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Determinants of preventive behaviour against dengue haemorrhagic fever among caregivers of children in Magway Township, Myanmar

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Abstract

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This cross-sectional study aimed to determine factors associated with preventive behaviour of dengue haemorrhagic fever (DHF) among caregivers in Magway Township, Myanmar. Multistage cluster sampling was used to draw a sample of 318 caregivers of children aged 1-4 years. A structured questionnaire was used in a face-to-face interview with caregivers at their houses. The data collection was conducted from 21st April 2016 to 30th May 2016. Chi-square test and multiple logistic regression were used to examine associations between independent variables and preventive behaviour against dengue haemorrhagic fever among caregivers of children.

The results of this study showed that 26.4% of the caregivers were in a good level of preventive behavior against DHF. The household income (Adj OR=2.35, 95% CI=1.04-5.31), knowledge on DHF (Adj OR=12.99, 95% CI=6.65-25.39), perceived susceptibility (Adj OR=3.13, 95% CI=1.39-7.06), perceived barriers (Adj OR=2.70, 95% CI=1.22-5.93) and self-efficacy (Adj OR=5.48, 95% CI=1.47-20.39) were the significant predictors of with DHF preventive behaviour among caregivers.

This study indicated that high income, good knowledge, high perceived susceptibility, low perceived barriers and high self-efficacy among caregivers were required to have good preventive behaviour to prevent their children from DHF. Therefore, adequate income generation, health education, and reduction of barriers should be promoted to increase the high level of the DHF preventive behaviour among caregivers of children.

Keywords: Dengue haemorrhagic fever, caregivers, children aged 1-4 years, preventive behavior, Myanmar

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ปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันโรคไข้เลือดออกของผู้ดูแลเด็กในเขตเมืองมาวเวย์ ประเทศพม่า

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บทคัดย่อ

อ๋อง ซู ลิน จิราพร ชมพิกุล และอรุณศรี มงคลชาติ
ปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันโรคไข้เลือดออกของผู้ดูแลเด็กในเขตเมืองมาวเวย์ ประเทศพม่า
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การศึกษาแบบภาคตัดขวางนี้มีวัตถุประสงค์เพื่อหาปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันโรคไข้เลือดออกของผู้ดูแลเด็กในเขตเมืองมาวเวย์ ประเทศพม่า เด็กที่มีอายุ 1-4 ปีจำนวน 318 คนได้ถูกสุ่มเป็นตัวอย่างด้วยการสุ่มตัวอย่างแบบกลุ่มหลายขั้นตอน การเก็บรวบรวมข้อมูลในระหว่างวันที่ 21 เมษายน พ.ศ. 2559 ถึงวันที่ 30 พฤษภาคม พ.ศ. 2559 โดยใช้วิธีการสัมภาษณ์ผู้ดูแลเด็กที่บ้านด้วยแบบสอบถามที่มีโครงสร้าง วิเคราะห์ข้อมูลโดยใช้การทดสอบไคสแควร์และการถดถอยลอจิสติคพหุคูณเพื่อค้นหาปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันโรคไข้เลือดออกของผู้ดูแลเด็ก

ผลการศึกษาพบว่า ร้อยละ 26.4 ของผู้ดูแลเด็กมีพฤติกรรมป้องกันโรคไข้เลือดออกในระดับดี ปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันโรคไข้เลือดออกของผู้ดูแลเด็กอย่างมีนัยสำคัญทางสถิติ ได้แก่ รายได้ของครอบครัว (Adj OR = 2.35, 95% CI = 1.04-5.31) ความรู้เกี่ยวกับ DHF (Adj OR = 12.99, 95% CI = 6.65-25.39), การรับรู้โอกาสเสี่ยงของการเป็นโรคไข้เลือดออก (Adj OR = 3.13, 95% CI = 1.39- 7.06) การรับรู้อุปสรรค (Adj OR = 2.70, 95% CI = 1.22-5.93) และ การรับรู้ความสามารถของตนเอง (Adj OR = 5.48, 95% CI = 1.47-20.39)

