Knowledge, perceptions and prevention of malaria among women in Sistan va Baluchestan, Islamic Republic of Iran

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المعارف والمعتقدات والوقاية من الملاريا بين النساء في سيستان وبلوخستان، في جمهورية إيران الإسلامية

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الخلاصة: وزعت استمارات حول المعارف والمعتقدات والممارسات المتعلقة بالملاريا على عينة عشوائية تتكون من 2168 من النساء المتزوجات من المناطق الريفية والحضرية في سيستان وبلوخستان في جمهورية إيران الإسلامية. وقد كان وسطي أحراز المعارف للأفراد المدروسين منخفضاً ولا يتجاوز 5.5 (فيما كان أعلى حَرَز 15.0). وقد أوضح بعض المستجيبين للدراسة (37.6٪) أنهم يعرفون أن الملاريا من الأمراض الهامة في المنطقة، فيما أوضح 58.4٪ منهم أن الملاريا تنتقل بواسطة البعوض، ومعظم الناس 69.4٪ لم يستعمل من قبل أية ناموسية للوقاية من البعوض. و لم يطلب الرعاية من المراكز الصحية عند الإصابة بالحمى والنوافض أكثر من 49.9٪ من سكان الأرياف و73.8٪ من سكان المدن. إن العاملين الصحيِّين كانوا هم المصدر الرئيسي للمعلومات (29.5٪) بالنسبة للنساء الريفيات. أما دور الأطباء في التثقيف فقد كان ضئيلاً. لذلك ينبغي تصميم التثقيف الصحي بعد ذلك ليلائم الاحتياجات التثقيفية للسكان المستهدَفين في المنطقة.

ABSTRACT A questionnaire about malaria knowledge, beliefs and practices was given to a random sample of 2168 married women from rural and urban areas of Sistan va Baluchestan, Islamic Republic of Iran. The mean knowledge score of subjects was low at 5.5 (maximum 15.0). Few respondents (37.6%) knew that malaria was an important disease in the area and only 58.4% knew that malaria was transmitted by mosquitoes. Most subjects (69.4%) never used a mosquito net. Only 49.9% of rural and 73.8% of urban residents would seek care for fever and chills from the local health centre. Community health workers (*behvarz*) were the main source of information (29.5%) for rural women; the role of physicians in education was minimal. Subsequent health education must be tailored to the educational needs of the target population in this area.

Connaissance, perception et prévention du paludisme chez les femmes à Sistan va Baluchestan (République islamique d'Iran)

RESUME Un questionnaire sur les connaissances, les croyances et les pratiques concernant le paludisme a été distribué à un échantillon aléatoire de 2168 femmes mariées dans les zones rurales et urbaines de Sistan va Baluchestan (République islamique d'Iran). Le score moyen pour les connaissances des sujets était faible : 5,5 (maximum 15,0). Peu de sujets ayant répondu au questionnaire (37,6 %) savaient que le paludisme était une maladie importante dans la région et 58,4 % seulement savaient que le paludisme était transmis par les moustiques. La plupart des sujets (69,4 %) n'avaient jamais utilisé de moustiquaire. Seulement 49,9 % des résidentes en zone rurale et 73,8 % des résidentes en zone urbaine iraient consulter dans le centre de santé local en cas de fièvre et de tremblements. Les agents de santé communautaires (*behvarz*) étaient la source principale d'information (29,5 %) pour les femmes rurales ; le rôle des médecins dans l'éducation était minime. L'éducation sanitaire future doit être adaptée aux besoins de la population cible en matière d'éducation dans cette région.

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Introduction

Malaria kills between 1.5 and 2.7 million people each year, and between 300 and 500 million others become ill, often severely. Over 1 million of these deaths occur among children aged less than 5 years. Malaria is one of the most serious diseases in developing countries where communities live under difficult and impoverished conditions [*1*].

