

RESEARCH NOTE

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The evaluation of awareness, attitude, and performance of the residents of Bandar Abbas in relation to preventive behaviors and methods for controlling dengue fever

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Abstract

Objective Dengue fever is a rapidly spreading viral disease transmitted by mosquitoes, and it is becoming a global concern. This study aimed to assess the awareness, attitude, and performance of the people in Hormozgan province in carrying out preventive behaviors and dengue fever control methods.

Method This descriptive-analytical study was conducted in 1401 in Bandar Abbas, Iran. A total of 642 men and women participated in the study, and a researcher-made questionnaire was used to collect data on demographic information, awareness, attitude, and performance. The data were analyzed using descriptive statistics.

Findings The study included 642 citizens of Bandar Abbas, with the majority being male. The average scores for awareness, attitude, and performance were relatively low, indicating insufficient knowledge and weak preventive behaviors regarding dengue fever.

Conclusion The findings suggest a need for educational programs to increase awareness and preventive behaviors among the citizens, especially in essential areas such as protected coverage against mosquito bites and inspection of water accumulation sites in homes. It is also important for health centers and mass media to provide more information and education about dengue fever and its prevention.

Keywords Awareness, Attitude, Performance, Dengue Fever, Bandar Abbas, Iran

Introduction

In the past five decades, due to factors such as urbanization, globalization, and international mobility, the modern world has witnessed a significant increase in global arboviral diseases, especially dengue fever, chikungunya, and Zika [1]. The severe outbreaks of these diseases and their threat to human health, along with the challenges of prevention and control, have been evident [2]. The spread of these diseases has been coordinated with the expansion of the two main vectors, *Aedes aegypti* and *Aedes albopictus* mosquitoes. The dispersal of both species has been greatly influenced by international trade, travel, and

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climate change. While the flight range of these species limits their active dispersal, their passive dispersal has expanded through long distances via ships, international trade of tires and lucky bamboo plants, and even by airplanes due to their resistant eggs to desiccation [1]. The global emergency declaration following the Zika virus outbreak, along with a significant increase in dengue and chikungunya cases in recent years, has raised a red flag for governments, research institutions, investors, and the World Health Organization in the Eastern Mediterranean region to strengthen programs and research in this field.

Dengue fever (DF) and dengue hemorrhagic fever (DHF) are among the most prevalent mosquito-borne diseases in Southeast Asia, the Western Pacific region, and the United States. This disease is caused by the dengue virus (DENV). Iran has always been susceptible to DENV infection due to its geographical location and bordering countries endemic to DENV, such as Afghanistan and Pakistan. In 2011, over 17,000 cases of DF with 219 deaths were reported in Pakistan [3]. In 2013, over 74,000 cases were confirmed in India [4]. The World Health Organization classifies dengue into two major categories: dengue (with/without warning signs) and severe dengue. Severe dengue is a potentially fatal complication due to plasma leakage, fluid accumulation, respiratory distress, severe bleeding, or organ impairment [5]. Since the *Aedes aegypti* species was reported in Bandar Lengeh in 2019 and in Bandar Abbas in 2021, it appears to be rapidly spreading in the country, posing a risk of dispersal to other provinces.

Given that *Aedes aegypti* has developed resistance to most insecticides, has diverse and inaccessible larval habitats, and has tolerance to desiccation of eggs, the eradication of this vector is not feasible. This disease is highly significant as it can cause serious problems in various health, social, economic, and political dimensions. Therefore, necessary preventive measures are required due to the spectrum of diseases transmitted by it and the fundamental problems and the involvement of the health sector and the lack of sufficient facilities, which necessitates community awareness.

A key solution in this regard is the assessment of knowledge, attitude, and practices of individuals in the community. Therefore, community knowledge, attitude, and practices (KAP) for controlling *Aedes*-transmitted arboviruses are essential. Therefore, apart from evaluating the KAP of the community regarding *Aedes*-transmitted diseases, providing initial knowledge about this disease and its prevention methods is of utmost importance.

