

Travelers' malaria-related knowledge, attitudes and behavior on the north coast of Peru

Conocimientos, actitudes y comportamientos de los viajeros en relación con la malaria en la costa norte de Perú

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ABSTRACT

Introduction: An increase in interprovincial travel has been registered annually during the last decade on the north and northeast coast of Peru, resulting in the spread of vector-borne diseases such as malaria. Therefore, travelers using interprovincial transport should be informed about the impact of infectious diseases in endemic regions and be aware of the risk of acquiring a travel-related condition.

Objective: Examine travelers' malaria-related knowledge, attitudes, and practices.

Methods: A cross-sectional study was conducted from January to March 2019 of a random sample of individuals who attended bus stations classed as areas with a higher risk of malaria selected at random in Chiclayo, Peru. The study was conducted reliably through a survey consisting of 29 questions: 18 about knowledge and 11 about attitudes.

Results: Of the 250 participants in the study, knowledge was found to be good in 29.13%, practices in 14.74%, and attitudes in 18.33%. People with a higher education degree had a better level of knowledge and attitudes. Also, 60 people were asked about their self-perception of knowledge about malaria and said their knowledge about the subject was adequate. Of the 190 who reported not having enough knowledge about malaria, 49.47% were interested in learning about malaria practices and 25.26% were interested in learning about treatment.

Conclusions: Most of the knowledge, attitudes, and practices of people who travel to endemic areas are not adequate.

Keywords: knowledge; attitudes; behavior; malaria; traveler.

RESUMEN

Introducción: En la última década se ha registrado un incremento anual de los viajes interprovinciales en la costa norte y noreste de Perú, lo que ha provocado la propagación de enfermedades transmitidas por vectores, como es el caso de la malaria. Es por eso que los usuarios del transporte interprovincial deben estar informados sobre el impacto de las enfermedades infecciosas en las regiones endémicas y sobre el riesgo de adquirir una enfermedad relacionada con los viajes.

Objetivo: Examinar los conocimientos, actitudes y prácticas de los viajeros en relación con la malaria.

Métodos: En el período comprendido de enero a marzo de 2019, se realizó un estudio transversal de una muestra aleatoria de personas que visitaban estaciones de ómnibus clasificadas como áreas de alto riesgo de malaria, seleccionadas aleatoriamente en Chiclayo, Perú. El estudio se llevó a cabo mediante un procedimiento confiable basado en una encuesta de 29 preguntas: 18 sobre conocimientos y 11 sobre actitudes.

Resultados: De los 250 participantes en el estudio, 29,13 % mostraron buen dominio de los conocimientos, 14,74 % de las prácticas y 18,33 % de las actitudes. Los graduados de la educación superior tenían un mejor nivel de conocimientos y actitudes. Además, a 60 personas se les preguntó sobre la percepción que tenían acerca de sus propios conocimientos sobre la malaria, y respondieron que estos eran apropiados. De los 190 que declararon no tener suficientes conocimientos sobre la malaria, 49,47 % mostraron interés en aprender sobre prácticas relacionadas con la enfermedad y 25,26 % sobre el tratamiento de la misma.

Conclusiones: La mayor parte de los conocimientos, actitudes y prácticas de las personas que viajan en regiones endémicas no es adecuada.

Palabras clave: conocimientos; actitudes; comportamientos; malaria; viajero.

