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KNOWLEDGE, ATTITUDES AND PRACTICES RELATED TO DENGUE FEVER: EVIDENCE FROM A VIETNAMESE PROVINCE

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ABSTRACT

Background: *Dengue fever (DF) is an acute infectious disease that easily escalates to epidemic proportions and is transmitted mainly by dengue viruses, which are prevalent in tropical countries, such as Vietnam. This situation indicates that dengue prevention is a challenge for the health sector, but such prevention can be advanced by assessments of a community's knowledge, attitudes and practices in relation to DF.*

Objectives: *This study was aimed at evaluating the DF-related knowledge, attitudes and practices of the Dong Nai community in Vietnam and exploring the relationship between these factors and participant characteristics.*

Methods: *This cross-sectional study was conducted on 388 residents of Dong Nai from June to October 2017.*

Results: *The participants lacked knowledge regarding DF symptoms, such as bone (17.0%), joint (29.1%) and muscle (37.1%) pain, and they obtained DF information primarily from television (77.8%) and the Internet (56%). The results also showed that healthcare professionals provide poor-quality information, thereby leading to confusion as regards dengue symptoms. On the positive side, the participants exhibited good knowledge regarding transmission, which affected the favourable attitudes and practices of the residents. Marital status ($p = 0.018$), educational level ($p = 0.038$), dengue history ($p = 0.017$) and knowledge regarding dengue patients ($p = 0.017$) were significantly correlated. The DF practices implemented by the respondents were those connected to living quarters ($p = 0.009$), occupations ($p = 0.021$), dengue history ($p < 0.001$) and familiarity with the disease ($p < 0.001$).*

Conclusion: *DF-associated knowledge, attitudes and practices should be improved through effective information dissemination.*

Keywords: *Dengue fever, Inhabitant, Knowledge, Attitude, Practice, Vietnam.*

INTRODUCTION

Dengue fever (DF) is an acute, dangerous infectious disease that easily escalates to epidemic proportions and is caused by four types of dengue viruses, which are transmitted mainly by *Aedes aegypti*. Dengue has resulted in more than US$8.9 billion in yearly costs, making this disease a global economic burden.[1] Compounding this problem is the fact that dengue outbreaks have been exacerbated by climate change and global warming.[2] In particular, people living in tropical and subtropical regions are highly susceptible to dengue, and local viral variants may develop because of a number of environmental factors, such as temperature and rainfall, as well as uncontrolled rapid urbanisation and the development of trade and travel across nations. These issues prompted the World Health Organization (WHO) to formulate dengue management guidelines in 1975 and release updated versions in 1997 and 2009.[3] The WHO recommendations classify clinical dengue into dengue fever, dengue haemorrhagic fever and dengue shock syndrome. The latest updated version of the guidelines advises attentiveness to 'warning signs' that may point to 'severe dengue'.[4,5]

According Bhatt et al., about 390 million cases of DF around the world are documented every year.[6] The disease occurs in more than 100 countries, especially in tropical nations, such as Vietnam.[6] This country is the Southeast Asian region with the highest annual incidence rate, having more than 34.3 cases per 1,000 residents.[7] In 1999, the Vietnamese government established the National Dengue Control Program primarily as a means of controlling vector–human transmission[8] as disease risk has increased in recent years to outbreak levels. According to a WHO report, as of December 2017, Vietnam has registered 183,287 DF cases, including 32 deaths.[9] The disease commonly occurs in many southern provinces of the country and is concentrated in urban areas.[10] Currently, no specific treatment for DF has been developed, and no consensus exists as to whether clinical features can be used to distinguish dengue infection from other febrile illnesses[11,12] and whether symptomatic treatment and fluid balance are the core interventions for the disease. In terms of prevention, Vietnamese citizens focus on avoiding water stagnation and using insecticides to treat bed nets.[1,7] Amid these challenges, the important tasks of the Vietnamese health sector are preventing DF and improving people's dengue-related understanding, attitudes and practices.[4,13]

The problem is that the knowledge, attitudes and practices of the Vietnamese as regards the disease and its prevention are rarely examined to clear the way for evaluating the effectiveness of the country's national programme. This deficiency is particularly problematic in Bien Hoa City, Dong Nai Province, which is a densely populated urban area located in the region of Vietnam where DF epidemics are pervasive. In consideration of this situation, this study was conducted to assess the level of understanding, attitudes and practices of Bien Hoa City residents with respect to DF.