การศึกษาครั้งนี้แสดงให้เห็นว่าผู้ดูแลเด็กที่มีรายได้สูง ความรู้ดี การรับรู้โอกาสเสี่ยงของการเป็นโรคสูง การรับรู้ต่ออุปสรรคต่ำ และการรับรู้ความสามารถในของตนเองสูง จะมีพฤติกรรมการป้องกันโรคที่ดีเพื่อป้องกันเด็กจากโรคไข้เลือดออก ดังนั้นควรส่งเสริมให้มีมาตรการการสร้างรายได้ ควรส่งเสริมการให้สุขศึกษา และลดอุปสรรคของการป้องกันโรค เพื่อส่งเสริมพฤติกรรมการป้องกันโรคไข้เลือดออกในผู้ดูแลเด็กให้สูงขึ้น

คำสำคัญ: โรคไข้เลือดออก ผู้ดูแล เด็กอายุ 1-4 ปี พฤติกรรมการป้องกันโรค ประเทศพม่า

Introduction

Dengue is a systemic viral infection transmitted between humans by Aedes mosquitoes. Dengue virus (DEN) have four distinct, but closely related serotypes DEN1, DEN2, DEN3, and DEN4[1]. A person who recovered from the infection due to one of these virus serotypes would have lifelong immunity against that serotype but he is susceptible to subsequent infection by the other three serotypes. Subsequent infections would increase the risk of more acute form of diseases like dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS)[2]. Dengue haemorrhagic fever is a life-threatening illness[3]. Today, dengue ranks as the most important mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold. An estimated 2.5 billion people live in over 100 endemic countries and areas where dengue viruses can be transmitted. Up to 50 million infections occur annually with 500 000 cases of DHF and 22,000 deaths mainly among children[4].

Almost 75% of the global population exposed to dengue live in Asia-Pacific[5]. 1.3 billion of these at-risk individuals live in ten dengue endemic countries in the South East Asia (SEA), and dengue is a leading cause of hospitalization and death in children[6]. The rates of disease reported in each of the SEA countries vary as they included either laboratory confirmed, probable, or suspected cases[7]. Severe dengue is endemic in most SEA countries, with rates of severe dengue being 18 times higher in this region compared with the America[5-6].

In Myanmar, DHF was one of the leading causes of morbidity in Kayin State, Mon State, Rakhine State, Ayeyawady Region and Thanintharyi Region during 2012[8]. In Magway Region, there were about 1500 cases and 10 deaths due to dengue infection during 2015[9].

The incidence of dengue infections in children aged 5 years or younger increased sharply in developing countries. Immune susceptibility affects the very young and the very old[10]. Children are more prone to develop DSS than adults, where children with secondary infections had significantly higher rates of shock and much higher mortality rates (14.5-fold higher) than young adults[11].

The caregivers' preventive behaviour plays a major role to reduce the transmission of dengue infection to children 1-4 year old because most of the children in this age group are under the control of the caregivers. A few researches concerning the factors associated with preventive behaviour against dengue haemorrhagic fever were done among caregivers of children in Magway Township, Myanmar. This study was the first community based survey among caregivers of children aged 1-4 years old.

Therefore, this study was conducted to determine factors associated with preventive behaviour against dengue haemorrhagic fever among caregivers of children aged 1-4 years in Magway Township. The findings of this study would support to the prevention, and consequently reduce the morbidity and mortality of dengue haemorrhagic fever in Magway Township, Myanmar.

Methods

This cross-sectional study was conducted in urban and rural area of Magway Township, Magway Region, Myanmar. Multistage cluster sampling was used for sampling procedure. The sample size of this study was calculated using a confidence interval of 95%,

an allowable error margin of 5% and a proportion of good preventive behaviour of 25%[12]. The required sample size was added by 10 % of the calculated sample size due to incomplete data or withdrawal of participants. So, the required sample size was 318. Magway Township was selected purposively. There are15 wards in the urban area and 10 villages in the rural area in Magway Township. Each of these villages had a rural health center. Three wards and 3 villages were selected by simple random sampling. Then, 53 households which had children aged 1-4 years were randomly selected from each ward and village. Only one caregiver from each household was selected for the interview. A total of 318 caregivers were selected to include in the study. The study period was from 21st April 2016 to 30th May 2016.

