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Original Article

Community Perceptions and Practices about Malaria Prevention and Control in Iran

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Abstract

Background: General knowledge of at risk people regarding malaria is key element to facilitate appropriate treatment and prevention behaviours. The aim of this study was to assess the family heads' understanding of malaria transmission, signs and symptoms, and preventive measures in malaria-affected districts of Iran.

Methods: In 2009 in a cluster randomized cross-sectional survey data were collected from the heads of 5,466 randomly selected households by trained interviewers and a validated questionnaire. Only one adult person was interviewed per household Once all the information collected and entered to the SPSS Ver. 18 analysis was done and descriptive statistics were used to summarize results. Point estimates and 95% confidence intervals were also estimated for indicators.

Results: 63.8% [95% CI: 62.2 - 65.4] of the participants recognized fever as a sign of malaria, 56.4% [95% CI: 54.6 - 58.2] reported that mosquito bites cause malaria and about 35% [95% CI: 32.7 - 37.1] of participants mentioned that the use of mosquito nets could prevent malaria. Furthermore, about one-third of selected samples in target districts did not know symptoms, transmission route and appropriate prevention method of malaria. Data also suggests a slight variation by residency, but substantial discrepancy according to the region.

Conclusions: General knowledge of respondents concerning malaria is too far from the levels required to be constructive for malaria elimination. Therefore, the survey suggests developing, and implementing effective health promotion policies to increase the awareness of households about the symptoms, transmission route and control measures of malaria.

Keywords: Malaria, Prevention, Knowledge, Iran

Introduction

Malaria is one of causes of sickness and death in the developing world; it is responsible for more than a million deaths and around 250 million new cases annually in the world (1-4). Malaria has been demonstrated excessively in several countries in Sub-Sahara, Thailand and India accounting for around 95% of all malaria cases in the world (5-10).

The south eastern areas of Iran including Sistan va Buluchistan Province, Hormozgan Province and the tropical parts of Kerman Province; are considered as malaria regions with a reported

Annual Parasite Incidence API ranged from 1 to 8 per 1,000 populations (11). The Ministry of Health and Medical Education in Iran has focused its effort on recommended guidelines by World Health Organization (WHO) (12). Two of these strategies consist of early diagnosis and prompt effective anti-malarial treatment. Administrators need local-level information to effectively direct and guide the programmes of malaria so they are responsive to local conditions (13). Operative malaria control is an essential precursor to development in countries (14)

In addition, the initial phase to any action or operative control program is to know about audience awareness about health problem. In this case, to evaluate people awareness about malaria symptom, prevention methods and transmission rout is noticeably important. However, to date no comprehensive national malaria survey has been conducted to identify the coverage of these strategies in Iran. Appropriate malaria control strategies with emphasis on organizational, economical, and cultural aspects are urgently needed.

Therefore, the present study was conducted to determine at risk people awareness about malaria symptoms, prevention methods, and transmission rout as the initial step to designing effective implementation program.

Materials and Methods

Sample design

In this cluster randomised cross-sectional household survey data were collected from 125 clusters (the size of each cluster was 40 households) in both rural and urban area of malaria affected districts of Iran from Jul 5 to Aug 9, 2009 as follows: Firstly, all the health facilities in the target districts in the three provinces (Sistan va Buluchistan, Hormozgan and Kerman) were listed based on geographical regions and separately for towns and villages and then the populations were calculated cumulatively. Secondly, required sample size divided based on the proportion of population/households in three target regions and in terms of rural or urban residency. Thirdly, clusters and head-clusters (the first selected household as opening point for survey) were determined using systematic random sampling. After that, trained personnel referred to the first household in every cluster and moved on their right side to cover the entire forty households in every cluster.

Survey questionnaire

Using available questionnaires in the website of WHO (15-17), the organizers of this survey developed the questionnaire for the local condition and its completion instructions. Then questionnnaire pretested in the field and its results were discussed in several meetings with the participation of a group of knowledgeable malaria experts from the involved organizations. Afterward, the questionnaires and its completion instructions were revised carefully to fulfil study demands.