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Introduction

The annual number of interprovincial travelers has steadily increased over the last decade all around the north coast and the northeast and the acquisition of

travel-associated infectious diseases is one of the major problems in public health.⁽¹⁾ In the last two years, malaria cases have been reported in jungle regions such as Loreto, Amazonas, and San Martín; in the last two, there are cities such as Bagua and Tarapoto that, although they have reported very little incidence of the disease, the risk remains latent since, in the cities that are around them, there is an increase in cases. It should be noted that the cities of Tarapoto and Bagua are commonly visited by people who travel for multiple reasons.⁽²⁾ To travel to tropical and sub-tropical geographic areas cause an increased probability of exposure to endemic infectious diseases like malaria.⁽³⁾ Transport networks continue expanding year by year, land transportation is faster and more comfortable than in past years, the volume of passengers can now move further, than ever before, these actions increase the spread of infectious diseases.⁽⁴⁾

It is well known that the spread of travel-related infectious diseases in travelers is increased by visiting rural and remote areas more frequently, activities during travel like tours, a greater consumption of high-risk food and drink in the local market, and a lower likelihood of seeking medical consultation before their journey as a recommendation or follow recommended vaccinations before the trip.^(5,6,7,8) For these reasons travelers on interprovincial trips must know the impact of infectious diseases in endemic regions and have a real awareness of the risk of acquiring a travel-related affliction, these diseases can be prevented through vaccinations, antimalarial drugs, and advice from healthcare professionals. The travel agencies and the government of Peru did not provide enough and accurate information about the risk and prevention of malaria to travelers who travel to the Amazon of Peru.⁽⁹⁾ In cross-sectional surveys of travelers who visit malaria-risk areas, it has been shown that some of them comply with preventive measures for this disease.⁽¹⁰⁾

In this context, we want to understand the travelers' knowledge, and practices, this could provide interesting information to make health policy to plan educational interventions on this population to prevent effectively travel-related diseases. The objective of this research is to examine the traveler's knowledge, attitudes, and practices of travel-related malaria.

Methods

Study setting and sample

This cross-sectional study was performed between January and May in 2019, in two bus stations in the area of Chiclayo. The sampling method was performed by a researcher who applied anonymous questionnaires at the arrival entrance at the bus station until the passenger waits to arrive at the bus. We select the bus station which travels to the north oriental area of Peru. The passenger participated voluntarily; we do not promote any incentive; the questionnaire was not piloted and was designed based on the experience of infectologists and epidemiologists who work at a Hospital, Peru, who are experts in vector-borne diseases. We include the passengers who have 18 years or more, trips to destinations with an intermediate or high risk of malaria were selected (Amazonas, San Martín,

Cajamarca, Loreto). We exclude incomplete and incorrect questionnaires. The Ethical Committee of the Universidad Nacional Pedro Ruiz Gallo approved the study with resolution 023-19. Also, permission was requested from the authorized persons of each bus station. Informed consent was obtained from participants before the survey when it was clarified that participation was voluntary. Anonymity and confidentiality of data were ensured.

Questionnaire

The survey consists of 29 questions, 9 knowledge questions, 9 preventing questions, 11 attitude questions. Our instrument was previously it was approved by an expert in the area of epidemiology and an expert in the area of infectious diseases in the region.

The survey questions were selected taking as a reference other similar studies concerning knowledge, attitudes, and practices about malaria in travelers.

The answers to the questions were graded as correct or incorrect, assigning a determined score and a final grade, which was as follows:

Knowledge level: It was graded through a vigesimal scale. Dividing the final marks according to the following table Poor ≤ 10 (less than the 50th percentile), regular 11 to 13 (between the 50th and 70th percentile), good from 14 to 17 (greater than the 70th and lower 90th percentile), very good 18 to 20 (greater than the 90th percentile).

Attitude level: It was rated through a vigesimal scale. The final grades are divided according to the following table: inadequate from 0 to 11 (lower percentile equal to 55), and adequate from 12 to 20 (higher percentile of 55). The questions were grouped as follows:

General characteristics: Age, sex, educational level, city to which you travel, have you previously suffered from any of the following diseases (Malaria, Dengue, Bartonellosis, Leishmaniasis, or Trypanosomiasis), do you have any current physical condition?

The characteristics associated with the trip: Purpose of the trip, length of stay at the destination. You can see the questionnaire in the annex.

