Cambodia Journal of Public Health

Awareness, Knowledge, Attitudes, and Practices toward Chikungunya Prevention among Publics in Svay Rieng Province, Cambodia

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Received: March 13, 2025; revised April 27, 2025; accepted May 03, 2025

ABSTRACT

Introduction

Chikungunya, a vector-borne disease transmitted by the female Aedes aegypti mosquito, has become a global health concern, particularly in Asia, Africa, and the Americas. The disease, which causes fever, rash, and debilitating joint pain, reemerged in Cambodia in 2020, leading to more than 6,000 cases, indicating the risk of local transmission. This study aims to assess the awareness, knowledge, attitudes, and practices (KAPs) regarding chikungunya among the general population in Svay Rieng Province, Cambodia.

Methods

A cross-sectional study was conducted in 2022 using data from post-temephos larvicide (Abate application) supervision reports in Svay Rieng Province. A total of 274 participants aged 18 years and above were included. Descriptive statistics were used to summarize sociodemographic characteristics, whereas bivariate and multivariate logistic regression analyses were employed to assess factors associated with KAP toward mosquito bites and mosquito breeding prevention. The adjusted OR was calculated, and a p value ≤ 0.05 was considered statistically significant.

Results

The mean age was 45 years (SD = 15), with women accounting for 63% of the sample. Of all participants, 33.3% were aware of Chikungunya, primarily through social media and mass communication channels (TV, radio). Of these, 41.7% had good knowledge, 43.9% demonstrated a good attitude, and 42.8% practiced effective mosquito prevention methods; Only 28.6% reported sleeping under a bed net in the daytime. Wearing long sleeves and use of mosquito repellents are common practices. Factors associated with good knowledge included higher monthly income >147$ (AOR = 5.3, 95% CI: 1.0-24.8), self-employment (AOR = 17, 95% CI: 3.0-94.5) and resided in urban areas (AOR = 3.9, 95% CI: 1.1-3.6). Similarly, positive attitudes were independently associated with self-employment (AOR =9.2, 95% CI: 1.8-46.2) and higher monthly income (AOR=6.2, 95% CI: 1.2-31.2); while positive practices associated with self-employment (AOR = 18.2, 95% CI: 3.4-96) and living in urban areas (AOR = 3.6, 95% CI: 1.1-11.9).

Conclusion

This study highlights the low level of awareness and knowledge of Chikungunya in Svay Rieng Province, with significant gaps in attitudes and practices. Public health interventions focusing on education and targeted awareness campaigns are necessary to improve KAP related to Chikungunya, especially in rural areas and among lower-income populations.

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Citation: S Ung, B Tol, H Sopheab. Awareness, Knowledge, Attitudes, and Practices toward Chikungunya Prevention among Publics in Svay Rieng Province, Cambodia; *CJPH (2025): 06:02*

Keywords: Chikungunya, Svay Rieng, Awareness, Knowledge, Attitude, Practice, KAP

Introduction

Chikungunya, a viral vector-borne disease caused by chikungunya virus (CHIKV), is transmitted to humans through the bite of infected female aides aegypti and Ae. Albopictus, the same species as dengue, Zika, and yellow fever (1). Fever, rash and prolonged joint pain are the most common clinical manifestations (1). The average incubation period is 7 days, with a range of 1–12 days (1). Severe cases and deaths are rare in chikungunya patients and are usually associated with patients' underlying health conditions (1). People infected with chikungunya may develop life-long immunity (1).

First identified in Africa in 1952, chikungunya remains a significant global public health concern with substantial morbidity, mortality and economic burdens (2). Over the past 10 years, chikungunya has demonstrated its potency, with major outbreaks continuously reported in Asia, Africa, Europe and America from 2013 to 2021 (2). To date, chikungunya has spread to more than 100 countries worldwide (2,3). Studies revealed that between 2011 and 2020, an estimated 18.7 million chikungunya cases occurred, with approximately 13,000 deaths (3). Different studies in low- and middle-income countries revealed low to moderate chikungunya knowledge among the communities, while attitudes were often influenced by education, personal experience, and misconception. Practices like mosquito control are weak unless link to higher education, high income, and stronger health program. The most recommended prevention measures are health education and community engagement (4–7).