Training and field work

Interviewers were trained by a combination course of classroom training and practical experience to know how to perform their task perfectly. Additionally, each interviewer had given a detailed manual, which was designed in accordance with WHO recommendations (15-17) to clarify them how to do their work.

Data management and analysis

Data were collected through direct referring of the trained interviewing teams to the selected households and filling in questionnaires. Each team interviewed 20 families on average every day. Once all the information was collected and cleaned, analysis was done and descriptive statistics (i.e. frequencies, percentages) were used to estimate coverage, use and access estimates. Additionally, point estimates and 95% confidence intervals were estimated for all malaria indicators. Heterogeneity between residency and regions were examined using Pearson's Chi squared test whenever necessary.

Evaluation the quality of project implementation

The quality of data collection was supervised and monitored daily by main investigators, provincial

and district focal points during implementation of the project to ensure the quality and quantity of data collected by surveyors. Additionally, the quality of data entering was also monitored in two stages: In the primary stage, data file and its manual was prepared by skilled experts in statistics. Then, data were entered by a team of trained data entry operators under the direct supervision of specialists in statistics and epidemiology. In the final stage, as data were analyzed the information about every variable was controlled once more and if necessary was corrected by referring to the questionnaires.

Ethical clearance

This study was approved by the Ethics Committee of Zahedan University of Medical Sciences, Iran. Moreover, verbal informed consent was obtained from the heads of households and each eligible individual before conducting the household questionnaires. In an effort to maintain confidentiality, the names of respondents and households was kept as strictly confidential information and was not used in the presentation of results.

Results

Characteristics of study population

Data were collected from 5466 randomly selected households in both rural and urban area of 20 malaria affected districts from three target provinces of Iran (2057 households from Sistan va Balucehstan, 2353 from Hormozgan and 1046 from Kerman Province).

Awareness of Malaria symptoms

Table 1 demonstrates data on respondents' awareness of malaria symptoms in target districts. Overall, 63.8% [95% CI: 62.2 - 65.4] of respondents recognized fever as a symptom of malaria. Those in urban areas were more likely to report this knowledge [67.4% urban vs. 62.1% of participants in rural areas]. The data also suggests regional variability with 81.4% [95% CI: 79.7 - 83.0] of respondents in Sistan va Baluchistan Province recognized these symptoms as compared to 48.1% [95% CI: 46.1 - 50.2] in Hormozgan Province. Nationally, one-third of participants reported shivering as a symptom of malaria. There is a minimal difference for this symptom by residence area, but knowledge of participants is differed considerably by region. Again, participants in highly malarias area of Sistan va Baluchistan province were more likely to report shivering as a symptom of malaria than those in Hormozgan.

Significantly, about 30% of selected samples in target districts did not know malaria symptoms with a minor variation by residence. However, there was a notable disparity by region such that nearly about a half of individuals in Hormozgan Province were unaware of malaria symptoms compared to 9.90% [95% CI: 8.58 - 11.2] in Sistan va Baluchistan and 31.1% [95% CI: 28.3 - 33.9] in Kerman.

Throughout the survey districts, just above half of participants 56.4 [95% CI: 54.6 - 58.2] reported that mosquito bites cause malaria (Table 2). Knowledge of this was slightly higher among individuals from urban households [59.1%; 95% CI: 56.7 - 61.6] than of those living in rural areas [55.4%; 95% CI: 53.8 - 57.0]. Nevertheless, there was evidence of regional disparity such that respondents in Sistan va Baluchistan [77.2%; 95% CI: 75.4 - 79.0] were more likely to note mosquito bite as cause of malaria compared to the individuals living in Kerman [59.1%; 95% CI: 56.1 - 62.1] and Hormozgan [36.6%; 95% CI: 34.7 - 38.6]. Considerably, once again about one-third of respondents did not understand transmission route of malaria. Data also suggests a slight variation by residence, but substantial discrepancy according to the region.

Just over half of individuals in Hormozgan were unacquainted of malaria transmission route in comparison to the 12.8% [95% CI: 11.4 - 14.2] and 30.1% [95% CI: 27.3 - 32.9] for Sistan va Baluchistan and Kerman, respectively.