The study included caregivers aged 18 years and older who lived together with children aged 1-4 years and took care of them for at least six months. If two families with children aged 1-4 years lived together in the same household, only one family was randomly selected to include in the study. Caregivers who were less than 18 years of age and those who did not give informed consents were excluded from the study.

A structured questionnaire was used for data collection through a face to face interview method. It was developed by the researchers according to research objectives, literature review and theoretical framework of the study using the Health Belief Model[13-16]. It was reviewed by 3 academic experts from Mahidol University. It consisted of 6 sections: (i) socio-demographic characteristics, (ii) knowledge on DHF, (iii) perception on DHF such as perceived susceptibility, perceived severity, perceived benefits and perceived barriers, (iv) self-efficacy, (v) cues to action and (vi) DHF preventive behaviour which consisted of environmental measures, protection against mosquito bite and chemical and biological measures. Knowledge was classified into 3 categories using Bloom's criteria: high if knowledge score was higher than 80%, moderate if score was 60%-80%, and low if score was < 60%. For perception (perceived susceptibility, severity, benefit and berries), self-efficacy, and cues to action, they were categories into two levels: high if total score was at the median or above, and low if score was below the median. The preventive behavior was categorized into high and low levels: high if total score was at 75th percentile or above and low if below.

For the reliability of the instrument, a pre-test was conducted with the sample of 30 caregivers in Minbu Township, which was similar to the study area. The questions that had the Cronbach's Alpha coefficient less than 0.7 was revised and amended. The KR-20 coefficient for knowledge was 0.822. The Cronbach Alpha coefficient for perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action were 0.743, 0.705, 0.743, 0.827, 0.732 and 0.766 respectively.

The protocol was approved by the Ethical Committees of Mahidol University, Thailand (Certificate of Approval No: 2016/119.2903) and University of Community Health, Myanmar. Informed consent was obtained from each caregiver before the interview. Each caregiver was visited at home to explain about the interview. If a caregiver was not available during the time of the visit, the research assistant made an appointment and would visit to that house again.

The characteristics of respondents was analyzed by descriptive statistics. The Chi-square test was used to examine an association between each independent variable and preventive behaviour of caregivers. The significance level was set up at 0.05. The multiple logistic regression was used to examine significant predictors for DHF preventive behaviour of caregivers.

Results

Most (71.7%) of caregivers were under 40 years. The median age of caregivers was 32 years. Only 44.4% finished secondary or higher level. 71.7% of family income were in high income group and the median family income was 150,000 Kyats (126.5 US$). Majority (85.5%) of caregivers were mothers. Nearly half took care of children aged 1-2 years while another half took care of those aged 3-4 years. The median age of the children was 3 years. Only 6.6% of the families had history of DHF in their family members and most of them were children. 68.9% of the caregivers used domestic water from wells. Four fifths of caregivers' house were built by bamboo and wood (Table 1).

Table 1 Distribution of caregivers by socio-demographic factors

Variables	Number	Percent
Age group of caregivers		
< 20 years	4	1.3
20-29 years	111	34.9
30-39 years	113	35.5
≥ 40 years	90	28.3
Median = 32, QD = 24, Min = 18, Max = 66		
Education of caregivers		
No education	37	11.6
Primary	140	44.0
Secondary	59	18.6
Higher	45	14.2
University/College	37	11.6
Household income		
Low income(< 150000 Kyats)	90	28.3
High income (≥150000 Kyats)	228	71.7
Median = 150000, QD = 230,000, Min = 40000, Max = 500000		
Relation of caregivers		
Mothers	272	85.5
Others	46	14.5

Table 1 Distribution of caregivers by socio-demographic factors (Conts).