Cambodia reported its first chikungunya case in 1962, ten years after the first global detection in 1952. Chikungunya reappeared in the country in 2011, when 24 patients were confirmed to be positive through PCR and ELISA. In 2012, chikungunya was detected again through a serological survey in a rural village of Kampong Speu Province. This marked the reemergence of chikungunya after a 50-year absence (8). In 2020, the disease reemerged nationwide, with a significant spike in cases; as many as 6,000 cases in several provinces included a significant number of cases in Kandal, Kratie, and Preah Vihea Provinces (9,10). Chikungunya has continued to be detected sporadically in other regions of Cambodia (10,11).

The reemergence of chikungunya disease in 2012 and 2020 indicated that Cambodia is already at risk of local transmission and that the immune status of the population in Cambodia has waned (9,11,12). Since chikungunya shares the same vector with dengue fever, the prevention and control measures for dengue are also effective against chikungunya (2,8). However, as a dengue endemic country, the high incidence of dengue may double the risk of chikungunya in Cambodia. Additionally, despite the increasing geographic spread of chikungunya in Cambodia, there is insufficient research on the awareness of the disease among the general population, which is an important indicator of the importance of implementing control measures at the community level (8).

This study aims to explore the level of awareness of chikungunya among the general population and assess the knowledge, attitudes and practices in Svay Rieng Province, a southern province of Cambodia.

Methods

Data source

This study utilized existing data from the supervision report of the post-application of temphos larvicides (Abate) by Svay Rieng Provincial Health Department in 2022. The report included data on socioeconomic and demographic information; mosquito larvae presence at the household level; usage and acceptance of the temphos larvicide (abate); and knowledge, attitudes, and practices related to dengue and chikungunya.

Study population

Post-temphos larvicide (Abate application) supervision reports contained information from 20 villages out of 100 targeted villages in Svay Rieng Province that received temphos larvicide for mosquito breeding prevention activities. Convenience sampling was used for household selection in these 20 villages. On average, 14 households were selected per village. The households were selected on the basis of their proximity to the village chief's house,

which is usually located in the village center. A total of 275 household members aged 18 years and older were visited and interviewed by the Dengue Control Program Team in Svay Rieng Province.

Variable measurement

We collected sociodemographic variables, including age (in years), sex (male or female), educational level (high school or above, secondary school, and below secondary school), residential village (urban or rural), marital status (married or never married), religion (Buddhism or other), and nationality (Khmer or non-Khmer). The socioeconomic variables included average monthly income (in US dollars) and occupation (self-employed, employed and unemployed).

Awareness of chikungunya was assessed using two questions: one asked whether the participants have heard of chikungunya and how the disease was heard. Of those who had ever heard of chikungunya, the knowledge was assessed with three questions about type of vector, mode of transmission, signs and symptoms, prevention and control methods, seasonality, and other perception-based knowledge. The participants could respond "true/yes", "false/no" or "don't know/not sure". Correct answers were scored as 1, and incorrect answers were scored as 0. The total knowledge score ranged from 0 to 5. The participants were then categorized as having either good or poor knowledge. Good knowledge was defined as correctly answered at least three of the five questions; otherwise, the participants were categorized as having poor knowledge (13).

Attitudes toward chikungunya were assessed by 11 statements about perceptions of chikungunya in seeking appropriate treatment and taking preventive measures, such as sleeping under a bed net and using mosquito repellent. The participants can answer "yes", "no" or "don't know". A good attitude was categorized as if the participants agreed with at least 6 of the 11 statements. Otherwise, the participant was categorized as having a poor attitude (13).