Malaria is one of the most prevalent endemic diseases in the Islamic Republic of Iran and the main health problem in the south, especially the southeast, of the country. Sistan va Baluchestan is the second biggest province in terms of surface area, but the smallest province in the country in terms of population. More than 50% of the total cases of malaria in the Islamic Republic of Iran are from this province, which constitutes 2.5% of the country's population. *Plasmodium vivax* is responsible for 77.5% of malaria infections in the province. Malaria transmission in the province is hypoendemic, mainly via *Anopheles culicifacies*, and exists for 9–10 months of the year.

Health services in Iran are designed differently for urban and rural areas according to their different needs and access. In rural areas the first point of contact with health services are 'health houses' located in villages covering 500 to 1500 people. Community health workers called '*behvarz*' work in health houses and provide primary health care services for rural people attending health houses and, if required, make home visits. Malaria control is integrated into the Iranian health system. *Behvarz* are responsible for identifying malaria cases, e.g. by obtaining blood smears, supplying patients with medication, and educating local people about malaria. In urban areas, the first point of contact is with urban health centres located in cities and covering populations of 1500–5000 people living near the centre. Primary health care services are provided only for people attending the centre. The staff of both rural and urban health centres includes at least one general practitioner, with collaboration from health technicians and experts such as family health, environmental health, disease control, occupational health and public health.

The present study had two major aims. The first was to assess the knowledge, perceptions and behaviour of married women in Sistan va Baluchestan province about malaria and identify factors affecting these. The second was to describe the role of health providers in malaria education. The study findings were designed to assist in evaluating the performance of health services and to develop programmes for improving community education about malaria.

Methods

A cross-sectional study was performed from 15 to 30 October 1999 in Sistan va Baluchestan province, Islamic Republic of Iran.

Sampling technique

The province has 7 districts. The study was conducted in 51 randomly selected clusters in the Baluchestan area of the province (Iranshahr, Saravan, Khash, Nikshahr and Chabahar): 26 clusters in rural areas and 25 clusters in urban areas. From each of these clusters 43 women in different age groups were interviewed.

Questionnaire

An open-ended questionnaire was developed to assess the subjects' knowledge,

perceptions and preventive behaviours about malaria. The questionnaire items were generated by an expert panel of 3 health educators and an epidemiologist who all were faculty members of Zahedan School of Health. The panel reviewed the instrument in Farsi to ensure conceptual clarity, factual accuracy and readability. The original instrument was piloted to determine the readability and comprehension of items and no problems were identified.

The final questionnaire consisted of 41 questions. Ten questions collected demographic and background data. The remaining 31 questions assessed subjects' knowledge about routes of transmission, control measures and signs and symptoms of malaria; their perceptions of their susceptibility to malaria and the severity of the disease; and their practice of malaria prevention measures, including sources of information about the disease.

The interviews were conducted in the local language by health students from the Zahedan School of Health accompanied by the principal investigator. Students were trained about the study objectives and the questionnaire and how to communicate with participants and ask questions. They explained the purpose of the survey and informed the women that participation was voluntary. In rural areas, all women approached agreed to participate in the survey; in urban areas just 2 families declined to participate. After participants had completed the questionnaire, they were thanked for their cooperation and students answered any questions they had about malaria. Questionnaires were completed without the presence of health workers to avoid bias.

Analysis

Analysis of the data included descriptive statistics (e.g. percentages, means and standard deviations) and univariate statistics (*t*-test, chi-squared test). Finally, multivariate regression analysis was conducted to determine which of the subscales and demographic/background variables predicted preventive behaviour.

Results

Of the 2193 questionnaires obtained, 25 were incomplete, leaving 2168 for analysis: 1065 from women in urban areas and 1103 from rural areas. The mean age of subjects was 32 years (range 12 to 75 years; standard deviation 12 years; median 30 years). The demographic characteristics of the interviewees are showed in Table 1. Almost all the women (97.9%) were housekeepers;

Table 1 **Main demographic characteristics of the study sample of women**

Characteristic	No.	%
Age (years)		
<25	826	38.4
26–45	1035	48.1
46+	293	13.6
Marital status		
Married	2025	93.7
Divorced, separated	137	6.3
Education level of woman		
Illiterate	1462	68.7
Literate	665	31.3
Educational level of husband		
Illiterate	1145	55.1
Literate	932	44.9

n = total number of interviewees; responses were missing for some categories.

the remainder were employed as teachers or government workers. Over two-thirds (68.7%) were illiterate.

