

Original Article

Public awareness of malaria at the beginning of a national malaria elimination program in China

Jianhai Yin^{1,2}, Zhigui Xia^{1,2}, Rubo Wang^{1,2}, Qingfeng Zhang^{1,2}, Wen Fang^{1,2}, Shuisen Zhou^{1,2}

¹ National Institute of Parasitic Diseases, Chinese Center for Disease Control and Prevention, Shanghai, People's Republic of China

² WHO Collaborating Centre for Malaria, Schistosomiasis and Filariasis, Key Laboratory of Parasite and Vector Biology, Ministry of Health, Shanghai, People's Republic of China

Abstract

Introduction: This study aimed to investigate the baseline level of malaria awareness in residents in 20 malaria-endemic provinces from October 2010 to January 2011 at the beginning of the implementation of the China National Malaria Elimination Programme (NMEP).

Methodology: A structured questionnaire about basic malaria knowledge was administered to residents in rural areas from 20 provinces, municipalities, and autonomous regions.

Results: A total of 182,085 residents no younger than 15 years of age took part in the cross-sectional investigation; 3,232 were excluded because of incomplete survey responses. Of the respondents, 56.86% were aware of malaria, 18.03% responded correctly to all five questions, and 5.57% answered all the questions incorrectly. Malaria awareness among different age groups was statistically significant ($p < 0.001$), males had a better understanding of malaria than did females ($p < 0.001$), and Type I counties had a better understanding than did Type II counties ($p < 0.001$).

Conclusions: The level of malaria awareness was low among residents at the beginning of the NMEP, especially about malaria pathogenicity and preventive methods. Health education campaigns should be developed and implemented to increase the public perceptions about malaria prevention and treatment, and to promote malaria elimination in China.

Key words: public awareness; malaria; China.

J Infect Dev Ctries 2015; 9(4):416-420. doi:10.3855/jidc.5307

(Received 18 May 2014 – Accepted 18 December 2014)

Copyright © 2015 Yin *et al.* This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Malaria has been reduced dramatically worldwide. While there were still 104 countries and territories considered malaria endemic in 2012 [1], malaria has been targeted for national elimination in China by 2020, since the issue of the China National Malaria Elimination Programme (NMEP) in 2010 [2]. The rate of public awareness of malaria is an essential evaluation index for malaria elimination according to this program. One of the program's aims is to have no fewer than 70% of residents in Type I and Type II malaria-endemic counties aware of malaria prevention and treatment by 2012; that percentage is targeted to rise to 80% by 2015. Finally, public awareness of malaria must be kept at a high level to for the goal of malaria elimination to be successful [2].

Health education and health promotion are important measures in malaria control, prevention, and elimination. Malaria awareness campaigns targeted to different populations not only can improve residents'

knowledge of malaria, consequently promoting the understanding and compliance of timely diagnosis, standard treatment, and preventive actions for malaria, but can also promote interdepartmental collaboration and understanding and support between residents and professional institutes and personnel [3]. All the factors above will play an important role in malaria elimination, and will continue to function in the post-elimination stage.

In order to understand the national baseline level of malaria awareness in China, essential reference data for effect evaluation when malaria elimination is achieved, a large-scale investigation of malaria awareness related to vectors, symptoms, pathogenicity, treatment, and preventive methods was implemented at the beginning of the China NMEP, and the information about students' awareness of malaria was published [4]. However, only some sporadic data about public awareness of malaria was available [5-7].

In this study, the national data was analyzed as the most recent baseline data.

Methodology

Study population and sampling

This cross-sectional study was carried out in rural areas from 20 Chinese provinces, municipalities, and autonomous regions of Liaoning, Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Yunnan, Guizhou, Tibet, Shaanxi, and Gansu, using multistage cluster sampling in the same period (October 2010 to January 2011) of the investigation of students’ awareness about malaria [4]. A total of 153 administrative villages from 54 towns in 19 Type I malaria-endemic counties (local infections detected in three consecutive years of 2006–2008 and the annual incidences $\geq 1/10,000$) and 862 administrative villages from 164 towns in 83 Type II counties (local infections detected in the three years and at least in one year the annual incidence $< 1/10,000$ and > 0) were randomly selected, and residents no younger than 15 years of age were surveyed.