For the practice component, 7 statements were assessed about the activities that had been regularly performed in the month prior to the interview date. These activities included wearing long-sleeved clothes regularly, using repellent daily, cleaning water containers at least once a week, properly covering water containers, removing discards around the house daily, sleeping under a bed net during the daytime and sleeping under a bed net at night. Participants who responded with at least 4 "yes" answers to the 7 statements were classified as having good practices. Otherwise, the participants were classified as poor practice (13).

Data management

The raw dataset was stored in Excel. Data errors were cleaned and reviewed for completeness for each collected variable. Incomplete or missing variables for any respondent were removed. The outliers were identified by reviewing each participants' responses and compared them with the original questionnaire form. Inconsistent and improbable response were marked as outlier and were corrected base on original data. One incomplete record was removed. A total of 274 final records were included in the analysis. Individual participants' scores were recorded in an Excel spreadsheet.

Statistical data analysis

All analyses were conducted via Stata version 17.0. Categorical variables are presented as frequencies and percentages. The means and standard deviations were calculated for all the continuous variables, whereas the medians and interquartile ranges (IQRs) were used for the monthly income variables due to the non-normal distribution of the data.

Pearson's chi-square test and Fisher's exact test were used to examine the associations between demographic and socioeconomic variables and the KAP level of participants ever had heard of chikungunya. Binary logistic regression analysis was used to explore the factors associated with KAP levels toward mosquito bites and mosquito breeding prevention in chikungunya. Odds ratios (ORs) and their 95% confidence intervals (CIs) were determined

to assess the strength of the associations. A multivariate logistic regression analysis with a stepwise backward approach was then used to determine the main predictors of the KAP level among chikungunya participants. All variables with a p value < 0.20 in the bivariate analysis were retained in the final model, including the most potential confounding factors and background variables such as age group, sex, and education level. A p value < 0.05 was considered statistically significant.

Ethical consideration

To ensure ethical compliance, personal identifiers such as names and phone numbers were removed before data analysis. This study was approved by the National Ethics Committee for Health Research (Ref # 222 NECHR). Data use was also approved by Svay Rieng Provincial Health Department.

Results

Sociodemographic characteristics

As shown in Table 1, 69% of the participants lived in rural areas. The mean age was 49 years (SD=15), ranging from 18-83 years. Approximately 63% of them were female. A total of 192 participants (70.4%) attended high school or above, 12% attended secondary school, and 17.6% attended just primary school or below. The median income per month of the participants was 287.5 USD (IQR = 380 USD), ranging from 25 to 1500 USD per month. Most participants were married (92.7%); participants of 58.7% reported being employed, followed by self-, employed (19.7%) and unemployed (21.6%).

Table 1: *Sociodemographic information (n=274)*

Characteristics	Freq (%)
Age (in years)	
Mean (SD)	49 (15)
Range	18-83
Sex	
Male	101 (36.9)
Female	173 (63.1)
Educational level	
Below secondary school	48 (17.6)
Secondary school	34 (12.4)
High school or above	192 (70)
Monthly Income (in USD)	
Median (IQR)	287.5 (380)
Range	25-1500
Marital status	
Married	254 (92.7)
Never married	20 (7.3)
Occupation	
Self-employed	161 (58.7)
Being employed	54 (19.7)
No employment	59 (21.6)
Place of residence	

Characteristics	Freq (%)
Rural	190 (69.3)
Urban	65 (23.7)
Missing	19 (6.9)
Religion	
Buddhism	273 (99.6)
Other	1 (0.4)