Variables	Number	Percent
Age of children		
1-2 years	140	44.0
3-4 years	178	56.0
Median = 3,QD = 1.5,Min = 1,Max = 4		
Previous history of DHF in family		
Yes	21	6.6
No	297	93.4
Sources of water supply		
Pipe water	99	31.1
Well	219	68.9
Types of housing		
Bamboo and wood	256	80.5
Wood and bricks	62	19.5

Table 2 shows 14.5% of the caregivers had good knowledge about DHF. 59.7% had a high level of perceived susceptibility. 69.5% of the caregivers were in a high level of perceived severity. 76.4% of the caregivers had a high level of perceived benefits. 80.8% had a high level of barriers. 77% had a high level of self-efficacy. 68.9% were in a high level of cues to action.

Table 2 Distribution of caregivers by knowledge, perception, cues to action and preventive behaviour

Variables	Number	Percent
Knowledge levels		
High (>13.6)	46	14.5
Moderate (10.2-13.6)	50	15.7
Low (<10.2)	222	69.8
Median = 7, QD = 8.5, Min = 0, Max = 17		
Perceived susceptibility levels		
High (24-30)	190	59.7
Low (12-23)	128	40.3
Median = 24, QD = 9, Min = 12, Max = 30		
Perceived severity levels		
High (20-25)	221	69.5
Low (12-19)	97	30.5
Median = 20, QD = 5, Min = 15, Max = 25		
Perceived benefit levels		
High (20-25)	243	76.4
Low (14-19)	75	23.6
Median = 20, QD = 5.5, Min = 14, Max = 25		
Perceived barrier levels		
High (18-35)	257	80.8
Low (8-17)	61	19.2
Median = 18, QD = 13.5, Min = 8, Max = 35		
Self-efficacy levels		
High (30-40)	245	77.0
Low (22-29)	73	23.0
Median = 30, QD = 9, Min = 22, Max = 40		
Cues to action levels		
High (20-25)	219	68.9
Low (12-19)	99	31.1
Median = 20, QD = 6.5, Min = 12, Max = 25		
Preventive behaviour level*		
Good	84	26.4
Poor	234	73.6
Median = 9, QD = 12.5, Min = 1, Max = 26		

*Categorized by using the score at P_{75}

DHF preventive behaviour was divided into environmental measures, protection against mosquito bite to children and chemical and biological control measures. In regarding environmental measures, only 26.7% of the caregivers were in a good level. In concern with protection against mosquito bite to children, 29.2% of the caregivers were in a good level. In dealing with the chemical and biological control, 27 % of the caregivers were also in a good level. Finally, in overall preventive behaviour, only 26.4% of the caregivers were in a high level while most of them were in a low level.

Table 3 and 4 describe associations of socio-demographic factors, knowledge, perception, self-efficacy and cues to action with DHF preventive behaviour of caregivers. Age and education of caregivers, household income, previous history of DHF, types of housing, knowledge levels, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action were significantly associated with preventive behaviour against DHF (P-value < 0.05). Relation of caregivers, age of children and sources of water supply were not significantly associated with the preventive behaviour against DHF.

Table 3 Association between socio-demographic factors and DHF preventive behaviour

Variables	n	Preventive behaviour		Crude OR (95% CI)	P-value
		Good (%)	Poor (%)		
Age of caregivers					
18 – 39 years	228	29.8	70.2	1.97 (1.07-3.62)	**0.030**
40 – 66 years	90	17.8	82.2	1	
Education levels of caregivers					
Middle and above	141	48.2	51.8	9.37 (5.09-17.3)	**<0.001**
Primary and lower	177	9.0	91.0	1	
Household income					
High income	228	30.7	69.3	2.40 (1.27-4.54)	**0.007**
Low income	90	15.6	84.4	1	
Relation of caregivers					
Mother	272	27.9	72.1	1.84 (0.82-4.13)	**0.138**
Other	46	17.4	82.6	1	
Age of children					
1-2 years	140	27.1	72.9	0.94 (0.57-1.54)	**0.794**
3-4 years	178	25.8	74.9	1	
Previous history of DHF in family					
Yes	21	47.6	52.4	2.70 (1.12-6.71)	**0.027**
No	297	24.9	75.1	1	
Sources of water supply					
Pipe water	99	29.3	70.7	1.24 (0.73-2.10)	**0.434**
Well	219	25.1	74.9	1	
Types of housing					
Wood and bricks	62	48.4	51.6	3.51 (1.96-6.27)	**<0.001**
Bamboo and wood	256	21.1	78.9	1	