Questionnaire design and data collection

Demographic information including code, province, city, county, and the individual information of name, gender, and age were included in the questionnaire. Five malaria knowledge choice questions, data collection training and implementation, and quality control were performed as described previously, and each question was awarded one mark for a correct answer, while each incorrect answer was given a mark of zero [4]. The total marks for the five questions were evaluated as follows: scores of five were considered excellent, while scores of three to four, one to two, and zero were considered good, poor, and very poor, respectively. The categories of excellent and good were considered as aware, while the others were considered as not aware [4]. The

questionnaire was administrated to every resident who had provided verbal informed consent before admission into the study.

Data analysis

Descriptive data were presented as mean \pm standard deviation (SD) and percentages using Microsoft Excel 2010. Differences in distribution were evaluated using the Chi-square (χ^2) test by SPSS version 16.0, and $p < 0.05$ was considered statistically significant.

Results

Demographic characteristics of enrolled respondents

A total of 182,085 respondents from the 20 provinces listed above in China participated in the study, and 178,853 valid questionnaires were received, while 3,232 respondents were excluded because of incomplete survey responses. The mean age of the enrolled respondents was 43.35 years (SD = 18.61). There were slightly more male respondents (56.41%) than female (43.59%) respondents. In terms of age groups, 21.53% of respondents were 15–29 years of age, 33.49% were 30–44 years, 27.99% were 45–59 years, and 16.99% were ≥ 60 years of age. Most of the respondents were from Type II counties (82.56%). The details from these questionnaires are presented in Table 1.

Knowledge of malaria

The responses to questions related to knowledge of malaria are provided in Table 2. Among 178,853 valid questionnaires, the percentage of correct responses to malaria vectors and symptoms was 60.25% and 66.72%, respectively. A total of 82.04% of respondents had knowledge of approaches to treat malaria; however, only 36.92% and 37.41% of all respondents knew the fatal malaria species and the preventive measures against malaria, respectively.

Table 1. Demographic characteristics of respondents of valid questionnaires

Age group (years)	Type I county		Type II county		Total
	Male	Female	Male	Female	
15–29	4,657	3,737	16,417	13,703	38,514
30–44	6,172	4,621	28,242	20,854	59,889
45–59	4,351	3,218	24,155	18,333	50,057
≥ 60	2,417	2,022	14,479	11,475	30,393
Total	17,597	13,598	83,293	64,365	178,853

Awareness of malaria

Only 32,240 (18.03%) of respondents whose questionnaires were valid answered all five questions correctly, and 9,968 (5.57%) respondents answered all questions incorrectly. Around 56.86% of respondents were aware of this protozoan disease, and 68.30% (69,455/101,695) of them were ranked as having good knowledge. There were significant differences in awareness of malaria among the four age groups ($p < 0.001$); the percentages were 56.72% (ages 15–29), 57.75% (ages 30–44), 57.79% (ages 45–59), and 53.74% (ages ≥ 60). Awareness of malaria was better among males (58.58%) than among females (54.64%) ($p < 0.001$). In addition, public awareness of malaria in Type I counties (59.50%) was better than that in Type II counties (56.30%) ($p < 0.001$). The details are listed in Table 3.

Discussion

Public awareness of infectious diseases has an important role in disease control and prevention. A lack of reasonable knowledge of infectious diseases contributes to low detection rates, interruption of treatment, and discrimination [4,8]. The improvement of public perception about malaria could not only help the general population protect themselves, but could also promote those individuals suspected of being infected to seek medical help early and be treated more completely [8-11]. This cross-sectional survey aimed to understand the level of awareness of malaria in residents in China at the very beginning of the China NMEP. One limitation of this study was the selection bias without regard of financial situation, education levels, family history of malaria, and occupation, so that there was not enough validity to perform bivariate or multivariate analysis to explore the main influence factors of awareness.