Considering the reported presence of *Aedes aegypti* mosquitoes in several counties of Hormozgan and the potential establishment of this species throughout the province, as well as the possibility of epidemics related to

this vector due to the migration of neighboring countries such as Pakistan, there is a lack of studies on the awareness, attitude, and practices of the residents of Bandar Abbas and the involvement of Hormozgan province. Therefore, this study was conducted to determine the awareness, attitude, and practices in carrying out preventive behaviors and *Aedes aegypti* control methods in the people of Hormozgan province.

Materials and methods

This descriptive-analytical and cross-sectional study was conducted in Bandar Abbas in 1401. The sampling method was convenience sampling, and 642 men and women residing in Bandar Abbas who were willing to participate in the study were included. G-power software was used to determine the sample size, and in order to increase the robustness of research and an attrition rate of 5%, which resulted in a sample size of 608 individuals considering a confidence level of 95%, power of 80%, effect size of 0.2, and 6 predictor variables. The inclusion criteria included willingness to participate in the study, residing in Bandar Abbas, and the exclusion criteria included unwillingness to continue cooperation, incomplete questionnaire response, and non-compliance.

The data collection tool was a self-made questionnaire (according to the updated guidelines of WHO and Ministry of Health) in two parts: the first part of the questionnaire included 5 demographic questions such as (age, gender, marital status, education and occupation). The second part of the researcher-made questionnaire was in 3 areas of awareness, attitude and performance, which was used after validity and reliability. The validity of the questionnaire was done through a panel of experts consisting of academic staff members of health education and health promotion and medical entomology. After collecting experts' opinions, the necessary changes were made in the items of the tool and its qualitative face validity was completed and the tool entered the next stage of validation. Quantitative formal validity method was used to reduce expressions and remove inappropriate expressions. For reliability, the questionnaire was completed by 30 people who were not in the study in a period of 10 days. Cronbach's alpha was 0.89 for awareness questions, 0.91 for attitude related questions, and 0.93 for performance questions. There were questions about the state of awareness (20 questions), attitude measurement questions (7 questions) and questions related to performance (15 questions). In the knowledge section, the correct answer is score 1, I have no opinion, and the wrong score was zero. Therefore, the minimum score obtained was zero and the maximum score was 20. In the Likert attitude section, five options from completely agree to completely disagree had scores from 5 to 1 respectively. Therefore, the minimum score in the attitude section

was 5 points and the maximum score was 35 points. In the performance section, the options of always, most of the time, sometimes, rarely, and never had scores of 5, 4, 3, 2, and 1, respectively. Therefore, the score that can be obtained in the functional part was between 5 and 75 points. Awareness had 20 questions with a score between minimum zero and maximum twenty, and the average score was 9.25 and standard deviation was 2.35. It means 25/46 total score. Attitude had 7 questions and its score could be between 7 and 35, the average score was 34.44 with a standard deviation of 2.42, which means 85% of the total score. The performance had 15 questions and the score was between 15 and 75, the average score was 33.46 with a standard deviation of 5.91, which is 44.61% of the total score.

Data was collected through online and printed questionnaires. In this way, first a brief explanation about the purpose of the research was presented, and a printed questionnaire was distributed and collected in health care centers and a link to an online questionnaire through virtual space and communication applications and SMS. The collected information was entered into SPSS 21 software and quantitative variables were used to describe mean and standard deviation, qualitative variables were described using frequency, relative frequency. T-test, one-way analysis of variance, and multivariate linear regression were used to determine the relationship between demographic variables and knowledge, attitude, and performance. In all tests, a significance level of less than 0.05 was considered. This study is extracted from a research project at Hormozgan University of Medical Sciences, which has been approved by the ethics committee of the said university with the code of ethics IR.HUMS.REC.1401.075.