Statistics

The collected data were entered into Microsoft Excel using a double data entry method and then reviewed for quality control. Variables were described using absolute and relative frequencies. Global frequencies and percentages were used to present general aspects, knowledge, and practices. All analyzes were performed using STATA 12.

Results

We record data of 250 participants. The average age was 36.8 years (SD: 13.14 years), with a similar proportion between men and women. The vast majority

traveled for tourism (45.2%) or personal reasons (44.8%). It was observed that the knowledge of the patients was good at 29.13%, practices were 14.74%, and attitudes 18.33% (Table 1).

Table 1 - Characteristics of travelers surveyed in bus station traveling to areas of northeastern Peru

Characteristics	N	%
Age	36.8	13.14
Sex		
Male	124	49.6
Female	126	50.4
Instruction		
High School	91	36.4
University	159	63.6
City of destination		
Bagua	69	27.6
Cajamarca	14	5.6
Chachapoyas	52	20.8
Jaen	55	22
Piura	1	0.4
Tarapoto	59	23.6
Did you have any vector-borne illness?		
Yes	10	4
Special physical condition		
Elderly	18	7.2
Pregnant	13	5.2
None	219	87.6
Purpose of the trip		
Tourism	113	45.2
Work	25	10
Others	112	44.8
Knowledge		
Good	74	29.13
Regular	51	20.08
Bad	129	50.79
Practices		
Good	37	14.74
Regular	47	18.73
Bad	167	66.53
Attitudes		
Good	46	18.33
Regular	55	21.91
Bad	150	59.76

About the level of knowledge, it was found that there were no differences between sex or age; but those with a higher education degree had a better level of knowledge compared to those in secondary school (Table 2).

Table 2 - Knowledge level of travelers surveyed in bus stations traveling to areas of northeastern Peru

Characteristics	Knowledge			p*
	Bad (N= 125)	Regular (N= 51)	Good (N= 74)	
Age	37.7	35.88	35.94	0.563
Sex				
Female	66 (52.8%)	21 (41.18)	39(52.70)	0.336
Male	59 (47.2%)	30 (58.82)	35 (47.30)	
Instruction				
High school	47 (37.6)	15 (29.41)	29 (39.19)	0.496
University	78 (62.4)	36 (70.59)	45 (60.81)	
Purpose of the trip				
Personal motives	72 (57.6)	19 (37.25)	21 (28.38)	<0.001
Work	13 (10.4)	10 (19.61)	2(2.7)	
Tourism	40 (32)	22 (43.14)	51 (68.92)	

*t-Student.

About the level of practices, it was found that there were no differences between sex or age, nor at the educational level, but it was slightly higher in those of higher grade (Table 3).

Table 3 - Practices of malaria in travelers surveyed in bus station traveling to areas of northeastern Peru

Characteristics	Practices			p*
	Bad (N= 166)	Regular (N= 47)	Good (N= 37)	
Age	37.48	37	33.56	0.261
Sex				
Female	83 (50%)	26 (55.32)	17 (45.95)	0.684
Male	83 (50%)	21 (44.68)	20 (54.05)	
Instruction				
High school	60 (36.14)	14 (29.79)	17 (45.95)	0.309
University	106 (63.86)	33 (70.21)	20 (54.05)	
Purpose of the trip				
Personal motives	81 (48.80)	26 (55.2)	5 (13.51)	does not apply
Work	13 (7.83)	0	12 (32.43)	
Tourism	72 (43.37)	21 (44.68)	20 (54.05)	

*Chi-square.

Regarding attitudes, it was found that there were no differences between sex or age; but those with a higher education degree had a better attitude about malaria compared to those in secondary school (Table 4).

