001
G1	Male	151	30.6	674	35.4	825	34.4	
G2	Female	342	69.4	1,232	64.6	1,574	65.6	
MS	Marital status							< 0.001
MS1	Single/widowed/divorced	294	59.6	1,419	74.4	1,713	71.4	
MS2	Married	199	40.4	487	25.6	686	28.6	
OC	Occupation							< 0.001
OC1	Farmer/Worker	62	12.6	113	5.9	175	7.3	
OC2	Civil servant/Officer	110	22.3	371	19.5	481	20.1	
OC3	Housewife	49	9.9	182	9.5	231	9.6	
OC4	University student	215	43.6	973	51.0	1188	49.5	
OC5	Others(a)	57	11.6	267	14.0	324	13.5	
EL	Education level							< 0.001
EL1	Primary school or lower	24	4.9	13	0.7	37	1.5	
EL2	Secondary school	35	7.1	50	2.6	85	3.5	
EL3	High school	194	39.4	881	46.2	1075	44.8	
EL4	College	128	26.0	362	19.0	490	20.4	
EL5	University or higher	112	22.7	600	31.5	712	29.7	
MI	Monthly income (USD)							< 0.001
MI1	<215	238	48.3	798	41.9	1,036	43.2	
MI2	215-<430	143	29.0	520	27.3	663	27.6	
MI3	430-<650	32	6.5	191	10.0	223	9.3	
MI4	?650	14	2.8	140	7.3	154	6.4	
MI5	NA(b)	66	13.4	257	13.5	323	13.5	
PE	History of DF							< 0.001
PE1	Yes	110	22.3	566	29.7	676	28.2	
PE2	No	383	77.7	1,340	70.3	1,723	71.8	
RE	Know someone else who has history of DF						0.160	
RE1	Yes	330	66.9	1211	63.5	1,541	64.2	
RE2	No	163	33.1	695	36.5	858	35.8	
C	Have children under 18					< 0.001		
C1	Yes	137	27.8	364	19.1	501	20.9	
C2	No	356	72.2	1,542	80.9	1,898	79.1	
	Level of Score KAP							
GK	Good knowledge level	162	32.9	731	38.4	893	37.2	< 0.001
GA	Good attitude level	303	61.5	1,067	56.0	1,370	57.1	< 0.001
GP	Good practice level	267	54.2	1,079	56.6	1,346	56.1	< 0.001
	Source of information							
	Television	427	86.6	1,622	85.1	2,049	85.4	0.107
	Internet	303	61.5	1,364	71.6	1,667	69.5	0.396
	Family/Friends	277	56.2	1,129	59.2	1,406	58.6	< 0.001
	Book/Newspaper/ Magazine	263	53.3	1,062	55.7	1,325	55.2	0.221
	Schools	260	52.7	1,035	54.3	1,295	54.0	0.345
	Poster	228	46.2	912	47.8	1,140	47.5	0.535
	Health professionals	256	51.9	825	43.3	1,081	45.1	0.526
	Local announcement	221	44.8	602	31.6	823	34.3	0.001
	Radio	123	24.9	411	21.6	534	22.3	< 0.001
	Others	14	2.8	54	2.8	68	2.8	0.107

Note: (a) Engineer, photographer, doctor, etc. (b) Not available - Respondents did not want to answer.

* All P-values are based on chi-square analysis of numbers in each category. Abbreviations: DF, Dengue fever; Q1, quartile 25% percentile; Q3, quartile 75% percentile.

The mean scores from each section-K, A, and P-were compared between demographic subgroups using Chi-square tests and Fisher exact tests. A binary logistic regression analysis was also performed to calculate crude odds ratios and 95% confidence intervals. The aim of the regression analysis was to identify predictors of the KAP level (good or poor). The good level was assigned if the total score of the section was at least 80% of the maximum score, i.e., K-score of 16-19 points, A-score of 11-13 points, and P-score of 7-8 points. Statistical significance was considered to be a p-value less than 0.05.

Ethical Considerations: This study received approval from the Science Research Committee of the Faculty of Pharmacy at the University of Medicine and Pharmacy in Ho Chi Minh City. Participants were informed of the purpose and related methodology and were asked to sign an informed consent form prior to enrollment, to ensure voluntariness and anonymity. Participants were free to refuse to answer any question and to quit at any time during the interview.

Results

Table-1 shows the characteristics of participants; from the

Table-2: Scores and binary logistic regression analysis related to knowledge levels (good vs. poor) [N = 2,399].

