KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING MALARIA CONTROL IN AN ENDEMIC AREA OF SOUTHERN IRAN

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Abstract. Iran is in the malaria pre-elimination stage. In this situation community based strategies are important for malaria control. In order to intensify elimination activities we need to have a better understanding of the knowledge, attitudes and practices (KAP) of malaria prevention in the community. We carried out a KAP study in one malaria endemic district in southern Iran in 2009 using a structured questionnaire. Five villages with indigenous malaria cases during the previous year and a high potential for anopheline mosquito breeding were selected. All the households in each village were visited and the head of the household or other responsible adult was interviewed. Data were analyzed using SPSS 11.5. A total of 494 respondents from the five villages participated. More than 33% of people in the study area were living in sheds with poor facilities. The illiteracy level of the studied population was high (44.2%) and significantly affected the knowledge and practices of the respondents about malaria control ($p<0.05$). Descriptive analysis showed significant differences between sex, job and history of malaria infection of the respondents and their knowledge and practices about malaria control ($p<0.05$). Knowledge of the respondents about the route of transmission in malaria was good; 72.1% knew mosquitoes were the vector. Most people knew at least one symptom of the disease. The practices of respondents were 59.5% for bednet use and 9.3% for screening windows. The knowledge, attitudes and practices of respondents in this survey about malaria control were good in some cases, but in general needed to be improved with educational programs.

Keywords: malaria control, KAP, Iran

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INTRODUCTION

Malaria is a worldwide disease with an estimated 243 million cases and 863,000 deaths in 2008. The vast majority of cases were in Africa, followed by Southeast Asia and the Eastern Mediterranean; Regions.

The deaths were most common in Africa (89%), followed by the Eastern Mediterranean and Southeast Asia (WHO, 2009).

In Iran, malaria is endemic in the southeastern part of the country. The first attempt to control it was through a control program started in 1948 (Edrissian, 2006). The number of malaria cases in Iran decreased from 64,581 in 1993 to 6,570 in 2008 (Edrissian, 2006; MoH and ME, 2008).

About 80% of all malaria cases in Iran are in southeastern area. Six anopheline species are known vectors for malaria in this area: *An. culicifacies*, *An. stephensi*, *An. dthali*, *An. fluviatilis*, *An. superpictus*, and *An. pulcherrimus* (Vatandoost, 2001; Zahirnia *et al*, 2001; Enayati *et al*, 2003; Naddaf *et al*, 2003; Oshaghi *et al*, 2003a,b; Vatandoost *et al*, 2004, Vatandoost and Borhani 2004; Vatandoost and Moinvaziri 2004; Oshagi *et al*, 2005; Vatandoost *et al*, 2005; Hanafi-Bojad *et al*, 2006; Oshaghi *et al*, 2006a,b,c; Vatandoost *et al*, 2006a,b; Emami *et al*, 2007; Davari *et al*, 2007; Vatandoost *et al*, 2007; Abai *et al*, 2008; Rafinejad *et al*, 2008; Vatandoost *et al*, 2008a,b; Vatandoost *et al*, 2009a,b; Omrani *et al*, 2010a,b). *An. sacharovi* and *An. maculipennis* malaria vectors in northern Iran (Oshaghi *et al*, 2003b; Sedaghat *et al*, 2003a,b; Sedaghat and Harback, 2005; Doosti *et al*, 2006, 2007).

A malaria report from the Islamic Republic of Iran in 2009 showed evidence of a sustained decrease in the number of cases associated with wide scale implementation of malaria control activities, and classified Iran as in the malaria pre-elimination stage (WHO, 2009).

Studies from different parts of the world have shown people in rural areas have a good understand of the risk of malaria, but their knowledge and practices regarding health behavior are poor (Williams and Jones, 2004). Current emphasis in malaria control is centered on community-based strategies. The success of such strategies relies on an understanding of human behavior and the socio-cultural, political, economic and environmental contexts that influence these behaviors (Williams and Jones, 2004).