Table 1: Respondents awareness about malaria symptoms

Symptoms	Residency		Province			Total
	Rural	Urban	S & B	Hormozgan	Kerman	
Fever	62.1 (60.5 - 63.6)	67.4 (65.1 - 69.7)	81.4 (79.7 - 83.0)	48.1 (46.2 - 50.2)	63.6 (60.7 - 66.5)	63.8 (62.2 - 65.4)
Shivering	36.2 (34.7 - 37.8)	35.2 (32.8 - 37.5)	46.6 (44.4 - 48.8)	23.4 (21.7 - 25.1)	42.5 (39.6 - 45.5)	35.9 (33.7 - 38.9)
Do not know	30.5 (29.0 - 31.9)	26.7 (24.5 - 28.9)	9.90 (8.58 - 11.2)	45.7 (43.6 - 47.7)	31.1 (28.3 - 33.9)	29.2 (27.0 - 31.5)
Headache	28.7 (27.3 - 30.2)	26.4 (24.3 - 28.6)	43.3 (41.2 - 45.5)	14.9 (13.5 - 16.4)	27.6 (24.9 - 30.3)	28.2 (25.9 - 30.5)
Dizziness	7.60 (6.78 - 8.47)	16.3 (14.5 - 18.1)	12.7 (11.3 - 14.2)	6.20 (5.17 - 17.4)	14.1 (12.0 - 16.3)	10.2 (7.67 - 12.4)
Myalgia	9.70 (8.77 - 10.7)	9.50 (8.08 - 11.0)	10.2 (8.90 - 11.5)	7.30 (6.22 - 8.35)	14.0 (11.9 - 16.1)	9.70 (7.16 - 12.2)
Vomit	8.44 (7.56 - 9.33)	10.0 (8.56 - 11.5)	9.20 (7.99 - 10.5)	8.40 (7.28 - 9.56)	10.0 (8.22 - 11.9)	9.00 (6.46 - 11.5)
Anorexia	3.60 (3.02 - 4.21)	5.80 (4.69 - 7.10)	6.20 (5.18 - 7.27)	2.00 (1.43 - 2.58)	5.60 (4.24 - 7.04)	4.30 (1.70 - 6.90)
Diarrhea	3.00 (2.44 - 3.52)	7.10 (5.85 - 8.39)	5.70 (4.69 - 6.69)	2.70 (2.04 - 3.37)	4.70 (3.40 - 5.97)	4.20 (1.60 - 6.80)
Jaundice	1.50 (1.07 - 1.83)	3.60 (2.64 - 4.48)	1.60 (1.02 - 2.09)	1.40 (0.95 - 1.93)	4.50 (3.24 - 5.75)	2.10 (0.00 - 4.76)
Others	2.50 (2.03 - 3.03)	2.00 (1.28 - 2.66)	1.50 (0.98 - 2.03)	2.70 (2.00 - 3.32)	3.90 (2.74 - 5.10)	2.50 (0.00 - 5.15)

S & B :Systanva Baluchestan

Table 2: Respondents awareness about transmission rout of malaria

	Residency		Province			Total
Transmis-sion rout	Rural	Urban	S & B	Hor-mozgan	Kerman	
Mosquito sting	55.4 (53.8 - 57.0)	59.1 (56.7 - 61.6)	77.2 (75.4 - 79.0)	36.6 (34.7 - 38.6)	59.1 (56.1 - 62.1)	56.4 (54.6 - 58.2)
Do not know	34.5 (33.0 - 36.0)	27.9 (25.7 - 30.1)	12.8 (11.4 - 14.2)	51.5 (49.4 - 53.5)	30.1 (27.3 - 32.9)	32.6 (30.4 - 34.8)
Contaminated water	14.8 (13.7 - 16.0)	21.7 (19.7 - 23.8)	18.2 (16.6 - 19.9)	13.1 (11.8 - 14.9)	22.6 (20.0 - 25.1)	16.9 (14.5 - 19.3)
Others	3.90 (3.24 - 4.47)	5.40 (4.29 - 6.52)	2.50 (1.81 - 3.15)	5.00 (4.12 - 5.91)	6.60 (5.09 - 8.10)	4.40 (1.78 - 7.02)
Spoiled food	2.50 (1.96 - 2.95)	6.00 (4.80 - 7.15)	3.80 (2.97 - 4.62)	1.70 (1.21 - 2.28)	7.00 (5.43 - 8.52)	3.50 (0.89 - 6.11)