		Urban (n= 493)		
Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0	0.056
A2	14.7 (2.6)	15.0 (13.0 - 17.0)	1.3 (1.0 - 1.6)	0.025
A3	14.0 (2.5)	14.0 (12.0 - 16.0)	0.8 (0.5 - 1.2)	0.196
A4	14.1 (2.2)	15.0 (12.5 - 16.0)	1.1 (0.5 - 2.2)	0.882
G				
G1	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0	0.301
G2	14.5 (2.5)	15.0 (13.0 - 16.0)	1.1 (0.9 - 1.3)	
MS				
MS1	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0	0.435
MS2	14.4 (2.6)	15.0 (13.0 - 16.0)	0.9 (0.7 - 1.1)	
OC				
OC1	14.0 (2.8)	14.0 (12.0 - 16.0)	1.0	0.358
OC2	14.4 (2.6)	15.0 (13.0 - 16.0)	1.2 (0.8 - 1.9)	0.322
OC3	14.5 (2.4)	15.0 (13.0 - 16.0)	1.0 (0.6 - 1.7)	0.852
OC4	14.5 (2.5)	15.0 (13.0 - 16.0)	1.1 (0.7 - 1.7)	0.596
OC5	14.3 (2.6)	15.0 (12.0 - 16.0)	0.9 (0.6 - 1.4)	0.629
EL				
EL1	13.1 (2.9)	13.0 (11.0 - 15.0)	1.0	<0.001
EL2	12.8 (2.5)	13.0 (11.0 - 15.0)	0.9 (0.2 - 4.0)	0.934
EI3	14.4 (2.4)	15.0 (13.0 - 16.0)	1.8 (0.5 - 6.5)	0.382
EI4	14.7 (2.5)	15.0 (13.0 - 16.0)	2.8 (0.7 - 10.2)	0.128
EI5	14.5 (2.6)	15.0 (13.0 - 16.0)	2.3 (0.6 - 8.5)	0.205
MI				
MI1	14.5 (2.5)	15.0 (13.0 - 16.0)	1.0	0.058
MI2	14.4 (2.5)	15.0 (13.0 - 16.0)	0.9 (0.8 - 1.2)	0.617
MI3	14.0 (2.6)	14.0 (12.0 - 16.0)	0.8 (0.6 - 1.1)	0.190
MI4	14.9 (2.3)	15.0 (13.0 - 17.0)	1.5 (1.0 - 2.1)	0.030
MI5	14.5 (2.6)	15.0 (13.0 - 16.0)	1.1 (0.9 - 1.5)	0.368
PE				
PE1	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0	0.040
PE2	14.6 (2.6)	15.0 (13.0 - 16.0)	1.2 (1 - 1.5)	
RE				
RE1	14.3 (2.5)	15.0 (13.0 - 16.0)	1.0	0.070
RE2	14.5 (2.5)	15.0 (13.0 - 16.0)	1.2 (1 - 1.5)	
C				
C1	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0	0.376
C2	14.5 (2.6)	15.0 (13.0 - 16.0)	1.1 (0.9 - 1.4)	

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Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
		Rural (n= 1,906)		
A				
A1	14.2 (2.6)	15.0 (12.0 - 16.0)	1	0.581
A2	14.1 (2.5)	14.0 (13.0 - 16.0)	0.8 (0.5 - 1.3)	0.305
A3	14.3 (2.6)	15.0 (13.0 - 16.0)	1.2 (0.7 - 2.1)	0.524
A4	13.9 (2.6)	14.0 (13.0 - 16.0)	1.1 (0.5 - 2.8)	0.78
G				
G1	14.3 (2.6)	15.0 (12.0 - 16.0)	1	0.482
G2	14.1 (2.5)	15.0 (13.0 - 16.0)	0.9 (0.6 - 1.3)	
MS				
MS1	14.4 (2.6)	15.0 (13.0 - 16.0)	1	0.003
MS2	13.8 (2.4)	14.0 (12.0 - 15.5)	0.5 (0.4 - 0.8)	
OC				
OC1	12.9 (2.2)	13.0 (11.0 - 14.0)	1	0.004
OC2	14.3 (2.3)	15.0 (13.0 - 16.0)	4.0 (1.7 - 9.3)	0.001
OC3	13.7 (2.9)	14.0 (11.0 - 16.0)	3.0 (1.1 - 7.8)	0.026
OC4	14.7 (2.5)	15.0 (13.0 - 16.0)	4.2 (1.9 - 9.4)	0
OC5	13.7 (2.6)	13.0 (12.0 - 16.0)	2.4 (0.9 - 6.2)	0.069
EL				
EL1	13.1 (2.3)	13.0 (12.0 - 14.0)	1	0.128
EL2	13.1 (3.0)	13.0 (10.5 - 15.0)	2.1 (0.5 - 8.8)	0.322
EI3	14.1 (2.7)	14.5 (12.0 - 16.0)	3.6 (1.0 - 12.5)	0.043
EI4	14.5 (2.4)	15.0 (13.0 - 16.0)	3.4 (1.0 - 12.1)	0.057
EI5	14.4 (2.3)	15.0 (13.0 - 16.0)	4.4 (1.2 - 15.5)	0.023
MI				
MI1	14.1 (2.6)	14.0 (12.0 - 16.0)	1	0.18
MI2	14.3 (2.6)	15.0 (12.5 - 16.0)	1.4 (0.9 - 2.1)	0.142
MI3	13.7 (2.3)	14.0 (12.8 - 15.0)	0.5 (0.2 - 1.3)	0.157
MI4	13.9 (2.4)	14.0 (13.0 - 15.0)	0.6 (0.2 - 2.2)	0.45
MI5	14.5 (2.4)	15.0 (13.0 - 16.0)	1.3 (0.7 - 2.2)	0.418
PE				
PE1	14.1 (2.5)	14.0 (12.0 - 16.0)	1	0.844
PE2	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0 (0.7 - 1.6)	
RE				
RE1	13.7 (2.4)	13.0 (12.0 - 16.0)	1	0.019
RE2	14.4 (2.6)	15.0 (13.0 - 16.0)	1.6 (1.1 - 2.5)	
C			1	
C1	14.3 (2.6)	15.0 (13.0 - 16.0)		0.007
C2	13.8 (2.4)	14.0 (12.0 - 15.0)	0.5 (0.3 - 0.8)	

Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
		Total (N=2,399)		
A				
A1	14.4 (2.5)	15.0 (13.0 - 16.0)	1	0.386
A2	14.5 (2.6)	15.0 (13.0 - 16.0)	1.2 (0.9 - 1.4)	0.163
A3	14.1 (2.5)	15.0 (12.0 - 16.0)	0.9 (0.6 - 1.2)	0.409
A4	14.0 (2.4)	14.0 (13.0 - 16.0)	1.0 (0.6 - 1.8)	0.878
G				
G1	14.4 (2.5)	15.0 (13.0 - 16.0)	1	0.588
G2	14.4 (2.5)	15.0 (13.0 - 16.0)	0.9 (0.8 - 1.1)	
MS				
MS1	14.4 (2.5)	15.0 (13.0 - 16.0)	1	0.289
MS2	14.2 (2.5)	15.0 (13.0 - 16.0)	0.9 (0.8 - 1.1)	
OC				
OC1	13.6 (2.7)	14.0 (11.0 - 16.0)	1	0.01