Table 1 Demographic characteristics of study participants

Variables		N (%)
Age	15–19	84(13.1)
	20–29	274(42.7)
	30–39	105(16.3)
	40–64	179(27.9)
Sex	man	344 (53.6)
	Woman	298 (46.4)
Marital	single	287 (44.7)
	married	319 (49.7)
	Divorced / widow	36 (5.6)
Education	Under diploma	138 (21.5)
	Diploma	246 (38.3)
	Academic	258 (40.2)
Job	Under graduated	92 (14.3)
	Employee	89 (13.9)
	Jobless	195 (30.4)
	Others	266 (41.4)

Results

Demographic characteristics of participants: The demographic characteristics of the participants in the study are presented in Table 1. In this research, 642 individuals from the citizens of Bandar Abbas city, aged between 15 and 64 years, were examined and studied. The research findings regarding the background characteristics of the respondents indicate that 53.6% (344 individuals) were male and 46.4% (298 individuals) were female. The majority of participants were in the age range of 20 to 29 years. 49.7% (319 individuals) were married. 41.4% (266 individuals) had a high school education. 40.2% (258 individuals) had a university education (Table 1). 62% of the participants gave the correct answer to the question “Using door and window nets prevents Aedes mosquito bites”(Table 2). In the field of attitude, 60.1% of the participants were completely disagree “I believe that my neighbors and I should be responsible for improving and eliminating mosquito habitats”(Table 3). In the field of performance, 11.5% always covered the water containers outside the house”(Table 4). Other comments of the participants can be seen in the relevant tables of Knowledge, Attitude and performance (Tables 2, 3 and 4). Knowledge has 20 questions and its score can be between 0 and 20, the average score is 9.25, which means 46.25 total score. Attitude has 7 questions and its score can be between 7 and 35, the average score is 34.44, which means 85% of the total score. The performance has 15 questions and its score can be between 15 and 75, the average score is 44.61% of the total score”(Table 5).

Discussion

The present study aimed to determine the KAP of the residents of Bandar Abbas regarding preventive behaviors and dengue fever control methods. The results of the study indicated that the KAP of the citizens of Bandar Abbas regarding preventive behaviors and Aedes aegypti control methods were low. According to the findings, 40.7% of individuals were aware of the transmission of diseases caused by Aedes aegypti mosquitoes, but they lacked awareness about the transmission methods. Levels of KAP among communities may vary depending on the environmental context in which they live. However, some studies [6, 7] argue that high knowledge and attitude do not necessarily lead to good performance, but they play a role in directing performance.

The study by Rebecca Chandren and colleagues [8] indicated that educational and health programs should focus on increasing dengue fever knowledge to carry out preventive actions, especially in villages with a high presence of mosquitoes, requiring broader measures to combat them. The results of Stefopoulou and colleagues’ study showed a good awareness among citizens regarding disease transmission by Aedes mosquitoes. Similarly,