METHODS

Study design and subjects

A cross-sectional survey was administered to residents of Bien Hoa City, Dong Nai in Southern Vietnam from May to October 2017. The inclusion criteria were residents older than 18 years, a willingness to participate in the research and the ability to acquire and respond to information.

Sample size

The sample size in this work was determined on the basis of WHO guidelines, which recommend grounding the choice of a minimum size on a 95% confidence interval, 50% with good KAP and a 5% margin of error. The calculation for this research yielded an ideal sample size of 384 participants. To ensure that the required number of respondents was obtained, the survey was administered to over 450 individuals through the direct interview method. Amongst these participants, 388 returned valid survey forms (including votes that met the criteria for interview selection and sufficient information needed to conduct the analysis), which corresponds to a response rate of 86.2%.

Instrument

The questionnaire was designed on the basis of Dhimal et al.'s study, and its reliability was reflected in its Cronbach's alpha value.[14] The instrument used in the current research consists of four sections that altogether encompass 51 items. Section 1 contains 11 items on participant characteristics, namely, age, gender, marital status, place of residence, ethnicity, occupation, education,

monthly income, history of DF, children and source of information about DF. Section 2 is composed of 19 items revolving around knowledge of DF symptoms and prevention. The knowledge of the participants was determined by asking them whether they could identify basic clinical symptoms, ways by which the disease is transmitted and basic preventive therapies. Section 3 comprises 13 items on attitudes about DF, which the respondents were asked to rate on a five-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). The participants were asked to provide responses to questions on their perceptions regarding dengue severity and their general attitudes about the need for prevention. Sections 4 comes with eight items focusing on daily activities for dengue prevention, with the questions answerable by a 'yes' or a 'no'.

Data analysis

A respondent can obtain a maximum of 19 points in the knowledge section of the questionnaire; a correct answer is assigned 1 point, whereas an incorrect or 'undefined' response is given 0. The maximum number of points that can be derived in the attitude section is 13; the Likert scales 1 to 3 receive 0 points, whereas scales 4 and 5 earn 1 point. A maximum of 8 points can be achieved in the practical section of the instrument, with a 'yes' ascribed 1 point. The final score is the sum of the scores in all the sections. Given that the data did not follow the rules of normal distribution, bootstrapping with a resampling of 1000 iterations was conducted to increase the accuracy of the study. Descriptive statistics (frequency, percentage, average) were processed in Microsoft Excel (version 2010), and the data were analysed using the Mann–Whitney U and Kruskal–Wallis H tests, which were run on the Statistical Package for the Social Sciences (version 20.0).

RESULTS

The results showed that 61.9% of the participants were women, with those aged 30 to 45 years old accounting for the highest proportion at 44.8%. Most of the respondents (93.3%) resided in urban areas, whereas only 6.7% lived in rural localities. This difference is due to the population characteristics of Bien Hoa City; the majority of the participants were workers (20.2%) and housewives (18.8%), amongst whom 67.0% have never had DF. The participants obtained information about DF mainly from television, the Internet, family/friends, public address systems, books, newspapers and magazines **(Figure 1)**. Nearly all the participants manifested knowledge of the characteristics of DF and ways of preventing it. Specifically, 87.4% knew that DF is a disease caused by a virus, and 94.8% were aware that using mosquito repellent sprays and lotions helps prevent disease occurrence. The bulk of the respondents (95.1%) agreed with the statement that infants, children and adults can all suffer from dengue **(Table 1)**.

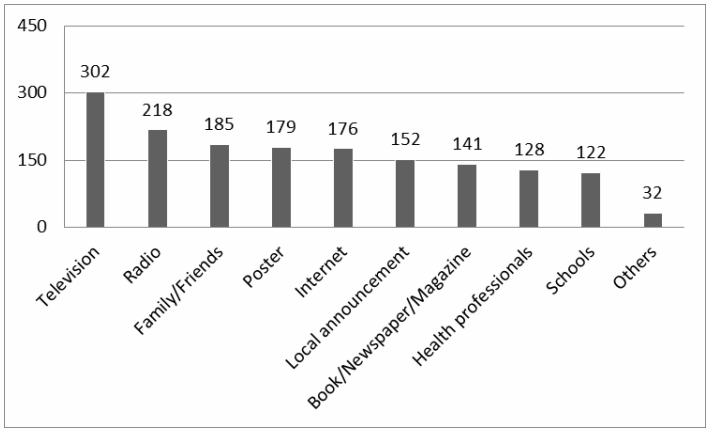

Fig 1: Source of information on DF

Table 1: Demographic characteristics of interviewees

Code	Characteristics	N=388	%
T	**Age**		
T1	18 - <30	154	39. 7
T2	30 - <45	174	44. 8
T3	45 - <60	44	11. 3