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OC2	14.4 (2.5)	15.0 (13.0 - 16.0)	1.8 (1.2 - 2.6)	0.003
OC3	14.3 (2.5)	15.0 (13.0 - 16.0)	1.4 (0.9 - 2.2)	0.092
OC4	14.6 (2.5)	15.0 (13.0 - 16.0)	1.6 (1.1 - 2.3)	0.006
OC5	14.2 (2.6)	14.0 (12.0 - 16.0)	1.2 (0.8 - 1.8)	0.309
EL				
EL1	13.1 (2.5)	13.0 (11.0 - 14.0)	1	<0.001
EL2	12.9 (2.7)	13.0 (11.0 - 15.0)	1.5 (0.5 - 4.1)	0.442
EI3	14.3 (2.5)	15.0 (13.0 - 16.0)	2.7 (1.1 - 6.6)	0.025
EI4	14.7 (2.4)	15.0 (13.0 - 16.0)	3.7 (1.5 - 9.1)	0.004
EI5	14.5 (2.5)	15.0 (13.0 - 16.0)	3.5 (1.5 - 8.6)	0.005
MI				
MI1	14.4 (2.5)	15.0 (13.0 - 16.0)	1	0.046
MI2	14.4 (2.5)	15.0 (13.0 - 16.0)	1.0 (0.8 - 1.3)	0.797
MI3	14.0 (2.6)	14.0 (12.0 - 16.0)	0.8 (0.6 - 1.1)	0.117
MI4	14.8 (2.3)	15.0 (13.0 - 16.8)	1.5 (1.0 - 2.0)	0.033
MI5	14.5 (2.5)	15.0 (13.0 - 16.0)	1.2 (0.9 - 1.5)	0.223
PE				
PE1	14.3 (2.5)	15.0 (13.0 - 16.0)	1	0.036
PE2	14.6 (2.6)	15.0 (13.0 - 16.0)	1.2 (1.0 - 1.5)	
RE				
RE1	14.2 (2.5)	14.0 (12.3 - 16.0)	1	0.01
RE2	14.5 (2.5)	15.0 (13.0 - 16.0)	1.3 (1.1 - 1.5)	
C				
C1	14.4 (2.5)	15.0 (13.0 - 16.0)	1	0.436
C2	14.3 (2.6)	15.0 (12.0 - 16.0)	0.9 (0.8 - 1.1)	

Table-3: Scores and binary logistic regression analysis related to attitude levels (good vs. poor) [N = 2,399].

		Urban (n= 493)		
Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0	<0.001
A2	10.7 (1.2)	11.0 (10.0 - 12.0)	1.5 (1.2 - 1.9)	<0.001
A3	10.7 (1.2)	11.0 (10.0 - 12.0)	1.2 (0.8 - 1.7)	0.428
A4	10.9 (1.3)	11.0 (11.0 - 12.0)	3 (1.3 - 7)	0.011
G				
G1	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0	0.025
G2	10.6 (1.2)	11.0 (10.0 - 12.0)	1.2 (1 - 1.5)	
MS				
MS1	10.5 (1.2)	11.0 (10.0 - 12.0)	1.0	0.078
MS2	10.6 (1.3)	11.0 (10.0 - 12.0)	1.2 (1 - 1.5)	
OC				
OC1	11.0 (1.2)	11.0 (10.0 - 12.0)	1.0	0.027
OC2	10.6 (1.3)	11.0 (10.0 - 12.0)	0.7 (0.5 - 1.2)	0.195
OC3	10.5 (1.3)	11.0 (9.0 - 12.0)	0.6 (0.4 - 0.9)	0.027
OC4	10.5 (1.3)	11.0 (10.0 - 11.0)	0.6 (0.4 - 0.9)	0.009
OC5	10.6 (1.2)	11.0 (10.0 - 12.0)	0.7 (0.4 - 1.1)	0.148
EL				
EL1	10.3 (0.9)	11.0 (10.0 - 12.0)	1	0.002
EL2	10.8 (1.3)	11.0 (10.0 - 12.0)	1.3 (0.9 - 1.6)	0.054
EI3	10.4 (1.3)	11.0 (10.0 - 11.0)	1.1 (0.6 - 2.0)	0.021
EI4	10.8 (1.2)	11.0 (10.0 - 12.0)	1.4 (0.8 - 1.6)	0.056
EI5	10.5 (1.3)	11.0 (10.0 - 12.0)	1.1 (0.9 - 1.6)	0.036
MI				
MI1	10.5 (1.2)	11.0 (10.0 - 11.0)	1.0	0.267
MI2	10.6 (1.3)	11.0 (10.0 - 12.0)	1.3 (1 - 1.6)	0.038

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MI3	10.5 (1.3)	11.0 (9.0 - 12.0)	1 (0.7 - 1.4)	0.883
MI4	10.5 (1.2)	11.0 (10.0 - 11.3)	1 (0.7 - 1.4)	0.858
MI5	10.6 (1.2)	11.0 (10.0 - 12.0)	1 (0.8 - 1.3)	0.980
PE				
PE1	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0	0.432
PE2	10.6 (1.2)	11.0 (10.0 - 12.0)	1.1 (0.9 - 1.3)	
RE				
RE1	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0	0.630
RE2	10.6 (1.3)	11.0 (10.0 - 12.0)	1.0 (0.9 - 1.3)	
C				
C1	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0	0.017
C2	10.7 (1.3)	11.0 (10.0 - 12.0)	1.3 (1.1 - 1.7)	