Table 2 Participants' responses in the field of knowledge

Knowledge	Correct	Incorrect	Don not know
	N (%)	N (%)	N (%)
1) Diseases transmitted by the Aedes mosquito are transmitted to a person through the bite of the carrier Aedes mosquito.	261(40.7)	173(26.9)	208(32.4)
2) Aedes-carrying mosquitoes bite more at night.	192(29.9)	150(23.4)	300(46.7)
3) One of the symptoms of diseases transmitted by Aedes mosquito is fever and body aches.	261(41.1)	160(24.9)	218(34)
4) Stagnant water around the living environment is a breeding ground for mosquitoes.	285(44.4)	153(23.8)	204(31.8)
5) If a person is infected with diseases transmitted by the Aedes mosquito, he can transmit it to another person.	175(27.2)	186(29)	281(43.8)
6) Aedes mosquito-borne diseases may spread from one place to another through travel.	175(27.2)	159(24.8)	308(48)
7) People can receive special medicine to protect against diseases transmitted by the Aedes mosquito.	256(39.9)	208(32.4)	178(27.7)
8) People can receive vaccines to protect against diseases transmitted by the Aedes mosquito.	181(28.2)	162(25.2)	299(46.6)
9) It is possible to transmit diseases transmitted by the Aedes mosquito from mother to fetus.	401(62.4)	116(18.1)	125(19.5)
10) The best way to prevent diseases transmitted by the Aedes mosquito is to prevent bites.	385(60)	122(19)	135(21)
11) Aedes is more common in the rainy season.	144(22.4)	150(23.4)	348(54.2)
12) The symptoms of diseases transmitted by the Aedes mosquito are similar to colds or influenza.	368(57.3)	152(23.7)	122(19)
13) The growth and spread of Aedes starts in the rainy season.	352(54.8)	157(24.5)	133(20.7)
14) Liquid foods are very helpful in treating dengue.	329(51.2)	102(15.9)	211(32.9)
15) Dusting and sweeping prevent the reproduction of the Aedes mosquito.	177(27.6)	121(18.8)	344(53.6)
16) Using door and window nets prevents Aedes mosquito bites.	398(62)	96(14.9)	148(23.1)
17) Using repellents in the form of creams, sprays, ointments on the skin prevents bites.	323(50.3)	120(18.7)	199(31)
18) The water under the pot can be the place where the eggs accumulate.	288(44.9)	169(26.3)	185(28.8)
19) Using insecticide spray is suitable to kill Aedes mosquitoes indoors.	303(47.2)	180(28)	159(24.8)
20) The use of electric mosquito repellents is effective for eliminating Aedes mosquitoes indoors.	361(56.2)	102(15.9)	179(27.9)

Table 3 Participants' responses in the field of attitudes

Attitudes	Com-pletely disagree	Disagree	Without idea	Com-pletely agree	agree
1) I think it is possible that I will get diseases transmitted by the Aedes mosquito.	362(56.4)	166(25.9)	106(16.5)	0	8(1.2)
2) I am afraid of contracting diseases transmitted by the Aedes mosquito.	375(58.4)	140(21.8)	126(19.6)	0	1(0.2)
3) I believe that my neighbors and I should be responsible for improving and eliminating mosquito habitats.	386(60.1)	135(21)	116(18.1)	0	5(0.8)
4) I believe that diseases transmitted by the Aedes mosquito can be prevented.	349(54.4)	176(27.4)	110(17.1)	0	7(1.1)
5) I think the diseases transmitted by the Aedes mosquito is a dangerous disease.	320(49.8)	119(18.5)	153(23.8)	0	50(7.8)
6) I am worried that my living environment is a breeding ground for Aedes mosquitoes.	298(46.4)	230(35.8)	107(16.7)	0	7(1.1)
7) I am concerned that the surrounding neighborhoods are potential breeding grounds for Aedes mosquitoes.	347(54)	144(22.4)	151(23.5)	0	0

the study by Hui Liu and colleagues [9] also indicated that most people had a high level of knowledge. However, health education interventions are necessary to enhance perceived sensitivity and severity of dengue fever among the population.

In the study by Al-Dubai and colleagues [10], the results showed that the community's knowledge about dengue transmission was very high, and the community's perception of the severity, importance, and risk of dengue fever was also very high. Participants who had previously been diagnosed with dengue were more concerned about the risk of contracting the disease and recommended the use of insect repellents. Studies in Thailand and Malaysia [10, 11] demonstrated a direct correlation between knowledge and dengue prevention. Therefore,

continuous assessment of individuals' knowledge is crucial for improving and coordinating comprehensive educational health programs in Bandar Abbas.

Another factor that can significantly impact the low KAP of the population is the timing of the study. This study was conducted at the onset of disease emergence and preventive measures for Aedes, for which the residents had no prior background about Aedes mosquitoes and dengue fever. These results indicate a lack of real awareness and highlight the necessity of information dissemination and educational media distribution through various channels to increase awareness and, consequently, improve attitudes and appropriate preventive actions against dengue and the prevention of Aedes mosquito proliferation.