Table 2. Distribution of knowledge of malaria in respondents in China (n = 178,853)

Items	N	%
Which transmit malaria?		
Correct	107,759	60.25
Incorrect	71,094	39.75
Major symptoms of malaria attack?		
Correct	119,328	66.72
Incorrect	59,525	33.28
If left untreated, which species of malaria is fatal?		
Correct	66,024	36.92
Incorrect	112,829	63.08
What should be done while malaria suffered?		
Correct	146,739	82.04
Incorrect	32,114	17.96
What measures could prevent malaria?		
Correct	66,903	37.41
Incorrect	111,950	62.59

Table 3. Characteristics of awareness of malaria in respondents in China

Characteristics	Aware (N = 101,695)		Not aware (N = 77,158)	
	Excellent (n = 32,240)	Good (n = 69,455)	Poor (n = 67,190)	Very poor (n = 9,968)
Age group (years)				
15–29	7,420	14,425	14,527	2,142
30–44	10,952	23,636	22,373	2,928
45–59	8,980	19,949	18,497	2,631
≥ 60	4,888	11,445	11,793	2,267
Sex				
Male	18,898	40,201	36,626	5,165
Female	13,342	29,254	30,564	4,803
County				
Type I	5,145	13,416	10,949	1,685
Type II	27,095	56,039	56,241	8,283

In the previous studies that targeted local residents [5-7,12] and students [4,13], awareness of malaria was low, similar to the findings in the present study. The awareness target of the NMEP is yet to be reached. In China, although the epidemiology of malaria has changed dramatically, the lowest malaria burden was achieved yearly. Malaria importation is an increasing challenge; therefore, malaria is still an important infectious disease. However, apart from low public awareness, knowledge of malaria among expatriate laborers working in malaria-endemic areas and among exposed Chinese travelers was far from satisfactory [14,15]. To reduce the rate of imported malaria, malaria prevention education should focus on advance notification if traveling to a malaria-endemic areas, understanding of and compliance with chemoprophylaxis, and the importance of practicing all recommended preventive measures [15-17]. In addition, medical staff's knowledge and awareness of diagnosis, treatment, and prevention of malaria is also very important to those who are infected or are suspected of being infected [18,19]. These measures can be carried out in a variety of ways, such as by mass media, labor companies, travel agencies, and community health service centers to spread malaria-related knowledge, to increase residents' awareness of self-protection and of the initiatives of malaria control, prevention, and elimination [2].

Conclusions

Most respondents' awareness of malaria was low at the beginning of the China NMEP; it should be improved through multi-sectoral cooperation. Nonetheless, respondents' awareness was still the current baseline for assessing the effectiveness of the NMEP in the future. Interim evaluation of the program should be done to adjust or update the health education campaigns for subsequent malaria elimination planning.

Acknowledgements

The authors thank the workers in CDCs/institutes of parasitic diseases and the residents from 20 provinces, municipalities, and autonomous regions of Liaoning, Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Yunnan, Guizhou, Tibet, Shaanxi, and Gansu, who participated in the study. This work was supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria (Grant No. CHN-S10-G13-M).