Awareness and KAP of Chikungunya

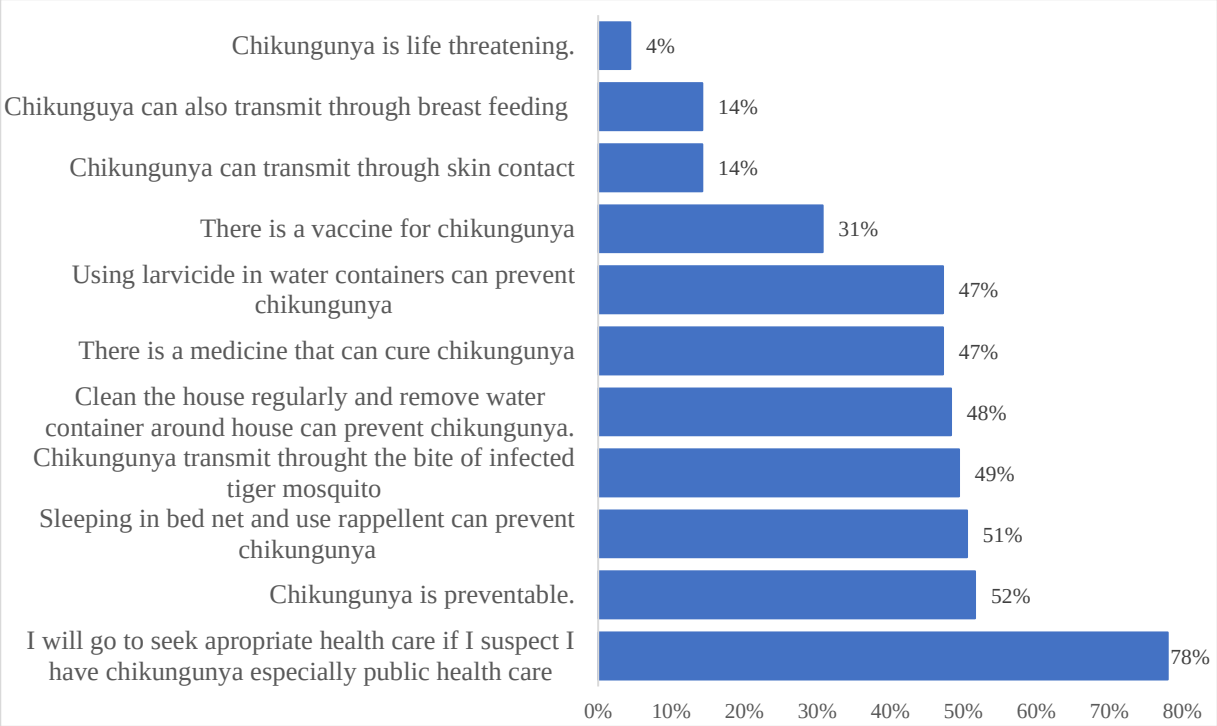
More than one-third (33.3%) of the study participants were aware of Chikungunya disease. Most (70.3%) heard about the disease through social media, television, or radio, whereas others learned about it through personal experience or infected family members (13.2%), word of mouth (8.8%), health center staff (2.2%) and other sources (5.5%). Approximately 42% of all participants who were aware of chikungunya knew the mode of chikungunya transmission, and everyone was able to describe at least one chikungunya mosquito prevention method. However, fewer than half (47%) described at least one chikungunya prevention method and knew that chikungunya occurred seasonally, primarily during the rainy season **(Table 2)**

Table 2: *Knowledge and awareness of Chikungunya*

Knowledge questions	Freq. (%)
Total response participants	**274**
Ever heard of chikungunya illness	91 (33.2)
If yes, what have you heard from? (n=91)	
Social media, TV, Radio	**64 (70.3)**
Used to get infected	12 (13.2)
Word of mouth	8 (8.8)
Health center or community outreach	2 (2.2)
Other	5 (5.5)
Be aware of the mode of chikungunya transmission	53 (58.2)
Please choose how chikungunya infected to human? (n=53)	
Tiger mosquito bite	39 (73.6)
Not able to describe correctly	12 (22.6)
Insect bite	1 (1.9)
Other	1 (1.9)
Knowing the sign and symptom of chikungunya (n=91)	48 (52.7)
If you know, please describe the symptoms (n=48)	
Be able to describe at least fever and joint pain	42 (87.5)
Not able to describe correctly	6 (12.5)
Knowledge of chikungunya prevention methods? (n=39)	
Able to describe at least 1 measure	39 (100)
Season of peak chikungunya illness (n=91)	
Rainy season	47 (51.6)
Don’t know	44 (48.4)