Table 4 Participants' responses in the performance domain

Performance	Never	A little	sometimes	Most of the time	always
1) When I learn about the spread of diseases transmitted by the Aedes mosquito, I use insecticidal spray.	270(42.1)	143(22.3)	41(6.4)	172(26.7)	16(2.5)
2) When I learn about the spread of diseases transmitted by the Aedes mosquito, I use mosquito repellents (gel, cream, repellent).	221(34.4)	213(33.2)	39(6.1)	136(21.2)	33(5.1)
3) I use a mosquito net when I sleep (day and night sleep).	278(43.3)	173(26.9)	42(6.5)	1.6(16.5)	43(6.7)
4) I regularly check the bottom of my pots and drain the accumulated water.	289(45)	138(21.5)	38(5.9)	137(21.3)	40(6.2)
5) I install nets on the doors and windows of my house.	267(41.6)	151(23.5)	40(6.2)	137(21.3)	47(7.3)
6) If I suspect that I have a disease transmitted by the Aedes mosquito, I go to the doctor.	283(44.1)	182(28.3)	139(21.7)	2(0.3)	36(5.6)
7) I cover the water containers outside my house.	228(35.5)	143(22.3)	75(11.7)	122(19)	74(11.5)
8) I throw away used items in the home environment (water container, tires, etc.) that have the possibility of water accumulation.	279(43.5)	144(22.4)	56(8.7)	106(16.5)	57(8.9)
9) My neighbors and I clean our living environment to prevent Aedes mosquitoes.	251(39.1)	165(25.7)	70(10.9)	92(14.3)	64(10)
10) I check the possible breeding places of Aedes mosquito in my house.	292(45.5)	156(24.3)	29(4.5)	142(22.1)	23(3.6)
11) I check for disposable items that can hold water around the house.	267(41.6)	150(23.4)	45(7)	154(24)	26(4)
12) I participate in environmental improvement activities to prevent Aedes.	272(42.4)	176(27.4)	30(4.7)	138(21.5)	26(4)
13) I prune the bushes around my house to prevent Aedes.	276(43)	146(22.7)	48(7.5)	136(21.2)	36(5.6)
14) I eliminate water accumulation places in the home environment.	242(37.7)	187(29.1)	28(4.4)	156(24.3)	29(4.5)
15) I try to use worn clothes.	289(45)	160(24.9)	31(4.8)	134(20.9)	28(4.4)

Table 5 Comparison of the average score of knowledge, attitude, and performance based on demographic variables

Demographic variable		knowledge		attitude		performance	
		P value	Mean ± Std	P value	Mean ± Std	P value	Mean ± Std
Sex	female	0.599	2.408 ± 9.20	0.134	2.547 ± 34.29	0.438	5.965 ± 33.65
	male		9.30 ± 2.304		2.302 ± 34.57		5.882 ± 33.29
Age	15–30	0.707	2.347 ± 9.20	0.090	2.348 ± 34.30	0.191	5.628 ± 33.66
	31–40		2.502 ± 9.41		2.765 ± 34.38		6.477 ± 33.85
	41–64		2.266 ± 9.29		2.325 ± 34.80		6.171 ± 32.73
Marital status	single	0.707	2.359 ± 9.29	0.088	2.280 ± 34.26	0.222	5.522 ± 33.78
	married		2.348 ± 9.22		2.523 ± 34.59		6.217 ± 33.20
Education	motevasete	0.510	2.513 ± 9.11	0.328	2.453 ± 34.37	0.304	6.331 ± 32.78
	Diploma		2.380 ± 9.38		2.332 ± 34.62		6.032 ± 33.70
	Academic		2.234 ± 9.21		2.486 ± 34.31		5.567 ± 33.60
Job	Undergraduated	0.073	2.348 ± 9.78	0.220	2.395 ± 33.96	0.698	5.775 ± 34.13
	Employee		2.433 ± 8.89		2.718 ± 34.45		5.671 ± 33.36
	Jobless		2.191 ± 9.20		2.214 ± 34.51		5.727 ± 33.41
	Others		2.461 ± 9.24		2.510 ± 34.56		6.284 ± 33.28