T4	≥60	16	4.2
GT	**Gender**		
GT1	Male	148	38.1
GT2	Female	240	61.9
HN	**Marital status**		
HN1	Single/Widowed /Divorced	133	34.3
HN2	Married	255	65.7
KV	**Living area**		
KV1	Urban	362	93.3
KV2	Rural	26	6.7
NN	**Occupation**		
NN1	Farmer	19	4.9
NN2	Chandler	65	16.8
NN3	Entrepreneur	11	2.8
NN4	Worker	78	20.1
NN5	Civil servant	64	16.5
NN6	Housework	73	18.8
NN7	Officer	37	9.5
NN8	Others*	41	10.6
HV	**Education level**		
HV1	Primary or lower	9	2.3
HV1	Secondary school	40	10.3
HV3	High school	76	19.6
HV4	College/Interme diate	101	26.0
HV5	University or higher	162	41.8
TN	**Income (million VND/month)**		
TN1	<5	61	15.7
TN2	5-<10	163	42.0
TN3	10-<15	65	16.8
TN4	≥15	27	7.0
TN5	NA**	72	18.5
BT	**Personally experienced DF**		
BT1	Yes	128	33.0
BT2	No	260	67.0
NK	**Do you know some who had dengue?**		
NK1	Yes	269	69.3
NK2	No	119	30.7
C	**Are you have a child/Children?**		
C1	Yes	216	55.7
C2	No	172	44.3

Note: (*) students, unemployed, engineers ...
(**) No answer

With reference to questions about the symptoms of dengue, the participants provided a low rate of correct answers. For example, 78.1% of them knew that headaches are a symptom of DF, but only 17.0%, 29.1% and 37.1% were aware that bone, joint and muscle pain are also signing of DF, respectively **(Table 2)**. Most of the participants held positive attitudes about DF and DF prevention. Almost all of them (92.0%) deemed DF a serious disease, and 85.8% regarded it as a preventable illness. The views with which 97.4% of the participants concurred were 'everyone can contract DF' and 'when symptoms occur, immediately go to the nearest medical facility' **(Table 3)**.

Table 2: Number of correct answers to the Knowledge section (K) questions about DF

Question code	Question	N=388	%	95% CI*
K1	Is headache a symptom of DF	303	78.1	73.7 - 82.2
K2	Is joint pain a symptom of DF	113	29.1	24.5 - 33.8
K3	Is muscle pain a symptom of DF	144	37.1	32.2 - 42.3
K4	Is bone sore a symptom of DF	66	17.0	13.4 - 20.9
K5	Dengue is caused by a virus	339	87.4	84.0 - 90.5
K6	Do insecticides sprays reduce mosquitoes and prevent DF	368	94.8	92.5 - 96.9
K7	Do mosquito repellents prevent mosquito bites	368	94.8	92.5 - 97.2
K8	Does dengue virus transmitted to humans by the bite of female Aedes mosquitoes that have been infected?	305	78.6	74.2 - 82.7
K9	Can you identify Aedes mosquitoes?	290	74.7	70.4 - 78.6
K10	Can a person be suffered from DF more than once?	324	83.5	79.9 - 87.1
K11	Does DF affect infants, children and adults?	369	95.1	92.8 - 97.2
K12	Use mosquito eating fish to reduce mosquitoes	275	70.9	66.2 - 75.3
K13	Cover water containers in the home	351	90.5	87.4 - 93.0
K14	Prevent water stagnation	366	94.3	92.0 - 96.1
K15	Change the water in flower containers	323	83.2	79.6 - 86.9
K16	Disposing water holding containers (such as tires, parts of automobiles, plastic bottles, crack pots…)	348	89.7	86.6 - 92.8
K17	Change the water plant containers in the house every week	288	74.2	69.8 - 78.4
K18	Check the waste/garbage that can block the flow of water around home.	319	82.2	78.4 - 86.1
K19	Check and clean the drains/gutters roofs of the rainy season	308	79.4	75.3 - 83.2