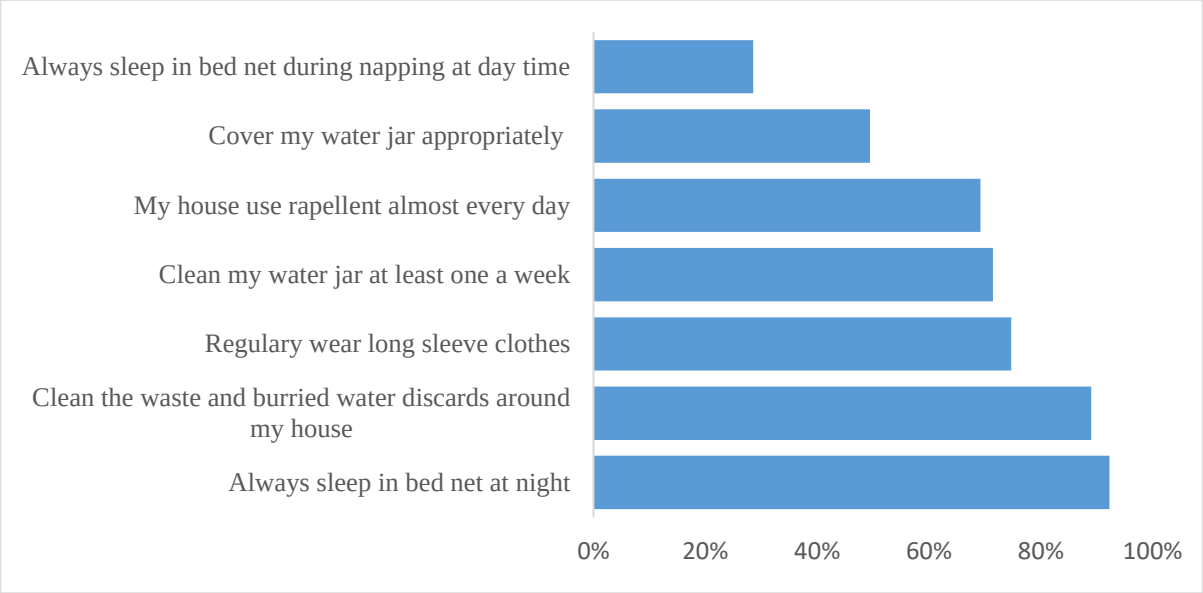
Among those aware of chikungunya, 44% were unsure whether chikungunya was preventable, while 51.6% agreed that it was preventable and 4.4% believed that it was not. Furthermore, nearly half of those who were aware of chikungunya (48.4%) believed that it was not life-threatening, whereas 4.4% believed that it was life-threatening, and 46.2% did not know whether the statement was correct. Additionally, 14.3% believed that chikungunya could be transmitted through skin contact and breast feeding, whereas 40.7% and 37.4% thought that it was not possible to transmit through these activities. Moreover, half of the participants who were aware of chikungunya believed that regularly cleaning houses, removing discarded water containers around houses, using larvicide, sleeping under bed nets and using repellents could prevent chikungunya infection, with proportions of 48.4%, 47.3%, and 50.5%, respectively. Up to 78% thought that they would seek appropriate healthcare if they suspected that they had chikungunya, particularly in public hospitals, while 31% believed that there is a vaccine for chikungunya, and 47% believed that there is a medicine that can cure chikungunya **(Figure 1)**