Bashagard is one of the most important foci of malaria in Hormozgan Province, southern Iran. It contains 40-50% of the annual malaria cases in this province. The API has ranged from 6.6 to 131.4 during the past decade (1999-2008). The life style and culture of people in this district and the difficulty in accessing some rural areas make it a good place for malaria transmission. Malaria control in this area includes indoor residual spraying, larviciding and distributing insecticide treated bed-nets.

The aim of this study was to evaluate the knowledge, attitudes and practices about malaria control to find gaps in the control program.

MATERIALS AND METHODS

Bashagard District in northeastern Hormozgan Province, southern Iran (Fig 1) located at 26º 21′ N and 57º 54′ E. Bashagard contains a total population of about 32,000. The area is mountainous with low precipitation and a hot, dry climate. In 2008 the average relative humidity was 46.3% with 140 mm precipitation. The minimum and maximum temperatures were 9.8ºC and 44.2ºC, respectively. There are different seasonal rivers in the area that provide suitable places for mosquito breeding. People live in mud houses and sheds made with palm leaves (Fig 2).

Five villages (Sardasht, Molkan, Goorichi, Dargazan and Chokhon) were selected by simple random sampling

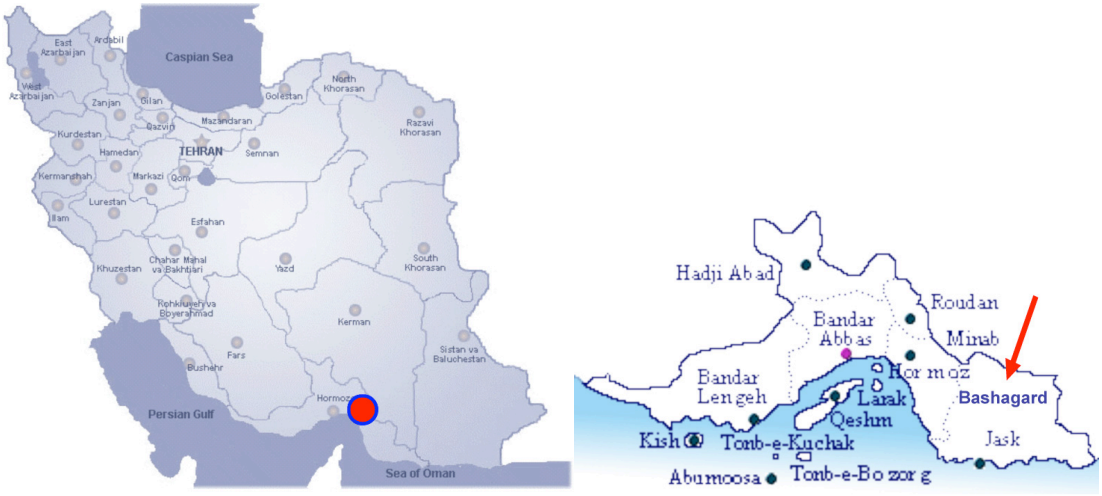

Fig 1–Hormozgan Province, southern Iran.

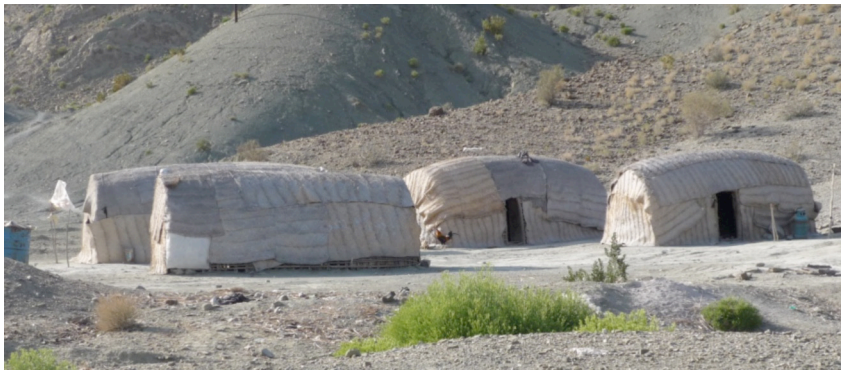

Fig 2–Sheds (Kapar), a living place for people in Bashagard.

based on factors, such as indigenous malaria cases during the previous year, suitable places fore mosquito breeding and easy access.