Table 4 Association between knowledge, perception, self-efficacy, cues to action and DHF preventive behavior

Variables	n	Preventive behaviour		Crude OR (95% CI)	P-value
		Good (%)	Poor (%)		
Knowledge levels					
Moderate to high	96	65.6	34.4	18.27 (9.87-33.83)	**<0.001**
Low	222	9.5	90.5	1	
Perceived susceptibility levels					
High	190	37.9	62.1	5.90 (3.04-11.44)	**0.001**
Low	128	9.4	90.6	1	
Perceived severity levels					
High	221	31.7	68.3	2.74 (1.46-5.18)	**0.002**
Low	97	14.4	85.6	1	
Perceived benefit levels					
High	243	32.1	67.9	5.44 (2.26-13.06)	**0.001**
Low	75	8.0	92.0	1	
Perceived barriers levels					
Low	61	52.5	47.5	4.35 (2.42-7.83)	**0.001**
High	257	20.2	79.8	1	
Self-efficacy levels					
High	245	33.1	66.9	11.50 (3.52-37.72)	**0.001**
Low	73	4.1	95.9	1	
Cues to action levels					
High	219	32.0	68.0	2.85 (1.52-5.37)	**0.001**
Low	99	14.1	85.9	1	

As shown in Table 5, final model of multiple logistic regression was performed to explore the most significantly associated predictors for prevention of DHF. High household income, knowledge levels, perceived susceptibility, perceived barriers and self-efficacy were found to be significantly associated with DHF preventive behaviour. After adjusting for household income, caregivers having moderate and good knowledge about DHF were about 13 times more likely to have good preventive behaviour against DHF than those having poor knowledge. Caregivers having a high level of perceived susceptibility were about 3 times more likely to have good preventive behaviour against DHF than those having a low level. Caregivers having a low level of perceived barriers were about 2.7 times more likely to have

good preventive behaviour against DHF than those having a high level. Caregivers having a high level of self-efficacy were about 5.5 times more likely to have good preventive behaviour against DHF than those having a low level.

Table 5 Multiple logistic regression for predictors of preventive behaviour against DHF

Variables	Adjusted OR (95%CI)	P-value
Household income		
High (≥ 150000)	2.35 (1.04-5.31)	**0.040**
Low (< 150000)	1	
Knowledge levels		
Moderate to high	12.99 (6.65-25.39)	**<0.001**
Low	1	
Perceived susceptibility levels		
High	3.13 (1.39-7.06)	**0.006**
Low	1	
Perceived barriers levels		
Low	2.70 (1.22-5.93)	**0.014**
High	1	
Self-efficacy levels		
High	5.48 (1.47-20.39)	**0.011**
Low	1	

Discussion

This study revealed that caregivers with high household income was twice more likely to have good preventive behavior than those having low household income. This result was similar to telephone survey in Malaysia by Wong et al showed that high income group were more likely to have better dengue prevention practice than low income group[13].

The knowledge of caregivers was significantly associated with preventive behaviour. Caregivers who had moderate and good knowledge were 13 times more likely to take good preventive behaviour about than those with poor knowledge. It was consistent with the results from the previous studies that participants with good knowledge were more likely to have good preventive behavior[17-21]. Most of the caregivers did not know that *Ades agypti* is the mosquito that transmits DHF, the daytime is the period that DHF transmitting mosquito bites, emergency symptoms of DHF and breeding sites for DHF causing mosquitoes such as unused tires, blocked drain and uncover garbage. Caregivers of low income and education should be

targeted to provide health education and promotion to prevent DHF in their children. Knowledge of the caregivers should be strengthened by providing health education about DHF through the mass media and social media.