Table 2 shows that 37.0% of urban and 38.2% of rural women knew that malaria is one of the important diseases in the area. Overall, 11.8% of the women did not know any of the signs of the malaria. The most known signs were fever (77.5%), chills (57.9%) and headache (45.1%). Overall, 17.8% did not know the route of malaria transmission, 58.4% correctly stated that it was via mosquitoes, and 21.3% believed it was transmitted by water. When asked about the ways of preventing malaria, 41.0% recognized using mosquito nets, 14.2% drying stagnant water around their homes, 13.1% using screens on doors and windows and 7.2% insecticides as control measures.

The maximum score on the knowledge questions was 15.0. The mean knowledge of the respondents was around one-third of this and was significantly higher in rural (5.5 ± standard deviation 2.2) than in urban areas (4.7 ± 2.4) (*t*-test, $P < 0.001$).

In general, the perceived susceptibility to and severity of malaria among subjects of this study were high. Overall, 91.7% of women would be worried if they had malaria and 75.6% believed that it was possible for them or their family to contract malaria. Significantly more rural women (80.6%) than urban women (70.4%) believed in the possibility of contracting malaria ($\chi^2 = 49.08$, df = 2, $P < 0.001$). When asked about severity of the disease, 81.8% believed that malaria is a severe disease that would change their life and 74.0% that it could cause death. Urban and rural women had significant differences in how they perceived the severity of the disease (χ^2 test, $P < 0.015$); 16.3% of urban and 14.2% of rural respondents believed that a malaria patient has to interrupt normal daily activities. However, significantly more rural women than urban women (76.4% versus 71.5%; $\chi^2 = 7.21$, df = 2, $P = 0.027$) believed that malaria could cause death. This difference, which is significant ($P < 0.02$), may in part be due to the greater severity of cases in rural areas. Women who believed that malaria could cause death and severe morbidity had higher knowledge scores about malaria ($P < 0.001$).

Half of rural women (49.9%) said they would attend the local health house as the first place for treatment for fever and convulsions; half would go to a rural health centre (Table 3). Only 73.8% of urban residents would attend an urban health care centre for chills and fever.

Questions about malaria prevention behaviour showed that mosquito nets were much more common in rural than urban areas (Table 3): 78.3% of rural and 36.3% of urban residents had a mosquito net. They were used significantly more often in rural than urban areas (χ^2 test, $P < 0.001$): 26.4% of rural women reported always using mosquito nets, 20.9% occasionally and 52.7% never. In urban areas, only 7.4% reported using nets always, 7.2% occasionally and 85.4% never. Around half of the respondents using nets did so both in the evening and at night and half used them only for sleeping at night. Most respondents (73.8%) reported not using mosquito nets when sleeping inside the house with ventilators. More of the urban than the rural residents used mosquito screens on windows (27.5% versus 19.8%) and doors (29.2% versus 8.5%).

Use of mosquito nets was more common among women who knew that mosquitoes are the vector of malaria ($P < 0.02$). However, 58.0% of the women who knew this did not use mosquito nets. Interestingly, in the cities, knowledge of

Table 2 **Knowledge of rural and urban women about the importance of malaria and about the signs, transmission route and control measures**