		Rural (n= 1906)		
Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	10.6 (1.2)	11.0 (10.0 - 12.0)	1	0.026
A2	10.9 (1.2)	11.0 (10.0 - 12.0)	1.8 (1.1 - 2.9)	0.011
A3	11.0 (1.2)	11.0 (10.0 - 12.0)	1.4 (0.8 - 2.4)	0.274
A4	10.9 (1.3)	11.0 (11.0 - 12.0)	2.6 (0.9 - 7.3)	0.063
G				
G1	10.8 (1.2)	11.0 (10.0 - 12.0)	1	0.149
G2	10.7 (1.2)	11.0 (10.0 - 12.0)	0.7 (0.5 - 1.1)	
MS				
MS1	10.6 (1.2)	11.0 (10.0 - 12.0)	1	0.044
MS2	10.9 (1.2)	11.0 (10.0 - 12.0)	1.5 (1 - 2.1)	
OC				
OC1	10.7 (1.4)	11.0 (9.0 - 12.0)	1	0.424
OC2	10.7 (1.1)	11.0 (10.0 - 12.0)	1.1 (0.6 - 2)	0.829
OC3	10.7 (1.3)	11.0 (10.0 - 12.0)	0.7 (0.3 - 1.6)	0.406
OC4	10.6 (1.2)	11.0 (10.0 - 12.0)	0.8 (0.5 - 1.5)	0.544
OC5	11.1 (1.2)	12.0 (10.0 - 12.0)	1.4 (0.6 - 3)	0.402
EL				
EL1	10.4 (0.8)	11.0 (10.0 - 11.0)	1	0.016
EL2	10.9 (1.5)	12.0 (10.0 - 12.0)	1.5 (1.0 – 2.0)	0.009
EI3	10.6 (1.2)	11.0 (10.0 - 12.0)	1.1 (0.6 - 2.8)	0.533
EI4	10.8 (1.2)	11.0 (10.0 - 12.0)	1.3 (0.5 - 1.3)	0.379
EI5	10.7 (1.2)	11.0 (10.0 - 12.0)	1.3 (0.8 - 2.2)	0.291
MI				
MI1	10.7 (1.2)	11.0 (10.0 - 12.0)	1	0.912
MI2	10.7 (1.2)	11.0 (10.0 - 12.0)	1.1 (0.7 - 1.6)	0.819
MI3	10.8 (1.4)	11.0 (10.0 - 12.0)	0.9 (0.4 - 1.9)	0.794
MI4	10.4 (1.3)	10.5 (9.3 - 11.8)	0.6 (0.2 - 1.8)	0.384
MI5	10.7 (1.3)	11.0 (10.0 - 12.0)	1 (0.5 - 1.7)	0.864
PE				
PE1	10.7 (1.2)	11.0 (10.0 - 12.0)	1	0.562
PE2	10.7 (1.2)	11.0 (10.0 - 12.0)	0.9 (0.6 - 1.4)	
RE				
RE1	10.8 (1.2)	11.0 (10.0 - 12.0)	1	0.125
RE2	10.6 (1.2)	11.0 (10.0 - 12.0)	0.7 (0.5 - 1.1)	
C				
C1	10.7 (1.2)	11.0 (10.0 - 12.0)	1	0.322
C2	10.8 (1.2)	11.0 (10.0 - 12.0)	1.2 (0.8 - 1.9)	

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Variable	Total (N=2,399) Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	10.5 (1.3)	11.0 (10.0 - 12.0)	1	<0.001
A2	10.8 (1.2)	11.0 (10.0 - 12.0)	1.6 (1.3 – 2.0)	<0.001
A3	10.8 (1.2)	11.0 (10.0 - 12.0)	1.3 (0.9 - 1.7)	0.149
A4	10.9 (1.3)	11.0 (11.0 - 12.0)	2.9 (1.5 - 5.6)	0.001
G				
G1	10.5 (1.3)	11.0 (10.0 - 12.0)	1	0.137
G2	10.6 (1.2)	11.0 (10.0 - 12.0)	1.3 (1.1 - 1.5)	
MS				
MS1	10.5 (1.2)	11.0 (10.0 - 12.0)	1	0.006
MS2	10.7 (1.3)	11.0 (10.0 - 12.0)	1.3 (1.1 - 1.5)	
OC				
OC1	10.9 (1.3)	11.0 (10.0 - 12.0)	1	0.008
OC2	10.6 (1.2)	11.0 (10.0 - 12.0)	0.8 (0.6 - 1.2)	0.301
OC3	10.5 (1.3)	11.0 (9.0 - 12.0)	0.6 (0.4 - 0.9)	0.021
OC4	10.5 (1.2)	11.0 (10.0 - 12.0)	0.6 (0.5 - 0.9)	0.007
OC5	10.7 (1.2)	11.0 (10.0 - 12.0)	0.8 (0.6 - 1.2)	0.307
EL				
EL1	10.3 (0.8)	11.0 (10.0 - 11.0)	1	0.009
EL2	10.8 (1.4)	11.0 (10.0 - 12.0)	1.3 (0.5 - 1.7)	0.35
EI3	10.4 (1.3)	11.0 (10.0 - 11.0)	1.1 (0.6 - 1.6)	0.414
EI4	10.8 (1.2)	11.0 (10.0 - 12.0)	1.5 (1.2 – 1.8)	0.026
EI5	10.6 (1.2)	11.0 (10.0 - 12.0)	1.3 (1.0 - 1.6)	0.064
MI				
MI1	10.5 (1.2)	11.0 (10.0 - 12.0)	1	0.241
MI2	10.7 (1.3)	11.0 (10.0 - 12.0)	1.2 (1.0 - 1.5)	0.056
MI3	10.5 (1.3)	11.0 (10.0 - 12.0)	1.0 (0.7 - 1.3)	0.897
MI4	10.5 (1.2)	11.0 (10.0 - 11.8)	0.9 (0.6 - 1.3)	0.509
MI5	10.6 (1.3)	11.0 (10.0 - 12.0)	1.0 (0.8 - 1.3)	0.911
PE				
PE1	10.6 (1.2)	11.0 (10.0 - 12.0)	1	0.585
PE2	10.6 (1.2)	11.0 (10.0 - 12.0)	1.1 (0.9 - 1.3)	
RE				
RE1	10.6 (1.2)	11.0 (10.0 - 12.0)	1	0.93
RE2	10.6 (1.3)	11.0 (10.0 - 12.0)	1.0 (0.8 - 1.1)	
C				
C1	10.5 (1.2)	11.0 (10.0 - 12.0)	1	0.009
C2	10.7 (1.2)	11.0 (10.0 - 12.0)	1.3 (1.1 - 1.6)	

total of 2,399 participants, 493 rural participants and 493 urban participants were needed. Most study participants were youngerthan 30 yearsage(69.3%) and unmarried (71.4%). The majority (71.8%) of participants had no personal experience of DF (71.8%) (Table-1, Figure-1).