S & B :Systanva Baluchestan

Knowledge of prevention methods

Generally, 34.9% [95% CI: 32.7 - 37.1] of participants reported that use of mosquito nets could prevent malaria (Table 3). Here, a greater percentage of rural respondents knew this [38.4%; 95% CI: 36.8 - 39.9] than urban ones [25.6%; 95% CI: 23.4 - 27.7]. Similar to the malaria symptoms and transmission routes, regional differences were

also seen for prevention methods. As can be seen, recognition of mosquito net as an effective method to prevent malaria reported by a larger proportion of participants in Sistan va Baluchistan [64.0%; 95% CI: 61.9 - 66.0] in contrast to the Kerman [31.3%; 95% CI: 28.5 - 34.1] and Hormozgan [10.0%; 95% CI: 8.71 - 11.2]. Finally, 32.3% [95% CI: 30.1 - 34.5] of all surveyed persons did not know a prevention method against malaria with insignificant discrepancy by residence, but noteworthy dissimilarity by region. Likewise to the abovementioned findings, respondents living in Sistan va Baluchistan [11.6%; 95% CI: 30.1 - 34.5] were less likely to not know prevention methods against malaria than those of living in other target provinces [34.8%; 95% CI: 31.9 - 37.7 in Kerman and 50%; 95% CI: 48.0 - 52.1 in Hormozgan).

Table 3: Respondents awareness about prevention methods of malaria

Prevention methods	Residency		Province			Total
	Rural	Urban	S & B	Hormozgan	Kerman	
Sleeping under bed net	38.4 (36.8 - 39.9)	25.6 (23.4 - 27.7)	64.0 (61.9 - 66.0)	10.0 (8.71 - 11.2)	31.3 (28.5 - 34.1)	34.9 (32.7 - 37.1)
Do not know	33.4 (31.8 - 34.9)	30.3 (28.1 - 32.6)	11.6 (10.2 - 13.0)	50.0 (48.0 - 52.1)	34.8 (31.9 - 37.7)	32.3 (30.1 - 34.5)
Spraying anti-malaria poison	15.5 (14.3 - 16.7)	25.9 (23.7 - 28.1)	24.5 (22.7 - 26.4)	11.9 (10.6 - 13.2)	21.7 (19.2 - 24.2)	18.7 (16.3 - 21.1)
Others	14.4 (13.3 - 15.5)	18.1 (16.2 - 20.0)	4.20 (3.32 - 5.05)	25.3 (23.5 - 27.1)	16.6 (14.4 - 18.9)	15.5 (13.0 - 18.0)
Draining standing water	10.8 (9.84 - 11.8)	21.0 (19.0 - 23.1)	16.8 (15.2 - 18.5)	11.3 (9.98 - 12.6)	13.6 (11.5 - 15.7)	13.9 (11.4 - 16.4)
Using wire screen for doors and windows	7.90 (7.01 - 8.73)	13.7 (12.0 - 15.4)	13.2 (11.8 - 14.7)	3.50 (2.71 - 4.22)	15.4 (13.2 - 17.6)	9.50 (6.96 - 12.0)
Takinganti-malaria drugs	4.20 (3.52 - 4.80)	6.70 (5.45 - 7.91)	9.10 (7.85 - 10.3)	1.60 (1.12 - 2.17)	4.00 (2.83 - 5.21)	5.00 (2.38 - 7.62)
Usinganti-mosquito cream	1.80 (1.36 - 2.21)	3.10 (2.26 - 3.98)	3.80 (3.01 - 4.67)	1.50 (0.97 - 1.96)	0.40 (0.01 - 0.76)	2.20 (0.00 - 4.87)
Usinganti-mos-quito coil	0.20 (0.08 - 0.40)	0.20 (0.00 - 0.40)	0.20 (0.03 - 0.46)	0.20 (0.03 - 0.42)	0.20 (0.00 - 0.46)	0.20 (0.00 - 2.37)