Table 4 - Attitudes about malaria in travelers surveyed in bus station traveling to areas of northeastern Peru

Characteristics	Attitudes			p*
	Bad (N= 149)	Regular (N= 55)	Good (N= 46)	
Age	37.77	35.58	35.17	0.371
Sex				
Female	79 (53.02)	23 (41.82)	24 (52.17)	0.352
Male	70 (46.98)	32 (58.18)	22 (47.83)	
Instruction				
High school	51 (34.23)	20 (36.36)	20 (43.48)	0.522
University	98 (65.77)	35 (63.64)	26 (56.52)	
Purpose of the trip				
Personal motives	76 (51.01)	21 (38.18)	15 (32.61)	does not apply
Work	14 (9.4)	11 (20)	0	
Tourism	59 (39.6)	23 (41.82)	31 (67.39)	

*Chi-square.

Also, 60 people (24%) were asked about their self-perception of knowledge about malaria and stated they had an adequate level of self-perceived malaria knowledge. Of the 190 who reported not having enough knowledge about malaria, 49.47% were interested in learning about malaria practices, followed by 25.26% who were interested in knowing about treatment. Age in tables refers to the mean age and the units are years.

Discussion

Malaria has had a greater impact than any other infectious disease in world history. More than 300 to 500 million people worldwide are infected with *Plasmodium spp.*, and 1.5 to 2.7 million people a year, most of whom are children, die from the infection.⁽¹¹⁾ According to the WHO, malaria persists as an important cause of morbidity and mortality in risk regions; There are very few studies carried out on travelers from South America that allow us to measure how much people know about this disease and what level of attitudes they have. In Peru, malaria continues to be a public health problem, mainly in jungle regions. where there is the highest prevalence.⁽¹²⁾ The knowledge, attitudes, and practices (KAP) study carried out on the population of travelers to these regions was carried out as a strategy to gain an in-depth understanding of this problem and subsequently allow correct decision-making regarding the prevention of this disease.⁽¹³⁾

Our investigation is one of the first studies on this topic describing the knowledge, attitudes, and prevention of malaria in travelers in Peru. The potential role of this research could be used in developing strategies for this health issue. Peru is highly affected by malaria since its geography and rainy areas make this public health problem prevalent.⁽¹⁴⁾ Amazon regions are considered endemic for malaria.⁽¹⁵⁾ This is due to the humid areas presented by high rainfall.⁽¹⁶⁾ One of the problems associated with malaria in Peru is the treatment time that lasts up to three days in the Peruvian Amazon.⁽¹⁷⁾ It has been seen that in Peru the knowledge and techniques could reduce malaria in the Peruvian territory.⁽¹⁸⁾

The travelers need to improve their knowledge because of the participants surveyed only 29.13% had a good level of knowledge. This result is unsatisfactory compared with other surveys published from other countries with a high level of knowledge.⁽¹⁹⁾ We found studies with similar results. These differences may be attributed to the different populations who do not have similar characteristics, methods of collecting the data, and instruments used. The travelers did not receive any information or recommendation about the risk of malaria in the areas that travel. We think our results reflect the vast reality of the travelers because they do not investigate the risk of infectious diseases and the high frequency of the trips normalizes this.

It is important to know the travelers showed little concern about the risk of getting malaria during their travel. This result is in the line with other studies conducted in other countries with different populations where travelers have a low perception of the malaria risk. Results from this study show travelers did not

receive information about the endemic areas to those who traveled, regarding measures for preventing the risk of getting malaria in the destination.^(5,20) The level of knowledge of prevention was low at 14.74%, the majority did not show actions to prevent the infection with malaria, in other studies we found similar results that people did not foresee the risk of malaria.^(21,22) In general, this behavior of travelers can be explained by the fact that they do not usually undergo health checkups until they show some symptoms.