A descriptive cross-sectional survey using a structured questionnaire, including demographic characteristics, knowledge, attitudes and practices of people about malaria prevention was used. The questionnaire was administered to all households in the selected villages during November-December 2009. The head of the household or a responsible adult was interviewed by a team of interviewers. Collected data were analyzed with SPSS 11.5. Descriptive analysis and the χ^2 test were used to compare different groups.

Ethical considerations

This study was part of national strategy for malaria control and elimination. It is a joint project of different intersectoral orgnizations, including Tehran University of Medical Sciences, Hormozgan University of Medical Sciences and the Center for Disease Control, Ministry of Health and Medical Education of Iran. Ethical approval from a university ethics committee was obtained.

RESULTS

A total of 494 households from five villages were interviewed. In each village, both sheds and mud-made houses were used by the local population. The road was good in each of the villages but not asphalted in Molkan and Dargazan. Electricity and piped water were present in all the studied villages. Permanent or seasonal rivers, and springs of water are present in these villages and provide suitable breeding places for anopheline mosquitoes. Indigenous malaria cases have been reported from each of the studied villages.

The demographic characteristics of the studied population and their residences are described in Table 1. The rate of illiteracy of the respondents was high (44.2%); the literate population had mostly (36.6%) a primary school education level. Many of the subjects had work, usually a small business with a low income. The percent unemployed in our sample was high (23.5%). We included students in the unemployed group because they had no income. One type of residence, called a shed (or "Kapar" in local language) is made of palm leafs (Fig 2). Sheds are common in Bashagard District, with some villages being totally comprised of sheds. In the studied villages 33.6% of the population lived in these sheds. In recent years the government has had a program to improve the living facilities in this area. Roads have been constructed and access to the villages is easier. Nearly 95% of the villages in this area have access to electricity and piped water. In the 5 studied villages only 3.8% of interviewed families had no access to electricity in their houses/sheds and only 8.1% had no piped water. More than half (65%) of families had containers for water storage and animal

Table 1
Demographic characteristics of subjects and their residences in Bashagard, southern Iran, 2009.

Characteristic	Number	Percent
Gender		
Male	281	56.9
Female	213	43.1
Family size		
1-4	227	45.9
5-9	256	51.8
≥10	11	2.3
Education level		
Illiterate	218	44.2
Primary	181	36.6
Secondary	44	8.9
High school and higher	51	10.3
Occupation		
Free	150	30.4
Employee	43	8.7
Housewife	185	37.4
Unemployed	116	23.5
Type of residence place		
Mud	328	66.4
Shed	166	33.6
Electrical power		
Yes	475	96.2
No	19	3.8
Piped water		
Yes	454	91.9
No	40	8.1
Water saving container/pool		
Yes	322	65.2
No	172	34.8
Animal shelter close to house		
Yes	340	68.8
No	154	31.2
History of indoor residual spraying		
Yes	319	64.6
No	175	35.4
History of malaria infection in family members of respondent		
Yes	287	58.1
No	207	41.9
Total $N = 494$		

Table 2
Knowledge, attitudes and practices of respondents about malaria in Bashagard District, southern Iran, 2009.