Figure 1: *Attitudes and perceptions of participants toward chikungunya (n=91)*



Good mosquito bite prevention practices were observed among the study participants: 74.7% regularly wore long sleeve clothes, 69.2% used repellents daily, 71.4% cleaned water containers at least once a week, 49.5% properly covered water containers, 89% removed waste and buried water discarded around their house, and 92.3% slept under bed nets at night. Fewer than one-third (28.6%) of the participants reported sleeping under bed nets during the daytime **(Figure 2)**

Figure 2: *Respondents' practices toward mosquito prevention for chikungunya (n=91)*



Among the participants who were aware of the disease, 38% had good knowledge scores, 43.9% had positive attitudes scores, and 42.8% were identified as practicing good preventive behavior against chikungunya infection in the past month **(Table 3)**

Table 3: *Classification of the overall KAP scores of the participants who ever heard of chikungunya (n=91)*

Classifications	Freq. (%)
Knowledge	
Good (score ≥ 3)	38 (**41.7)**
Poor (score < 3)	53 (58.3)
Attitude and perception	
Good (score ≥ 6)	40 (**43.9**)
Poor (score < 6)	51 (56.1)
Practice	
Good (score ≥ 4)	39 (**42.8**)
Poor (score < 4)	52 (57.2)

Bivariate and multivariate analysis: Factors associated with the KAP score

We found that educational level, marital status, occupation, and place of residence were significantly associated with level of knowledge, with p values of 0.02, 0.03, <0.001, and 0.04, respectively. However, only educational level, income level, and occupation showed statistically significant associations with the attitude components, with a p value of <0.001. For the practice component, only educational level and occupational status were statistically significant. **(Table 4)**

Table 4: Socio-demographics and good knowledge, attitudes, and practices (n=91)

Characteristics	Knowledge		P-Value	Attitude		P-Value	Practices		P-Value
	Freq.	%		Freq.	%		Freq.	%	
Sex									
Male	19	46.3	0.42	20	48.8	0.40	21	52.2	0.14
Female	19	38.0		20	40.0		18	36	
Age group									
18-35 years	16	53.3	0.29	18	60	0.08	16	53.3	0.25
36-50 years	11	35.5		12	38.7		10	32.3	
>50 year	11	36.7		10	33.3		13	43.3	
Education level*									
High school & above	**21**	**58.3**	**0.02**	**23**	**63.9**	**<0.001**	**21**	**58.3**	**0.05**
Secondary school	4	25		6	37.5		5	31.3	
Primary school	13	33.3		11	28.2		13	33.3	
Monthly income									
≥ 147 USD	**34**	**46.5**	**0.06**	**37**	**50.7**	**<0.001**	34	46.6	0.14
< 147 USD	4	22.2		3	16.7		5	27.8	
Marital status									
Married	**29**	**37.2**	**0.03**	33	42.3	0.40	32	41.1	0.30
Never married	9	69.2		7	43.9		7	53.8	
Occupation									
Self-employed	**10**	**20.8**	**<0.001**	**12**	**25**	**<0.001**	**9**	**18.7**	**<0.001**
Being employed	23	74.2		14	82.4		13	76.5	
No employment	5	41.6		13	53.8		17	65.4	
Place of residence									
Urban	**16**	**57.1**	**0.04**	16	57.1	0.09	**16**	**57.1**	**0.06**
Rural	22	34.9		40	38.2		23	56.5	

After adjusting for factors such as sex, age group, educational level, occupation, marital status and place of residence, we found that better income level, marital status (nonmarried), occupation (employed), and place of residence (urban) were associated with good knowledge. In the attitude component, income level and occupation remained statistically significant, whereas in the practice component, only occupation and urban residence were significantly associated with good practices.