Figure-1 summarizes the participants' resources for information on DF, with the two most common sources being television (85.4%) and the internet (69.5%). The proportion of internet-based information was statistically different between rural and urban areas ($p<0.05$) (Table-2).

Table-2 presents scores for knowledge of symptoms and preventions for DF, analyzed using binary logistic regression to identify factors that affect knowledge. The study found that 37.3% of participants had good knowledge levels, with occupation, education, personal experience of DF, and knowing people who have had DF being significantly associated with knowledge (Table-3).

Table-3 shows average scores for attitudes toward DF in urban areas, rural areas, and overall, and factors that affected those scores. Of the 2,399 participants, more than half had good attitude levels, which was more than those with good knowledge levels (Table-4).

Table-4 shows scores and logistic regression analysis of good practice levels. Participants who were married or had children were 1.5 to 2.0 times more likely to have

Table-4: Scores and binary logistic regression analysis related to practice levels (good vs. poor) [N = 2,399].

Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
		Urban (n= 493)		
A				
A1	6.6 (1.6)	7.0 (5.0 - 8.0)	1	<0.001
A2	6.2 (1.7)	6.0 (5.0 - 8.0)	1.5 (1.2 - 1.9)	<0.001
A3	5.9 (1.7)	6.0 (4.0 - 7.3)	1.2 (0.8 - 1.7)	0.428
A4	5.8 (1.8)	6.0 (4.5 - 7.5)	3 (1.3 - 7)	0.011
G				
G1	6.3 (1.7)	7.0 (5.0 - 8.0)	1	0.025
G2	6.5 (1.6)	7.0 (5.0 - 8.0)	1.2 (1 - 1.5)	
MS				
MS1	6.5 (1.6)	7.0 (5.0 - 8.0)	1	0.078
MS2	6.1 (1.7)	6.0 (5.0 - 8.0)	1.2 (1 - 1.5)	
OC				
OC1	6.0 (1.7)	6.0 (5.0 - 8.0)	1	0.027
OC2	6.3 (1.8)	7.0 (5.0 - 8.0)	0.7 (0.5 - 1.2)	0.195
OC3	6.5 (1.6)	7.0 (5.0 - 8.0)	0.6 (0.4 - 0.9)	0.027
OC4	6.6 (1.6)	7.0 (6.0 - 8.0)	0.6 (0.4 - 0.9)	0.009
OC5	6.1 (1.7)	6.0 (5.0 - 8.0)	0.7 (0.4 - 1.1)	0.148
EL				
EL1	5.9 (1.7)	6.0 (5.0 - 8.0)	1	0.002
EL2	5.8 (1.7)	6.0 (5.0 - 7.0)	1.6 (0.4 – 6.0)	0.463
EI3	6.5 (1.7)	7.0 (5.0 - 8.0)	3.1 (0.9 - 10.2)	0.061
EI4	6.5 (1.6)	7.0 (5.0 - 8.0)	3.1 (1.0 - 10.4)	0.061
EI5	6.3 (1.7)	7.0 (5.0 - 8.0)	2.8 (0.8 - 9.2)	0.091
MI				
MI1	6.5 (1.6)	7.0 (5.0 - 8.0)	1	0.267
MI2	6.3 (1.7)	7.0 (5.0 - 8.0)	1.3 (1.0 - 1.6)	0.038
MI3	6.2 (1.8)	6.0 (5.0 - 8.0)	1.0 (0.7 - 1.4)	0.883
MI4	6.4 (1.7)	7.0 (5.0 - 8.0)	1.0 (0.7 - 1.4)	0.858
MI5	6.6 (1.6)	7.0 (6.0 - 8.0)	1.0 (0.8 - 1.3)	0.98
PE				
PE1	6.4 (1.7)	7.0 (5.0 - 8.0)	1	0.432
PE2	6.5 (1.6)	7.0 (5.0 - 8.0)	1.1 (0.9 - 1.3)	
RE				
RE1	6.4 (1.7)	7.0 (5.0 - 8.0)	1	0.561
RE2	6.4 (1.6)	7.0 (5.0 - 8.0)	1 (0.9 - 1.3)	
C				
C1	6.5 (1.6)	7.0 (5.0 - 8.0)	1	0.017
C2	6.2 (1.7)	6.0 (5.0 - 8.0)	1.3 (1.1 - 1.7)	
		Rural (n= 1,906)		
Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	6.6 (1.6)	7.0 (6.0 - 8.0)	1	0.007
A2	6.2 (1.6)	6.0 (5.0 - 8.0)	0.6 (0.4 - 0.9)	0.014
A3	6.1 (1.7)	6.0 (5.0 - 8.0)	0.5 (0.3 - 0.9)	0.022
A4	5.6 (1.6)	6.0 (4.3 - 7.0)	0.4 (0.2 - 0.9)	0.032
G				
G1	6.3 (1.6)	7.0 (5.0 - 8.0)	1	0.459
G2	6.4 (1.6)	7.0 (5.0 - 8.0)	1.2 (0.8 - 1.7)	
MS				
MS1	6.6 (1.5)	7.0 (6.0 - 8.0)	1	<0.001
MS2	6.0 (1.7)	6.0 (5.0 - 7.5)	0.5 (0.3 - 0.7)	