Question	Answers	Number	Percent
What is the transmission route of malaria?	Mosquito bite	359	72.7
	Infected water/air	135	27.3
Where do mosquitoes breed?	Water	316	64.0
	Trash/animal feces, etc	178	36.0
What are malaria symptoms?	Fever/Chill/Bone pain	480	97.2
	False answer	14	2.8
What is the source of your information?	Radio/TV	62	12.6
	Health workers	414	83.8
	Others	18	3.6
Using bed-net is useful for malaria prevention.	Yes	463	93.9
	No	31	6.1
Agree with indoor residual spraying of your house.	Yes	475	96.2
	No	19	3.8
Are you interested in participating in a malaria control program as a volunteer?	Yes	376	76.1
	No	118	23.9
Do you have a covered water container?	Yes	306	95.0
	No	16	5.0
Do you use a bed net for sleeping?	Yes	294	59.5
	No	200	40.5
Do your doors and windows have screens?	Yes	46	9.3
	No	448	90.7
Do you use an air conditioner?	Yes	312	63.2
	No	182	36.8
Usual sleeping place on summer nights.	Inside house with air conditioner	296	59.9
	Inside shed	115	23.3
	Outdoors	83	16.8
What do you do for malaria prevention?	Chemoprophylaxis	51	10.3
	Bed net	289	58.6
	Indoor residual spraying or using aerosols	138	27.9
	Others	10	2.0
	Nothing	6	1.2

shelters were close to houses in 68.8% of respondents.

A malaria control program is conducted in the studied areas. Sixty-four point six percent of residences were covered by indoor residual spraying (IRS). Malaria is an important disease in Bashagard District; 58.1% of interviewed subjects had a history of malaria infection themselves or family members.

Table 2 shows the knowledge, attitudes and practices of respondents about malaria. Their knowledge of malaria transmission routes was at a good level;

72.7% of them knew mosquito bites can transmit malaria. When we asked about symptoms of malaria, 97.2% answered at least one symptom correctly, such as fever or chills (Table 2). Most respondents (83.8%) obtained their information about malaria from village health workers. The majority of the studied population (93.9%) believed using bed nets can help prevent malaria and 96.2% mentioned residual spraying of their residences. Of the 494 respondents, 376 (76.1%) were interested in participating in a malaria control program as a volunteer.

Only 59.5% of households used bed nets and 9.3% used screens on doors/windows of their houses. Air conditioners were common in the studied villages and 59.9% of families slept inside their houses and used air conditioners during the summer, 115 families prefered to use sheds without air conditioners and 83 families usually slept outside. More than half of respondents (58.6%) said they used bed nets for malaria prevention.

DISCUSSION

The illiteracy rate among respondents was high (44.2%), 36.6% had a primary school education level. Among respondents knowledge about malaria transmission routes was good; 72.7% knew mosquito bites can transmit malaria, and 97.2% knew at least one or more symptoms of the disease. The majority of the studied population (93.9%) knew using bed nets can help prevent malaria and 96.2% agreed to having residual spraying of their residence. Fifty-nine point five percent of households used bed nets and 9.3% used screens on doors/windows of their houses. Fifty-eight point six percent of respondents knew bed nets can prevent malaria infection.

One of the most important factors for preparing a successful malaria control program is evaluation of the knowledge, attitudes and practices of people living in an at risk area to find ways to improve collaboration with the public health system. Our findings showed high levels of illiteracy among respondents. This factor can affect the success of control programs. Literacy level has a direct correlation with practice. We found a significant correlation between the education level of respondents and their interest in participating in malaria control programs as a volunteer ($p<0.05$). Education level also showed a significant role in using bed nets ($p<0.05$). According to other studies, an increasing trend in literacy is a protective factor for malaria morbidity (Koram, 1989; Masoumi *et al*, 2003). The results of the KAP study in Baluchistan area, southeastern Iran showed 67.5% were illiterate and one-third of respondents considered malaria as an important disease in the area; more than 58% of respondents considered mosquitoes to be the cause of malaria (Rakhshani *et al*, 2001). Knowledge about malaria among rural women in Kahnuj was found in 38.1% (Rostami *et al*, 1998). In our study, the illiteracy level was lower than in Kahnuj but knowledge about malaria transmission routes was higher. We found a significant difference between literacy level and knowledge about malaria transmission routes ($p<0.05$).