Note: (*) 95% confidence interval is calculated by Bootstrap method with 1000 repetitions

Table 3: Number of correct answers to questions of Attitude (A) on DF

Question code	Question	N=388	%	95% CI*
A1	Is DF a serious illness?	357	92.0	89.4 - 94.6
A2	Can DF be prevented?	333	85.8	82.2 - 89.2
A3	Is controlling the breeding places of mosquitoes a good strategy to prevent DF?	370	95.4	92.3 - 97.2
A4	Do you think that stagnant water around the houses in discarded tyres, broken pots and bottles are breeding places of Aedes mosquitoes?	377	97.2	95.4 - 98.7

A5	Do you think communities should actively participate in controlling the vectors of DF	376	96.9	95.1 - 98.5
A6	Everyone has a chance to be suffered from DF	378	97.4	95.9 - 99.0
A7	If you experience signs and symptoms of DF, you would immediately come to Community Health Centre	378	97.4	95.6 - 99.0
A8	You are the key individuals in preventing DF	345	88.9	85.8 - 92.0
A9	All DF patients have a chance for a full recovery	318	82.0	78.1 - 85.8
A10	The government is doing their best to prevent DF	340	87.6	84.3 - 90.7
A11	Community members are capable of preventing DF	311	80.2	76.0 - 84.0
A12	You are capable of preventing DF	360	92.8	89.7 - 95.1
A13	Government actions are needed for DF prevention	368	94.8	92.5 - 96.9

Note: (*) 95% confidence interval is calculated by Bootstrap method with 1,000 repetitions

With respect to DF prevention practices, the most commonly implemented measure was cleaning up waste around the house (P8, 95.1%), which was carried out by the respondents as a means of participating in local dengue prevention campaigns. The deterrent coded as P6 was applied at a frequency of 70.4%. Significant measures of DF prevention were sleeping during the day (P5) and clearing bushes around the house (P7), which were implemented at frequencies of 75.5% and 89.2%, respectively **(Table 3)**.

Table 4: Number of correct answers to the Practice section (P) questions about DF

Question code	**Question**	**N=388**	**%**	**95% CI***
P1	Use screen windows to reduce mosquitoes	293	75.5	71.4 - 79.6
P2	Use mosquito coils to reduce mosquitoes	287	74.0	69.6 - 78.1
P3	Use Mosquito repellent/cream	321	82.7	78.9 - 86.6
P4	Covering body with clothes when working in the bush, farm or forest	298	76.8	72.7 - 80.9
P5	Use bed net when sleeping during day	293	75.5	71.1 - 79.6
P6	Participate in any of the dengue infection campaign in the community	273	70.4	65.7 - 74.7
P7	Cut down bushes in the yard to reduce mosquitoes	346	89.2	85.8 - 92.3
P8	Cleaning of garbage/trash	369	95.1	92.8 - 97.2

Note: (*) 95% confidence interval is calculated by Bootstrap method with 1000 repetitions

No difference in attitudes was found amongst the respondents, but significant differences in knowledge were discovered between the participants of varying marital statuses, educational levels, DF histories and levels of disease familiarity and the respondents who have contracted from DF. The married participants earned high knowledge scores, and those who have suffered from DF or know people who were afflicted with the disease exhibited considerable knowledge of the illness.

Differences in anti-DF practices were found between the participants from urban and rural areas, between those with different occupations and between the respondents with a history of DF and those who know other people with DF. The rural residents implemented practices that were better than those carried out by the urban residents; the farmers and office employees were also better in this regard than the respondents with other careers, and so were the group who have had DF or know other people who have suffered from the disease.

Table 5: Average score of Knowledge (K), Attitude (A), Practice (P) among the surveyed groups