Variable	Rural		Urban		Total	
	No.	%	No.	%	No.	%
Important diseases in the area						
Malaria	420	38.2	394	37.0	815	37.6
Diarrhoea	366	33.3	317	29.8	683	31.5
Respiratory diseases	246	22.4	158	14.8	404	18.6
Other diseases	202	18.4	132	12.4	334	15.4
Don't know	228	20.7	283	26.6	511	23.6
Signs of malaria						
Fever	894	81.2	786	73.8	1680	77.5
Chills	682	61.9	572	53.7	1254	57.9
Headache	601	54.6	376	35.3	977	45.1
Dizziness	162	14.7	127	11.9	289	13.3
Loss of appetite	58	5.3	40	3.8	98	4.5
Others	307	27.9	212	19.9	519	2.4
Don't know	75	6.8	180	16.9	255	11.8
Route of transmission						
Mosquitoes	666	60.6	599	56.2	1265	58.4
Dirty water	223	20.3	238	22.3	461	21.3
Unhygienic surroundings	98	8.9	109	10.2	207	9.6
Polluted food	47	4.3	56	5.3	104	4.8
Other incorrect	101	9.2	69	6.5	170	7.9
Don't know	164	14.9	221	20.8	385	16.8
Control measures						
Using mosquito net	568	51.7	319	30.0	887	41.0
Using door/window screens	133	12.1	151	14.2	284	13.1
Taking drugs regularly	118	10.7	109	10.2	227	10.5
Drying stagnant water	132	12.0	174	16.4	307	14.2
Using insecticides	54	4.9	102	9.6	156	7.2
Others	206	18.8	221	20.8	427	19.7
Don't know	211	19.2	269	25.3	480	22.2

n = *total number of respondents.*

Table 3 **Malaria preventive behaviours practised by rural and urban women**

Variable	Rural		Urban		Total	
	No.	%	No.	%	No.	%
Availability of mosquito net						
Have mosquito net	862	78.3	388	36.6	1250	57.8
Frequency of net use						
Always	281	26.4	78	7.4	359	16.9
Sometimes	223	20.9	75	7.1	298	13.7
Time of net use						
Night	241	21.9	111	10.4	352	16.2
Evening and night	233	21.1	39	3.7	272	12.6
Use of screens						
On windows	211	19.8	283	27.5	494	23.6
On doors	91	8.5	306	29.2	397	18.3
First place to attend for treatment						
Health house	545	49.9	N/A	N/A	N/A	N/A
Health centre	487	44.6	778	73.8	1265	58.9

n = total number of respondents.
N/A = not applicable as health houses are only present in rural areas.

the route of transmission of malaria was not related to the use of mosquito nets, and in the rural areas it even had an indirect relation to mosquito net use. Fewer women in urban areas (61.0%) than in rural area (68.3%) believed that many mosquitoes were present around their homes (Fisher's test, $P < 0.001$). These beliefs about the presence of mosquitoes were not related to the use of mosquito nets in urban areas; however they showed a correlation in rural districts ($P < 0.05$). Subjects who recognized mosquito nets as a way of preventing malaria were more likely to report always using a net ($P < 0.001$).

Multiple regression analysis was conducted to determine the variables that predicted various preventive behaviours. Higher scores on perceptions of suscep-

Table 4 **Sources of information about malaria for the study women**

Source of information	No.	%
Personal experience	698	29.7
Community health worker (*behvarz*)	695	29.5
Malaria worker[a]	308	13.1
Friends	177	7.4
TV and radio	152	6.5
Physician	129	5.6
Religious leader	13	0.6
Others	182	7.7

n = total number of respondents.
[a]Before the malaria control programme was integrated into the health system, 'malaria workers' fulfilled the current role of the behvarz. At present, they provide these services as mobile teams in areas not covered by health services.

tibility to and severity of malaria had a positive relation to higher knowledge scores and practice of preventive behaviour such as using mosquito nets and drying stagnant water.

Ordered logistic regression was used to identify significant predictors of malaria preventive behaviours in each area (rural and urban). The woman's age, marital status and education level and the education level of their husband were entered into the model as independent variables. In both urban and rural areas, out of all the demographics factors only the educational level of husbands was a predictor of malaria preventive behaviour. Using illiterate level of education as the reference level, odds ratios (OR) were calculated and confidence intervals (CI) were set at 95%. Higher scores on malaria prevention behaviour had a positive correlation with higher educational level of husbands in both urban (OR = 2.36, CI = 1.21–4.60) and rural areas (OR = 4.12, CI = 1.29–13.06).