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OC				
OC1	5.8 (1.7)	6.0 (4.3 - 7.0)	1	<0.001
OC2	6.5 (1.5)	7.0 (6.0 - 8.0)	2.0 (1.0 - 3.7)	0.038
OC3	5.9 (1.8)	6.0 (4.0 - 7.0)	1.4 (0.6 - 3.0)	0.406
OC4	6.8 (1.4)	7.0 (6.0 - 8.0)	3.5 (1.9 - 6.3)	0
OC5	5.6 (1.6)	6.0 (4.0 - 7.0)	0.8 (0.4 - 1.7)	0.527
EL				
EL1	5.8 (1.5)	6.0 (4.8 - 7.0)	1	0.123
EL2	5.9 (2.0)	6.0 (4.0 - 8.0)	2.3 (0.8 - 6.9)	0.14
EI3	6.5 (1.6)	7.0 (5.0 - 8.0)	3.3 (1.3 - 8.4)	0.011
EI4	6.6 (1.4)	7.0 (6.0 - 8.0)	3.1 (1.2 – 8.0)	0.018
EI5	6.3 (1.7)	7.0 (5.0 - 8.0)	2.7 (1.0 – 7.0)	0.041
MI				
MI1	6.5 (1.6)	7.0 (6.0 - 8.0)	1	0.143
MI2	6.2 (1.7)	6.0 (5.0 - 8.0)	0.7 (0.5 - 1.0)	0.078
MI3	6.2 (1.5)	6.0 (5.0 - 8.0)	0.6 (0.3 - 1.2)	0.143
MI4	5.8 (1.6)	5.5 (5.0 - 7.0)	0.6 (0.2 - 1.6)	0.286
MI5	6.6 (1.6)	7.0 (6.0 - 8.0)	1.2 (0.7 - 2.1)	0.506
PE				
PE1	6.3 (1.6)	7.0 (5.0 - 8.0)	1	0.024
PE2	6.6 (1.5)	7.0 (6.0 - 8.0)	1.7 (1.1 - 2.6)	
RE				
RE1	6.2 (1.6)	6.0 (5.0 - 8.0)	1	0.162
RE2	6.5 (1.6)	7.0 (5.0 - 8.0)	1.3 (0.9 - 1.9)	
C				
C1	6.5 (1.5)	7.0 (6.0 - 8.0)	1	0.001
C2	6 (1.7)	6.0 (5.0 - 8.0)	0.5 (0.3 - 0.7)	

		Total (N=2,399)		
Variable	Mean (SD)	Median (25-75)	OR (95%CI)	P-value
A				
A1	6.6 (1.6)	7.0 (6.0 - 8.0)	1	<0.001
A2	6.2 (1.7)	6.0 (5.0 - 8.0)	0.6 (0.5 - 0.8)	<0.001
A3	5.9 (1.7)	6.0 (5.0 - 8.0)	0.5 (0.3 - 0.6)	<0.001
A4	5.7 (1.7)	6.0 (4.0 - 7.0)	0.4 (0.2 - 0.7)	0.001
G				
G1	6.3 (1.7)	7.0 (5.0 - 8.0)	1	0.003
G2	6.5 (1.6)	7.0 (5.0 - 8.0)	1.3 (1.1 - 1.4)	
MS				
MS1	6.5 (1.6)	7.0 (6.0 - 8.0)	1	<0.001
MS2	6.1 (1.7)	6.0 (5.0 - 8.0)	0.6 (0.5 – 0.7)	
OC				
OC1	5.9 (1.7)	6.0 (4.5 - 8.0)	1	<0.001
OC2	6.3 (1.7)	7.0 (5.0 - 8.0)	1.6 (1.2 - 2.1)	0.002
OC3	6.4 (1.6)	7.0 (5.0 - 8.0)	1.7 (1.2 - 2.4)	0.002
OC4	6.6 (1.6)	7.0 (6.0 - 8.0)	2.2 (1.7 - 2.8)	<0.001
OC5	6.0 (1.7)	6.0 (5.0 - 8.0)	1.0 (0.7 - 1.5)	0.894
EL				
EL1	5.8 (1.5)	6.0 (5.0 - 7.0)	1	0.003
EL2	5.9 (1.8)	6.0 (5.0 - 8.0)	1.9 (0.8 - 4.4)	0.124
EI3	6.5 (1.7)	7.0 (5.0 - 8.0)	3.3 (1.6 - 6.7)	0.001
EI4	6.5 (1.5)	7.0 (6.0 - 8.0)	3.2 (1.6 - 6.7)	0.002
EI5	6.3 (1.7)	7.0 (5.0 - 8.0)	2.9 (1.4 - 5.9)	0.004
MI				
MI1	6.5 (1.6)	7.0 (5.0 - 8.0)	1	0.001
MI2	6.2 (1.7)	7.0 (5.0 - 8.0)	0.7 (0.6 - 0.9)	0.002
MI3	6.2 (1.7)	6.0 (5.0 - 8.0)	0.6 (0.5 - 0.9)	0.002

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MI4	6.4 (1.7)	7.0 (5.0 - 8.0)	0.9 (0.6 - 1.3)	0.529
MI5	6.6 (1.6)	7.0 (6.0 - 8.0)	1.1 (0.8 - 1.4)	0.56
PE				
PE1	6.4 (1.7)	7.0 (5.0 - 8.0)	1	0.001
PE2	6.6 (1.6)	7.0 (5.0 - 8.0)	1.4 (1.1 - 1.7)	
RE				
RE1	6.4 (1.7)	7.0 (5.0 - 8.0)	1	0.837
RE2	6.4 (1.6)	7.0 (5.0 - 8.0)	1.0 (0.9 - 1.2)	
C				
C1	6.5 (1.6)	7.0 (5.0 - 8.0)	1	0.001
C2	6.1 (1.7)	6.0 (5.0 - 8.0)	0.4 (0.3 - 0.8)	