The knowledge of the respondent about transmission of malaria was good; 72.7% knew malaria was transmitted by the bite of an infective mosquito. This level was 34% in Zanzibar (Alilio and Bammek, 1998), 73% in Vietnam (Anh *et al*, 2005), 48.8% in Ethiopia (Paulander *et al*, 2009) and 99.7% in Swaziland (Hlongwana *et al*, 2009). More than 97% of the subjects in our study could name one or

more of the symptoms of malaria. For comparison most respondents (92.7%) in a KAP study in Ethiopia were able to name at least one symptom of malaria (Paulander *et al*, 2009). This may be partly due to a large number of people with malaria in both areas, so that most could recognize the symptoms of the disease. The high level of knowledge in our study area might also be due to a history of malaria infection in family members; 58.1% of respondents admitted to have a case of malaria among a family member in the past. Rakhshani *et al* (2001) found an awareness among rural housewives was higher than in urban areas ($p<0.001$). This may be due to more frequent contact with the disease in rural areas.

Personal protection has an important role in malaria prevention. Masoumi *et al* (2003) in Iran found not using nets or screens on doors and windows raised the risk of malaria by 5 times. In our study population only 9.3% used nets on doors and windows, but 59.5% used bed nets. These rates need to increase using with education, but they are higher in a study from Zanzibar where 30% of respondents used personal protection (Alilio and Bammek, 1998), in Kahnuj, southern Iran, where 30% used bed nets (Rostami *et al*, 1998) and in Swaziland where 38.8% used bed nets (Hlongwana *et al*, 2009). In Ethiopia more than 85% of respondents on the KAP study knew about bed nets, only 18.2% used them throughout the year, 44.1% during the rainy season, 48.7% after the rainy season and 9.8% during the dry season (Paulander *et al*, 2009). Only in a report from Vietnam did 84% claim to sleep under bed nets regularly (Anh *et al*, 2005). In our study we found a significant correlation between literacy level, job, sex and history of malaria infection and using bednets ($p<0.05$).

Most of the respondents believed bed nets, residual spraying (IRS), chemoprophylaxis or a combination of these factors could protect them against malaria infection. Chemoprophylaxis is not include in the national malaria control program (Saebi *et al*, 2006), however, bed nets are distributed in the area and residual spraying is used in some villages. More than 96% of respondents agreed with IRS in their residence. Because of sleeping behavior of the population in this area, IRS alone is not enough for malaria control. Education programs are needed to encourage people to use bed nets and other personal protection methods, such as using screens on doors and windows and using repellents. Although residual spraying is one of the best control methods for adult mosquitoes, but is useful only when vectors are endophilic and people sleep inside. More than 64% of respondents had used residual spraying in their houses. WHO guidelines recommended IRS coverage should be more than 80% in targeted communities (WHO, 2006). The coverage in the study area was not enough. Masoumi *et al* (2003) reported no significant differences between cases and control groups in their study area using IRS. This may be due to poor coverage and exophilic vectors in the study area.

The public health system has worked to provide information to people about malaria; 83.8% of respondents obtained their information from health workers. This rate was reported to be 50% by Rakhshani *et al* (2001) and 71% by Anh *et al* (2005). Employing radio/TV with the aim of increasing knowledge about prevention of malaria is important.

Bashagard District is the main malaria nidus for Hormozgan Province due to special geographic conditions. It is hilly with scattered villages. Seasonal

rivers, rainfall during the transmission season, natural mosquito shelters in numerous mountains and hills in the area and weather conditions have provided a suitable environment for malaria vectors in the district. The habitats of people in this area are different from other parts of the province, because they use sheds as living places.

We mentioned electricity as an important factor that can affect malaria morbidity. In our study area 96.2% of families had access to electricity. During the warm months of the transmission season 59.9% of the population used air conditioners in their rooms and sleep inside. This behavior will protect them from mosquitoes bites and reduce malaria morbidity. Another study in southern Iran found the chance of contracting malaria infection in areas without electricity increased 1.96 times more than the control group (Masoumi *et al*, 2003).

A problem in this study was the limited number and location of villages studied because of difficulty accessing some areas and budgetary restrictions. Further studies of malaria and its vectors in this area are recommended.

In conclusion, the knowledge of respondents was rather good about malaria symptoms, transmission routes and prevention. We recommend strengthening the malaria education programs for people in this area to eliminate malaria, which is the ultimate goal of malaria control in this country.

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