	K			A			P		
Variable	**Mean (SD)**	**95% CI****	**P-value***	**Mean (SD)**	**95% CI****	**P-value***	**Mean (SD)**	**95% CI****	**P-value***
T									
T1	14.2 (2.7)	13.8-14.6	0.927	10.9 (1.2)	10.8-11.1	0.200	6.5 (1.6)	6.3 - 6.8	0.300
T2	14.5 (2.7)	14.0 - 14.8		10.9 (1.2)	10.8 - 11.1		6.2 (1.7)	6.0 - 6.5	
T3	14.4 (2.5)	13.7 - 15.2		11.3 (0.9)	11.0 - 11.6		6.6 (1.6)	6.1 - 7.1	
T4	14.3 (2.6)	12.9 - 15.5		10.5 (1.4)	9.7 - 11.2		6.2 (1.5)	5.5 - 6.9	
GT									
GT1	14.2 (2.7)	13.7 - 14.6	0.227	11.0 (1.1)	10.8 - 11.2	0.600	6.4 (1.6)	6.1 - 6.6	0.900
GT2	14.5 (2.6)	14.1 - 14.8		10.9 (1.2)	10.8 - 11.1		6.4 (1.6)	6.2 - 6.6	
HN									
HN1	13.9 (2.5)	13.5-14.4	**0.018**	11.0 (1.1)	10.8 - 11.2	0.750	6.4 (1.7)	6.1 - 6.6	0.700
HN2	14.6 (2.7)	14.2- 14.9		11.0 (1.2)	10.8 - 11.1		6.4 (1.6)	6.2 - 6.6	
KV									
KV1	14.4 (2.6)	14.1-14.6	0.803	11.0 (1.2)	10.9 - 11.1	0.803	6.3 (1,6)	6.2 - 6.5	**0.009**
KV2	14.2 (3.1)	13.0-15.4		10.8 (1.3)	10.3- 11.4		7.1 (1,5)	6.6 - 7.7	
NN									
NN1	13.7 (2.6)	12.5-14.9	0.261	10.6 (1.3)	10.0 - 11.2	0.709	7.1 (1.1)	6.6 - 7.6	**0.021**
NN2	14.5 (2.6)	13.8 - 15.0		11.0 (1.0)	10.8 - 11.3		6.3 (1.6)	5.9 - 6.8	
NN3	14.8 (3.3)	12.8 - 16.7		11.1 (1.3)	10.3 - 11.8		6.5 (1.6)	5.5 - 7.6	
NN4	13.9 (2.8)	13.3 - 14.6		11.1 (1.2)	10.8 - 11.3		5.9 (1.7)	5.6 - 6.3	
NN5	14.7 (2.5)	14.5 - 14.6		10.9 (1.2)	10.6 - 11.1		6.6 (1.6)	6.5 - 7.2	
NN6	14.3 (2.6)	13.7 - 14.9		11.0 (1.2)	10.7 - 11.2		6.3 (1.6)	5.9 - 6.7	
NN7	14.1 (2.8)	13.2 - 15.0		10.8 (1.3)	10.4 - 11.3		6.7 (1.4)	6.2 - 7.1	
NN8	14.1 (2.9)	13.2 - 15.0		11.1 (1.3)	10.7 - 11.5		6.1 (1.8)	5.5 - 6.7	

HV									
HV1	13.2 (3.4)	11.1 - 15.3	**0.038**	11.3 (0.5)	11.0 - 11.6	0.622	6.0 (1.8)	5.0 - 7.1	0.477
HV1	13.5 (2.9)	12.6 - 14.4		10.8 (1.4)	10.4 - 11.2		6.7 (1.7)	6.2 - 7.1	
HV3	14.0 (2.7)	13.4 - 14.6		11.0 (1.1)	10.8 - 11.3		6.2 (1.6)	5.8 - 6.5	
HV4	14.4 (2.6)	13.9 - 14.9		10.8 (1.3)	10.6 - 11.1		6.3 (1.6)	6.0 - 6.6	
HV5	14.7 (2.6)	14.3 - 15.2		11.0 (1.2)	10.9 - 11.2		6.5 (1.6)	6.2 - 6.8	
TN									
TN1	13.7 (3.1)	13.0 - 14.5	0.167	11.0 (1.1)	10.7 - 11.3	0.100	6.3 (1.7)	5.8 - 6.7	0.400
TN2	14.6 (2.6)	14.3 - 15.0		11.0 (1.2)	10.8 - 11.2		6.4 (1.6)	6.2 - 6.7	
TN3	13.9 (2.7)	13.3 - 14.6		10.6 (1.3)	10.3 - 10.9		6.2 (1.6)	5.8 - 6.5	
TN4	14.9 (2.3)	14.1 - 15.8		11.2 (1.1)	10.8 - 11.6		6.8 (1.6)	6.2 - 7.3	
TN5	14.4 (2.6)	13.8 - 15.0		11.0 (1.2)	10.8 - 11.3		6.5 (1.7)	6.1 - 6.9	
BT									
BT1	14.8 (2.8)	14.3- 15.3	**0.017**	11.0 (1.2)	10.8 - 11.2	0.759	6.9 (1.4)	6.6 - 7.2	**<0.001**
BT2	14.1 (2.6)	13.8 - 14.4		10.9 (1.2)	10.8 - 11.1		6.1 (1.7)	5.9 - 6.3	
NK									
NK1	14.5 (2.7)	14.2 - 14.8	**0.017**	10.9 (1.2)	10.8 - 11.1	0.759	6.5 (1.6)	6.3 - 6,7	**<0.001**
NK2	14.0 (2.6)	13.5 - 14.4		11.0 (1.3)	10.8 - 11.2		5.7 (1.7)	5.8 - 6,4	
C									
C1	14.5 (2.6)	14.2 - 14.9	0.130	11.0 (1.2)	10.8 - 11.1	0.700	6.4 (1.7)	6.2 - 6,6	0.900
C2	14.1 (2.7)	13.7 -4.5		11.0 (1.2)	10.8-11.1		6.4 (1.6)	6.2 - 6,6	