In regarding to perceived susceptibility, 44% of caregivers did not agreed that a person could get DHF infection again sometime after primary infection. This incorrect perception may let the caregivers think about their children would not be infected again. In this study, caregivers having the high level of perceived susceptibility were more likely to take good preventive behaviour. Wong et al mentioned that the proportion of a total dengue prevention practice score was significantly higher among a higher perceived susceptibility of dengue than a lower perceived susceptibility of dengue[13].

Caregivers' perceived barriers made DHF prevention difficult in practicing. This study showed that caregivers having low level of perceived barriers were about 3 times more likely to have good preventive behaviour against DHF. Wong et al showed that a significantly higher proportion of lower perceived barriers to prevent dengue had a higher dengue prevention practice score than higher perceived barriers to prevent dengue[13]. Barriers that caregivers faced were elimination of mosquito breeding sites, no spared time to check larva, wearing of long sleeve clothes during daytime, usage of insecticide and anti-mosquito coils and repellents. Phuanukoonnon et at mentioned that barriers proved more powerful than benefits of the recommended larval control method[22]. Chandren et al found the same result that participants with lower perceived barriers were more likely to have better dengue prevention practices[18]. Thompson et al reported that perceived threat and cost effectiveness were associated with greater mosquito control behavior[23]. Lennon suggested in his article that health communication messages designed through HBM constructs might be used to communicate awareness about dengue and its control[24].

This study reported that caregivers with the high level of self-efficacy were more likely to perform good preventive behaviour. In contrary, Zaw et al also found that level of perceived efficacy was high but was not consistent with prevention practices like container management[25]. 90% of caregivers did not agreed that they could insert Temephos (Abate), organophosphate larvicide, into water containers. Caregivers had limited accessibility to get Temephos. Health centers distributed Temephos only in the DHF season and outbreak. Phuanukoonnon et al reported that insufficient information about how to add in the correct dose of Temepho and when to re-add had occurred in their study population. Insufficient temephos distribution creates further barriers for control activities[22]. Isa et al found that levels and strength of self-efficacy fully mediated the relationship between knowledge and DHF preventive behavior[26]. Quadri et al that behaviour of self-mosquito bite protection, self-prevention in breading mosquitoes, density of vegetation, lack of self-efficacy in controlling vectors and lack of preventive measure were significantly associated with transmission of dengue infection[27]. Rugkua and Rungsihirunrat reported that the results indicated that the knowledge, perceived susceptibility, self-efficacy, and behavioral practices in the experimental village for both students and housewives were significantly higher compared to the control village after larval and pupal source reduction program was

implemented for three months[28].

The causal relationship between independent and dependent variables could not be estimated because a cross sectional study was employed. There would be recall bias because of time limitation. Moreover, the incidence of DHF had seasonal variation in pattern[29]. Some of prevention measures was not carried out during the study period because there were less prevalence of DHF during this period.

Most of the previous study about prevention of DHF were done in adult, school children, housewives and migrants. There were no similar study conducted in caregivers of children. This community-based study was the first survey in caregivers of children aged 1-4 years in Magway Township.

Conclusion and recommendations

This study showed that household income, knowledge, perceived susceptibility, perceived barriers and self-efficacy were the significant predictors of DHF preventive behaviour among the caregivers of 1-4 year old children.

To increase the perceived susceptibility of DHF, caregivers should often be informed that biting of infected Aedes mosquitos can cause DHF, secondary infection can cause more severe complications and Aedes mosquito breed in clean water in and around the houses. Caregivers should be explained in details each measure of preventions by health care persons and volunteer health workers to lessen the perceived barriers in prevention of DHF. Mobile health education program should be conducted more often to provide knowledge about DHF prevention and lessen perceived barriers to prevent DHF. Role plays or video about preventive measures should be used to encourage the caregivers and strengthen their self-efficacy in regarding prevention of DHF.

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