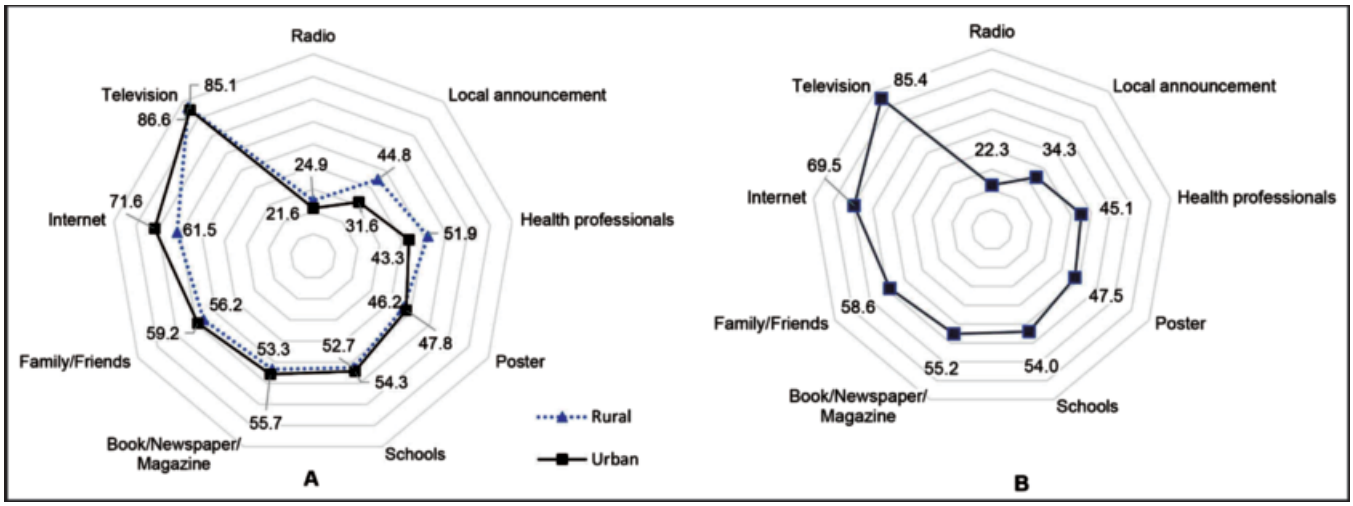

Figure-1: Resources for information on DF.

Table-5: Correlations between knowledge, attitude, and practice scores.

Spearman's rho		Urban			Rural		
		GK	GA	GP	GK	GA	GP
Urban	GK	1.000	0.189**	0.507**	0.013	-0.047	0.019
	GA	0.189**	1.000	0.145**	-0.016	0.062	-0.047
	GP	0.507**	0.145**	1.000	0.011	-0.057	0.048
Rural	GK	0.013	-0.016	0.011	1.000	0.201**	0.484**
	GA	-0.047	0.062	-0.057	0.201**	1.000	0.122**
	GP	0.019	-0.047	0.048	0.484**	0.122**	1.000

(**) P - Value <0.001.

good practice levels than unmarried people without children (Table-4).

Spearman correlations showed a positive relationship between good knowledge and good practices in both rural (rs=.484, p<.001) and urban areas (rs=.507, p<.001) (Table-5), while the correlation with good attitudes was much weaker.

Discussion

In general, southern Vietnamese residents appeared to lack knowledge of DF symptoms, especially joint pain and bone pain, with 71.9% and 86.1% incorrect answers, respectively, to these questions. This finding was consistent with other studies in Nepal, Jamaica, Thailand, India, and Pakistan.[7,9,10,12] The gap in knowledge may be explained by three factors: the low proportion of individuals who have a history of dengue (28.2%); the similarity of DF symptoms with common causes of fever, such as influenza and typhoid, which are easily confused and so ignored;[21] and the relatively little official information provided

by schools (54%).

The relationship between school-supplied information and good knowledge can be seen in studies in Nepal[7] and Jamaica,[9] and in the current study. The higher the percentage of respondents who were informed by schools, the higher the K-score obtained. Similar results from univariate logistic regression analysis in a study in Indonesia indicated that good knowledge was associated with education level, that those who obtained a higher level of education had better knowledge of DF[8] Surprisingly, there was a significant difference in mean K-score between rural and urban groups (p=0.025), with people living in rural areas having better knowledge than those in urban areas, despite the opposite being the case for A-scores.

In comparison with previous studies, the percentage of good A-scores in Vietnam (56.7%) was higher than in Indonesia (37%),[8] but lower than in Nepal (83%).[7] However, the proportion of participants who obtained good P-scores was 56.1%, higher than in Nepal, Indonesia, Jamaica, and Thailand.[7-10] The better DF-prevention practices in Vietnam might be due to community-oriented policies.[22] Though not excelling in medical treatment, the Vietnamese government has focused on improving awareness of DF prevention with the motto "An ounce of prevention is worth a pound of cure." The positive effects of training strategies toward DF attitudes and self-practice was demonstrated by the results of the logistic regression. Individuals with good K-scores had 1.7 times higher than A-scores and 5.0 times higher than P-scores. The comparable figures from Indonesia were 2.7 times for A-scores and 2.2 times for P-scores. The growth of education and training and the dissemination of DF information appears to have led to better attitudes and practices.

Television, as expected, was the most common source of DF information, which is consistent with studies from Jamaica,[9] Laos,[23] Philippines,[24] Indonesia,[8] and Nepal.[7,25] Encouragingly, the internet was the second most common information source. The provision of information by healthcare professionals was higher than in Nepal (half vs. a third),[7] but needs to improve in the future. The explosion of multimedia and digital materials in Vietnam in the last few years has created more avenues for disseminating information. Governments should consider television channels and web pages as essential means of education for raising public awareness about DF, while also increasing connections between patients and healthcare professionals.