S & B :Systanva Baluchestan

Discussion

This first comprehensive assessment of the coverage of the key malaria indicators in Iran highlights several important areas that need to be addressed urgently by Ministry of Health and Medical Education to achieve malaria control targets set by RBM partnership as well as national strategic plan for malaria elimination. Additionally, the present study indicates that awareness of interviewees concerning malaria symptoms and transmission are moderately modest, but mosqueito net as an effective prevention method against malaria was known by an unsatisfactorily small proportion of contributors (one-third). Actually, high awareness among indigenous malarious areas is obviously.

For instance, in one study in Warsy, India as malaria endemic region knowledge about malaria symptom was 81.5 % [15]. Whilst in another study in west of Kenya, awareness in malaria was lower than our study (16). Our study results are roughly similar to the existing data from the previous national surveys (17-20, 21-28) with an exception for Zambia (20) where more than 80% of women reported that had awareness about mosquito nets

as preventive malaria method. The last national study compare to this project is several years away. Naturally, the knowledge about malaria preventive method should be better, but is not. This indicates that any effective action at this time in order to increase awareness of ways to prevent malaria has not been done.

More than half of participants in this study had knowledge about malaria transmission. In comparison with similar study in Ethiopia, their awareness was more noticeably. This difference has routes in effective efforts of Iran health service network actions (29). Moreover, more than fifty percent of participants knew about role mosquito's role in malaria transmission. The study by Holakoei confirmed this result (30). Therefore, to promote awareness about importance of mosquito's role in malaria transmission need public participation in national malaria control program in community level (31).

The current study confirmed low awareness about prevention methods among surveyed participants. Less than 40% of people knew about prevention methods. This finding was confirmed to Daddi's study in Ethiopia (32). However, there was dramatically decreasing between participants' level of knowledge in prevention methods, and symptom and transmission of malaria.

This lower awareness of inhabitants about preventive measures of malaria might explain some lake of the health education and promotion intervention strategies. Therefore, the survey suggests developing, and implementing effective health promotion policies to increase the awareness of households about the symptoms, transmission route and in particular control measures of malaria. Strong and sustainable interventions efforts including information, education, and communication activities, not only maximize awareness about symptoms and transmission route and prevention method, but also improve health-seeking behaveiours at community levels.

Data also suggests variation by region and residency. In this study, residents in Sistan va Baluchestan showed better knowledge compared with other provinces. Likewise, at risk groups in rural areas were more likely to have more awareness about prevention method compared to the urban areas. This discrepancy might be attributed to higher experience rate of malaria cases and exposures and accordingly more sensitized to malaria problem and active service delivery in rural area in Iran compared with urban areas.

Several limitations need to be acknowledged and addressed regarding the present study. The first limitation concerns the participant avoidance to answer questions. In fact, they were not satisfied to appear their problems. The other limitations indicate about ambiguity of some questions. In this case, the interweaver tried to collects data by self-asking and explains any probable unclear questions to each interviewee. The third one is large number of included clusters, combined with well-trained local interviewers and extensive supervision, and minimized these effects. Furthermore, this is the first comprehensive survey of this highly malicious region in Iran.

Conclusion

Massive and substantial investments are needed to coordinate national malaria control programmers towards achieving determined goals and targets by World Health Organization. Primarily, to persuade people to participate in health educational program for malaria control and self-protection against Anopheles mosquito bites. In recent year, the national programs to combat diseases transmitted by arthropods do emphasize on community participation. Thus, any assessment for determine at risk people knowledge about malaria symptom, the transmission of malaria and prevention method is essential. Coupled with intensive nationwide education campaign may play a crucial role to achieve high awareness levels. Secondly, substantial behaviour change interventions are essential to promote malaria knowledge among individuals.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or fal-

sification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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