When asked how they had obtained their information about malaria, 29.7% of the women said that they had obtained it from their personal experience, 29.5% had been given information by the community health worker (*behvarz*) and only 5.5% by a physician (Table 4). Women who had received their information about malaria from a *behvarz* had better knowledge scores and were more likely to practice of preventive behaviours such as draining stagnant water, using screens and attending health houses with symptoms of fever and chills.

Discussion

The results of this study showed that just over one-third of the women recognized malaria as an important disease in their area. This result was similar to studies in India [*2*], but less than in Zimbabwe [*3*], Dar-al-Salaam [*4*] and Myanmar [*5*]. It is necessary to provide people with adequate information about the incidence of malaria in their area and its complications, to increase public awareness about the importance of malaria.

Just over half of the participants knew that mosquitoes are a vector for malaria, which is less than we expected in view of the fact that malaria is a very common disease in the area. Unfortunately, 21.3% thought that malaria is transmitted via contaminated water, and this misconception could adversely affect preventive behaviour. These figures were in agreement with findings from Kenya [*6–9*], but were higher than Zimbabwe [*10*], Ghana, Guinea-Bissau, Sierra Leone, Senegal and Gambia [*11*] and lower than Myanmar [*5*]. Our study showed mosquito net use was more common among people who knew that the mosquito is the vector of malaria. This is consistent with the findings from other studies that show that if people do not perceive the mosquito to be responsible for malaria transmission they do not take measures to protect themselves against the vector. Therefore, efforts to increase the population's awareness about this will improve the use of mosquito nets. We should at least emphasize the fact that laying a malaria patient in a mosquito net will decrease the risk of further transmission.

The results of this study reveal that regular use of mosquito nets in this area is low. Although 78.3% of rural residents reported having mosquito nets, only 26.4% always used them. Most respondents (73.8%) reported not using mosquito nets

when sleeping inside the house with fans or air-conditioning; even local health workers do not recommend the use of mosquito nets indoors. However, if the electricity is cut off at night in hot weather, health workers report that people who are sleeping indoors with ventilators go to sleep outdoors and are then at risk without a mosquito net. Over half of respondents reported using mosquito nets only at night when sleeping, whereas mosquitoes are most active in the evening. People need to be taught about the habits of the malaria vector.

The perceived susceptibility to malaria and severity of the disease were high among subjects of this study and had a positive relation to higher knowledge scores and higher scores on preventive behaviour. Better knowledge scores among subjects and practice of certain preventive behaviours (such as draining the mere, using screens and attending health houses with symptoms of fever and chills) were also related to having received information from a *behvarz*. In general, though, the *behvarz* have not been successful in changing people's behaviour about use of mosquito nets. For example, it may be that people avoid using mosquito nets in hot weather even at night. We need to understand the reasons for this and then seek appropriate methods to educate the public. We should hold training courses for health workers that promote better communication and proper teaching methods to improve the quantity and quality of their educational efforts. Furthermore, people in these areas usually trust what the radio and television say, so we can design a comprehensive media campaign to teach the public about malaria.

The reluctance of patients to go to local rural health houses when they have fever and chills—only 49.9% of rural residents would go there at first—is in part due to inability of these centres to make a diagnosis. They must send the samples to the rural health centres and wait for the results, all of which takes time. We should find suitable ways to solve this problem.

Multivariate analysis showed that the only factor with a significant effect on preventive behaviour was the educational level of husbands. This may be because men have the authority to buy mosquito nets, make window and door screens, dry stagnant water and accompany family members to the doctor. Therefore, education of men should be an important part of anti-malaria programmes.

The results of this study have helped to determine the educational needs of women and some of the associated factors in malaria prevention behaviour. Subsequent health education must be tailored to suit the sociocultural and economic circumstances and the educational needs of the target population in this area.

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