In terms of increasing awareness, it is advisable to utilize reliable and trustworthy resources under the supervision of entomology experts and tailor the educational methods based on educational needs assessment and access to information resources. To enhance attitudes, the focus should be on attitudes towards desirable behavior to increase the likelihood of performing a behavior. The more positive an individual's attitude towards a desirable behavior, the greater the likelihood of intending to perform that behavior. Another influential factor for attitude is the assessment of behavioral outcomes. If individuals understand the value of the outcome resulting from the correct behavior, the likelihood of performing that behavior will increase. Therefore, to enhance attitudes, the sum of behavioral beliefs and outcome evaluations

should be inclined towards performing the behavior, which will increase the likelihood of more behavior occurrence [12]. In the study of Handel et al. [13], knowledge, attitude and performance KAP (practice and health workers) are considered as important factors that affect the occurrence and transmission of dengue disease. In the study of Nikookar et al. [14], which investigated the awareness, attitude and performance of healthcare workers, the results showed that the awareness, attitude and performance of the employees were low, which is in line with the present study. It seems that in order to achieve the goals of health development regarding the prevention of the spread of diseases caused by the Aeds mosquito, it is better to take measures on employees and all members of society. Training employees improves their knowledge,

attitude and performance, and this indirectly improves people's knowledge, and direct training and influencing people's knowledge, attitude and performance has a significant effect on preventive measures against *Aedes* mosquito bites. In order to adopt health development policies in a society, increasing the knowledge, awareness and training of health system employees and raising their skills level, as the pioneers of improving access to primary health care services in the form of documented educational workshops, is very necessary to improve the collective and individual health of the people [15].

In the study by Wong and colleagues [16], urban and rural communities were exposed to the risk of dengue virus infection through various factors. Rural communities are more susceptible due to higher vegetation density and water storage habits, especially in times when water supply is not readily available. On the other hand, urban communities are at risk due to living in high-rise buildings and the presence of covered ornamental plant pots, which, due to their busy lifestyle, are not regularly cleaned, leading to an increased possibility of the spread of mosquito-borne diseases, particularly those transmitted by *Aedes aegypti*. In Bandar Abbas, being a port city, the high levels of heat and humidity contribute to the prevalent cultivation of ornamental plants. Failure to replace or dry stagnant water under plant pots is common, which is one of the reasons for the proliferation of mosquitoes.

Limitations of study

As this mosquito has only been found in a few provinces, the number of relevant published papers in Iran is limited to compare and discuss the results.

Suggestions

In order to increase the level of awareness, attitude and performance of the people of Bandar Abbas regarding preventive behaviors against diseases caused by the *Aedes* mosquito, it is necessary to carry out an educational intervention.

Conclusion

In conclusion, the study highlights the need for targeted educational and health interventions to improve the knowledge, attitude, and practices of the residents of Bandar Abbas in preventing dengue fever and controlling *Aedes aegypti*. These interventions should focus on increasing awareness and understanding of the transmission and prevention of dengue fever, especially in areas with a high presence of mosquitoes.

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Author contributions

AY, LH designed the study. NSH, SHM, MSH and AY conducted article screening and extraction, synthesis of findings and prepared the manuscript. LH reviewed and edited the manuscript along with securing the funding for the project. The author(s) read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Ethical approval for this research was granted by the ethics board of Hormozgan University of Medical Sciences. All survey participants were provided with a summary of the research and provided written informed consent at the beginning of the survey. All procedures were performed according to the relevant instructions.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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