This study has some limitations. Firstly, the study sample was slightly skewed toward younger participants, who have more opportunities to access information than older people, leading to better knowledge and practice, but lower A-scores due to lack of experience of dengue. Secondly, desirability bias might be a factor in attitude responses, which was identified as an issue in studies in Indonesia and Nepal.[7,8] This bias exists when participants give socially preferred answers to questions that do not reflect their real-world behaviors. To minimize this bias, the 5-point Likert scale was used instead of dichotomous-choice questions. Thirdly, socioeconomic status was not assessed in this study due to time constraints, although it was found in the study in Indonesia that this factor had a strong association with knowledge, attitudes, and practices.[8]

Conclusion

The lack of knowledge regarding dengue indicates a target for future strategies. Education programmes should be designed to improve knowledge, attitudes, and preventive behaviours for DF in the community, prioritizing people's knowledge and coordinating community prevention activities. Such programmes will be important for gaining community support for the application of effective measures to prevent dengue virus infection, improving monitoring and healthcare-seeking behaviours, and better controlling outbreaks. At the same time, the link between individuals and health professionals is essential in national dengue prevention programmes.

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References

1. World Health Organization. Communicable Disease Control, Prevention, and Eradication. Geneva, Switzerland: WHO Press, 2000.
2. World Health Organization. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control. Geneva, Switzerland: WHO Press, 2009; pp 147.
3. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, et al. The global distribution and burden of dengue. Nature 2013;496:504-7.
4. The World Health Organization. Dengue and severe dengue. News release. The WHO's Media Centre. [Online] 2018 [Cited 2018 August 15]. Available from URL: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue
5. Hung TM, Clapham HE, Bettis AA, Cuong HQ, Thwaites GE, Wills

BA, et al. The Estimates of the Health and Economic Burden of Dengue in Vietnam. Trends Parasitol 2018;34:904-918.
6. Cyril S, Smith BJ, Possamai-Inesedy A, Renzaho AM. Exploring the role of community engagement in improving the health of disadvantaged populations: a systematic review. Glob Health Action 2015;8:29842.
7. Dhimal M, Aryal KK, Dhimal ML, Gautam I, Singh SP, Bhusal CL, et al. Knowledge, attitude and practice regarding dengue fever among the healthy population of highland and lowland communities in central Nepal. PLoS One 2014;9:e102028.
8. Harapan H, Rajamoorthy Y, Anwar S, Bustamam A, Radiansyah A, Angraini P, et al. Knowledge, attitude, and practice regarding dengue virus infection among inhabitants of Aceh, Indonesia: a cross-sectional study. BMC Infect Dis 2018;18:96.
9. Shuaib F, Todd D, Campbell-Stennett D, Ehiri J, Jolly PE. Knowledge, attitudes and practices regarding dengue infection in Westmoreland, Jamaica. West Indian Med J 2010;59:139-46.
10. Van Benthem BH, Khantikul N, Panart K, Kessels PJ, Somboon P, Oskam L. Knowledge and use of prevention measures related to dengue in northern Thailand. Trop Med Int Health 2002;7:993-1000.
11. Hairi F, Ong CH, Suhaimi A, Tsung TW, bin Anis Ahmad MA, Sundaraj C, et al. A knowledge, attitude and practices (KAP) study on dengue among selected rural communities in the Kuala Kangsar district. Asia Pac J Public Health 2003;15:37-43.
12. Acharya A, Goswami K, Srinath S, Goswami A. Awareness about dengue syndrome and related preventive practices amongst residents of an urban resettlement colony of south Delhi. J Vector Borne Dis 2005;42:122-7.
13. Beck F, Richard JB, Nguyen-Thanh V, Montagni I, Parizot I, Renahy E. Use of the internet as a health information resource among French young adults: results from a nationally representative survey. J Med Internet Res 2014;16:e128.
14. Patz JA, Reisen WK. Immunology, climate change and vector-borne diseases. Trends Immunol 2001;22:171-2.
15. Hales S, de Wet N, Maindonald J, Woodward A. Potential effect of population and climate changes on global distribution of dengue fever: an empirical model. Lancet 2002;360:830-4.
16. Guzmán MG, Kourí G. Dengue: an update. Lancet Infect Dis 2002;2:33-42.
17. General Statistics Office of Viet Nam. Population and employment Ha Noi, Viet Nam. [Online] 2018 [Cited 2018 April 10]. Available from URL: https://www.gso.gov.vn/default_en.aspx?tabid=774
18. Lwanga SK, Lemeshow S. Sample size determination in health studies: a practical manual. Geneva, Switzerland: WHO Press, 1991; pp 80.
19. Cronbach LJ. Coefficient alpha and the internal structure of tests. psychometrika 1951;16:297-334.
20. Luskin RC, Bullock JG. "Don't know" means "don't know": DK responses and the public's level of political knowledge. J Polit 2011;73:547-557.
21. Sedhain A, Bhattarai G, Adhikari S. PP-246 An outbreak of dengue in central Nepal, 2010. Int J Infect Dis 2011;15:S113.
22. Kumaran E, Doum D, Keo V, Sokha L, Sam B, Chan V, et al. Dengue knowledge, attitudes and practices and their impact on community-based vector control in rural Cambodia. PLoS Negl Trop Dis 2018;12:e0006268.
23. Mayxay M, Cui W, Thammavong S, Khensakhou K, Vongxay V, Inthasoum L, et al. Dengue in peri-urban Pak-Ngum district, Vientiane capital of Laos: a community survey on knowledge, attitudes and practices. BMC Public Health 2013;13:434.
24. Yboa BC, Labrague LJ. Dengue knowledge and preventive practices among rural residents in Samar province, Philippines. Am J Public Health Res 2013;1:47-52.
25. Sharma B, Regmi S, Aryal B, Neupane MS, Lopchan M. Knowledge and attitude of dengue fever among clients from dengue prevalent areas. Int J Pharma Biol Archives. 2012;3:1383-8.