Note: (*) Differences between groups defined by Mann-Whitney and Kruskal-Wallis. The difference was statistically significant with P <0.05. (**) 95% confidence interval is calculated by Bootstrap method with 1000 repetitions.

DISCUSSION

Knowledge and sources of information of people

The results demonstrated that the participating residents of Bien Hoa City incorrectly identified the symptoms of DF. Specifically, 71.9% do not believe joint pain to be a manifestation of the disease, and up to 83.0% did not know that patients with DF may experience bone pain. Similar findings were obtained in DF studies performed in Nepal, Jamaica, Thailand, India and Pakistan [6-9]. The lack of awareness regarding DF symptoms may be ascribed to the small percentage of people who have suffered from dengue (33.0%) and from the fact that the initial symptoms of DF are easily confused with those of other common diseases, such as influenza and typhoid. The results could also have stemmed from the inaccurate knowledge of health workers (39%) - a situation comparable to that observed in the Indonesian study.[13]

The current work also identified television as the main source of information on DF, consistent with the results on Jamaica,[15] Laos,[16] Nepal,[14] the Philippines,[17] and Indonesia.[13] Vietnam is one of the countries around the world that registered the highest growth rates in Internet usage in the last decade; the majority of the respondents were young individuals who lived in urban areas, where Internet connectivity is high. This explains why the second most popular source of information for the respondents was the internet. Internet applications and advances in information technology should serve as new avenues in which to implement future anti-epidemic programmes. With many advantages, such as easy access, low costs, vivid visual information and widespread coverage, the Internet promises to be an effective means of pervasively disseminating information to the public.

The analysis of correlation in terms of demographics showed that the married participants had better knowledge of DF than the unmarried individuals, and the difference between them was statistically significant. Those with high educational levels and who have had DF or know others who have contracted the disease also showed significantly better knowledge than did the rest of the respondents. Similar research in Indonesia also found differences in knowledge between highly educated and married participants and the general population.

Attitudes and practices of DF prevention of people

The participants generally exhibited favourable attitudes towards DF prevention activities, but no difference in demeanour was found amongst the demographic groups. This result is inconsistent with research conducted in Nepal, where gender and educational level affect people's mindsets about the illness. The positive attitudes of the participants in the present study stem from that fact that most of them (92.0%) believe DF to be a serious disease. Although knowledge about DF symptoms amongst them is low, their viewpoints and practices have been partly improved by local epidemic prevention programmes. This result, once again, emphasised the role of community-oriented campaigns as a core determinant of successful DF prevention.

CONCLUSION

This research demonstrated that participants from Bien Hoa City, Dong Nai Province exhibited incorrect knowledge of common DF symptoms, such as bone pain (17.0%), joint pain (29.1%) and muscle pain (37.1%). Nevertheless, the participants possessed very good knowledge about disease transmission, prevention and control, which positively influenced their attitudes and practices regarding DF prevention. Television (77.8%) and the Internet (56.0%) were the key sources of information for the respondents - an aspect that requires attention in future anti-epidemic campaigns. Information coming from relatively low-level medical staff led to the misidentification of DF symptoms.

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CONFLICTS OF INTERESTS

The authors have no conflicts of interests to declare.

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