In the knowledge component, those with an income of 147 USD or more per month increased the odds of having good knowledge of chikungunya by 3.1 times after all the factors in the model were adjusted (AOR = 5.1, 95% CI: 1.0–24.8). Similarly, the odds of having a good attitude were 6.2 times greater (AOR = 6.2, 95% CI: 1.2–31.2). Those who never married were 4.8 times more likely to have good knowledge than the reference group was (AOR = 4.8, 95% CI: 1.0–22.6). Moreover, self-employed participants were more likely to demonstrate good knowledge, attitudes and practices than the reference group was. Participants residing in the urban setting had significantly higher knowledge scores (AOR = 3.9, 95% CI: 1.1–3.6) and good practices (AOR = 3.6, 95% CI: 1.1–11.9). **(Table 5)**

Table 5: *Multivariate logistic analysis: Factors associated with the KAP scores of chikungunya (N=91)*

Variables	Knowledge (n=91)		Attitude (n=91)		Practices (n=91)	
	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)	OR (95%CI)	AOR (95%CI)
Sex						
Male	1	1	1	1	1	1
Female	0.7 (0.3-1.64)	1.3 (0.3-4.5)	0.7 (0.40-1.6)	0.7 (0.2-2.5)	0.5 (0.2-1.24)	0.9 (0.2-3.05)
Age group						
18-35 years	1	1	1	1	1	1
36-50 years	2.0 (0.7-4.8)	0.8 (0.2-3.3)	2.3 (0.8-6.6)	1.4 (0.3-5.5)	2.4 (0.8-6.7)	1.2 (0.3-5.4)
>50 years	1.9 (0.7-5.5)	0.3 (0.1-2.0)	3.0 (1.0-8.6)	0.9 (0.2-4.6)	1.5 (0.5-4.1)	0.3 (0.07-2.1)
Education level						
High school & above	1	1	1	1	1	1
Secondary school	4.1 (1.1-15.5)	2.3 (0.4-13)	2.9 (0.8-9.9)	1.1 (0.2-1.09)	3.1 (0.8-10.7)	1.3 (0.2-6.6)
Primary school	2.8 (10.-7.1)	0.8 (0.1-3.6)	4.5 (1.7-11.9)	1.2 (0.3-4.7)	2.8 (1.1-7.1)	0.8 (0.18-3.6)
Monthly income						
≥ 147 USD	3.1 (0.91-10.1)	5.3 (1.0 -24.8)	5.1 (1.3-19.2)	**6.2 (1.2-31.2)**	2.2 (0.7-7.01)	4.3 (0.8-21.3)
< 147 USD	1	1	1	1	1	1
Marital status						
Married	1	1	1	1	1	1
Never married	3.8 (1.1-13.4)	**4.5 (1.0-22.6)**	1.5 (0.4-5.1)	1.0 (0.2-4.6)	1.6 (0.5-5.40)	1.3 (0.2-6.2)
Occupation						
Being-employed	1	1	1	1	1	1
Self-employment	12.3 (3.3-46.2)	**17 (3.0-94.5)**	14 (3.4-57.2)	**9.2 (1.8-46.2)**	14 (3.7-53.4)	**18.2 (3.4-96)**
No employment	2.3 (0.6-9.3)	2.2 (0.4-11.4)	4 (0.9-17.3)	2.3 (0.4-12.4)	1.7 (0.4-6.8)	1.7 (0.3-8.9)
Residence						
Rural	1	1	1	1	1	1
Urban	2.5 (0.9-6.1)	**3.9 (1.1-3.6)**	2.1 (0.9-5.3)	2.6 (0.8-8.2)	2.3 (0.9-5.7)	**3.6 (1.1-11.9)**

Discussion

This study highlighted lower KAP scores since approximately 42-43% of the participants had good knowledge, positive attitudes, and appropriate practices related to chikungunya. Additionally, we found that higher income, not being married, and being self-employed were the main predictors of good knowledge. However, higher income and self-employed status were the two main predictors of positive attitudes, whereas the predictors of appropriate practices included those who were self-employed and those living in urban areas.

Approximately 33% of the study participants were aware of chikungunya, also known as CHIKV fever. Awareness of chikungunya was unevenly distributed across Svay Rieng Province. However, all study participants residing in urban areas were more aware of the disease than were those in rural areas. Studies conducted in India, Ethiopia, and Bangladesh have also indicated high awareness and knowledge of chikungunya in urban settings (5,7,14). This may be explained by the fact that Chikungunya is more prevalent in urban settings than in rural settings (2).