References

1. World Health Organization (2012) World malaria report 2012. Geneva: World Health Organization.
2. Ministry of Health (2010) [Action plan of China malaria elimination (2010-2020)] (in Chinese). Beijing: Ministry of Health.
3. Bureau of disease prevention and control of Ministry of Health (2007) [The malaria manual (3rd edition)] (in Chinese). Beijing: People's medical publishing house.
4. Yin JH, Wang RB, Xia ZG, Zhou SS, Zhou XN, Zhang QF, Feng XY (2013) Students' awareness of malaria at the beginning of national malaria elimination programme in China. *Malaria J* 12: 237.
5. Cao XB, Wang XJ, Gu GM, Li L, Cao Y, Chen HX (2011) [Health education needs for malaria control in rural residents in Hai'an County] (in Chinese). *Zhongguo Xue Xi Chong Bing Fang Zhi Za Zhi* 23: 704-707.
6. Qiu Q, Hu XL, Wu MH, Cai L, Huang GQ, Yuan FY, Xu YH (2009) [Knowledge and demand of malaria prevention in rural residents of Hubei province] (in Chinese). *Chin J Public Health* 25: 229-230.
7. Zhou S, Lv Q, Du LF, Yang MD, Li L, Yang R, Yang ZH (2010) [Survey of knowledge, attitude and practice of malaria among villagers in rural areas of Yunnan Province] (in Chinese). *Zhongguo Xue Xi Chong Bing Fang Zhi Za Zhi* 22:87-89.
8. Liu H, Li M, Jin MJ, Jing FY, Wang H, Chen K (2013) Public awareness of three major infectious diseases in rural Zhejiang province, China. *BMC Infect Dis* 13: 192.
9. Lu SH, Tian BC, Kang XP, Zhang W, Meng XP, Zhang JB, Lo SK (2009) Public awareness of tuberculosis in China: a national survey of 69253 subjects. *Int J Tuberc Lung Dis* 13: 1493-1499.
10. Mazigo HD, Obasy E, Mauka W, Manyiri P, Zinga M, Kweka EJ, Mnyone LL, Heukelbach J (2010) Knowledge, Attitudes, and Practices about Malaria and Its Control in Rural Northwest Tanzania. *Malar Res Treat* 2010: 794261.
11. Das A, Das Gupta RK, Friedman J, Pradhan MM, Mohapatra CC, Sandhibigraha D (2013) Community perceptions on malaria and care-seeking practices in endemic Indian setting: policy implications for the malaria control programme. *Malaria J* 12: 237.
12. Wu CG, Luo XJ, Luo F, Li SS, Xiao BZ, Jiang SG (2012) [Current status of malaria prevention in Chongqing] (in Chinese). *J Trop Med* 12: 472-474.
13. Li CF, Dong Y, Wang XR, Guo XF, Lv SS (2005) [Survey of malaria knowledge in primary school pupils and middle school students of 4 malaria endemic counties in Yunnan province] (in Chinese). *China Tropical Medicine* 5: 153.
14. Zhang M, Liu ZY, Wang B, Huang LP, Wang SQ, Sheng HY, He HT (2010) [Survey on malaria correlations of knowledge, attitude and practice among labors going to epidemic areas of malaria] (in Chinese). *Chinese Frontier Health Quarantine* 33: 90-92.
15. Zhang M, Liu Z, He H, Luo L, Wang S, Bu H, Zhou X (2011) Knowledge, attitude, and practices on malaria prevention among Chinese international travelers. *J Travel Med* 18: 173-177.
16. Selent M, de Rochars VM, Stanek D, Bensyl D, Martin B, Cohen NJ, Kozarsky P, Blackmore C, Bell TR, Marano N, Arguin PM (2012) Malaria prevention knowledge, attitudes, and practices (KAP) among international flying pilots and

- flight attendants of a US commercial airline. *J Travel Med* 19: 366-372.
17. Berg J, Breederveld D, Roukens AH, Hennink Y, Schouten M, Wendt JK, Visser LG (2011) Knowledge, attitudes, and practices toward malaria risk and prevention among frequent business travelers of a major oil and gas company. *J Travel Med* 18: 395-401.
 18. Dawson AJ, Joof BM (2005) Seeing, thinking and acting against malaria: a new approach to health worker training for community empowerment in rural Gambia. *Rural Remote Health* 5: 353.
 19. Roy SK, Roy SK, Bagchi S, Bajpayee A, Pal R, Biswas R (2005) Study of KAP of the private medical practitioners

about national disease control programmes. *Indian J Public Health* 49: 256-257.

Corresponding author

Zhigui Xia
National Institute of Parasitic Diseases
Chinese Center for Disease Control and Prevention
WHO Collaborating Centre for Malaria, Schistosomiasis and Filariasis
Key Laboratory of Parasite and Vector Biology, Ministry of Health
Shanghai 200025, People's Republic of China
Email: nipdxzhg@163.com

Conflict of interests: No conflict of interests is declared.