The majority of the participants learned about chikungunya from media and social media, while some became aware of chikungunya through personal or infected family members. A systematic review of studies on the risk perceptions, attitudes and knowledge of chikungunya among the public and health professionals indicated that high awareness of chikungunya was in an outbreak-affected area where public education, media, social media, and personal experience with the disease were more commonly observed (15). For example, a study from Bangladesh demonstrated that media outlets and social media were associated with reducing the incidence of chikungunya, serving as a key medium used for educating the public and being included as part of a prevention strategy for chikungunya (16).

More than half of the study participants had poor knowledge, attitudes and practices regarding chikungunya prevention. Men tended to have higher knowledge scores than women did, but this difference was not statistically significant according to either bivariate or multivariate analysis. Good knowledge of chikungunya was more prevalent among younger participants aged 18–35 years. This could be explained by the fact that younger participants were also active on social media and generally had higher educational levels than older participants (17).

Compared with those in the reference group, participants with higher monthly income were significantly more likely to have good knowledge and attitudes toward chikungunya prevention. Higher income often linked to bigger access to health information, health service and preventive measure making them more aware and knowledgeable of the disease (18) However, result from our study indicated that income was not a statistically significant factor in determining good practices.

Our study found that participants residing in urban areas tend to have better knowledge, attitudes and practices regarding chikungunya prevention than those residing in rural areas. From our data, it is suggested that those with income were mostly resided in urban area. This could explain that high income individual are more likely to live in urban areas and tend to have more knowledge and positive attitudes toward chikungunya prevention as they have bigger access to information and service in term of care and prevention (18).

Self-employed participants were more likely to have significant knowledge across the three KAP components. This could also mean that self-employed participants may have more time and proactive in seeking out information make them healthier compare to other groups (19). They may engage more in community health session or searching time on social media as they are not constrained by fixed working schedule (19). However, this does not necessarily mean that they practice better prevention strategies than self-employed individuals do. Different studies have reported various findings on the relationships between KAP and sociodemographic factors. Some studies have shown that good knowledge translates into good attitudes and practices, whereas others have shown that good knowledge does not lead to improved attitudes and practices (5,6,20).

This study had several limitations. This study was conducted in only 20 of 100 target villages in Svay Rieng Province; these villages were not fully representative of the entire population of the province. Additionally, self-reporting bias may exist, particularly in practice components, as those with good knowledge may overreport their preventive behavior. As a result, the estimated proportion in this study may be higher than the actual situation.

Conclusion

There was a low level of awareness and the KAP in chikungunya in Svay Rieng Province. Among those who were aware of the disease, fewer than half had good knowledge, positive attitudes and appropriate practices regarding chikungunya. Self-employment status, high income level, marital status, and living in urban areas are the main predictors of KAP toward chikungunya. By utilizing various channels for dissemination, such as community meetings, social media, radio, television, posters, and pamphlets, to reach a wide audience, including poor people, unemployed people could increase awareness of chikungunya. Moreover, a rural community engagement strategy is important for changing the poor routine practices of mosquito-borne disease prevention, which could also potentially be effective in preventing chikungunya infection.

Authors' contribution

Sophanith Ung was responsible for writing the conceptualization, methodology, analysis, and original draft of the manuscript. Professor Heng Sopheab and Assistant Professor Tol Bunkea contributed to the review and editing of the manuscript, specifically focusing on the results and discussion sections.

Acknowledgement

The authors would like to express their gratitude to the Svay Rieng Provincial Health Department for providing access to the data used in this study. We would also like to acknowledge the support and guidance provided by colleagues and collaborators throughout the research process.

Funding

This research did not receive any specific grants from any funding agencies.

Conflict of interests

The author declares no competing interest in this research study.

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