In this study, traveler attitudes about malaria were low. This is not related to an investigation where immigrant travelers in the United States traveling to sub-Saharan, Africa, of which approximately 60% of the total of respondents affirmed to have taken an antimalarial in their last trip.⁽²³⁾ In the same way, they also affirmed the use of repellent against mosquitoes. This shows that these people show greater concern when they travel to places at risk of malaria due to the preventive behavior of these travelers.⁽²³⁾ Likewise, Dutch travelers who went to areas at risk of malaria showed preventive attitudes that were improving over time,⁽²⁴⁾ and also in Egyptian travelers where they showed a good attitude towards vaccination and think that it is necessary before a trip.⁽²⁵⁾ This demonstrates that in our country there is still ignorance and lack of concern about infectious vector-borne diseases, especially when making a trip to a place of risk, a situation that in other countries does not occur and that thanks to the same population become aware of these diseases, can promote the advancement of prevention measures in airports.

Regarding attitudes, it was found that there were no differences between sex or age; but those with a higher education degree had a better attitude about malaria compared to those in secondary school. However, in a study of Egyptian travelers, the overall attitude towards vaccination and the perceived benefits of malaria prophylaxis were significantly correlated with advancing age, but coincide in terms of correlation with the higher educational level of malaria knowledge⁽²⁵⁾ and also in a reliable survey in Yaoundé, where the attitude analysis revealed that people with a university or secondary education have a better knowledge of prevention measures and treatment measures for malaria compared to those at the primary level, where gender did not have significant significance.⁽²⁶⁾ We can say then that people with a higher educational level have a better attitude towards infectious diseases due to the same education and closer relationships with health professionals, regardless of gender or age.

Besides, 60 people (24%) were asked about their self-perception of knowledge about malaria and stated they had an adequate level of malaria knowledge. Of the 190 who reported not having enough knowledge about malaria, 49.47% were interested in learning about malaria prevention, followed by 25.26% who were interested in knowing about treatment. This is valuable information to generate more knowledge and propose prevention and treatment measures to travelers who go to areas at risk of any infectious disease, including malaria, either before the trip, during their stay on-site and after the trip, to ensure maximum follow-up and to avoid new outbreaks of infections.

It is important to understand how people recognize risks and communications about the risk of becoming infected with malaria.⁽²⁷⁾ There are differences between people who travel through tourist agencies and those who travel for

personal reasons,⁽²⁸⁾ In our study, people who traveled for personal reasons had worse knowledge than those who did not. The more experienced tourists take antimalarial drugs as part of the recommendations followed to travel to malaria-endemic areas.⁽²⁹⁾ Precautionary measures for young long-stay travelers and people visiting primarily for business purposes should be strengthened.⁽²⁷⁾

Data were collected on travelers departing from a city on the north coast of Peru. Most of the data came from a small population and only two large bus stations, with more than five small and medium-sized terminals in the city of Chiclayo. One of the limitations regarding the sample is that people who voluntarily accessed the study were surveyed, leaving out many people. Volunteer bias and the survey has not been psychometrically validated. There is no mention of emergency self-treatment of malaria in this study, there must be a part of emergency treatment for travel to low-risk malaria areas.⁽³⁰⁾ Furthermore, these surveys were conducted over a short period of months, and therefore, epidemiological trends cannot be deduced from this point prevalence studies. Since then no follow-up evaluations have been conducted and therefore current population estimates should be based on current data. Finally, the characterization of malaria in the sentinel population of travelers provides an overview of the scale of infection transmission but is not entirely representative of the general population.

The first recommendation to give is proper instruction and training, including the successful performance of the testing procedure. Some cities already apply such measures in airports, such as the city of Boston, in the United States, where most people took chemoprophylaxis before traveling, used mosquito repellent, and slept with a net in their bed.⁽¹⁰⁾ The population plays an important role in creating health strategies, that is why this type of study is carried out to improve the quality of prevention and interest in learning more about the diseases that can occur when traveling. The results of this study showed that travelers had low knowledge of malaria infection and do not often practice preventive measures when they travel to endemic areas. These findings show the importance of implementing better modes to communicate and educate travelers about the problem of malaria causes.

Conclusions

Most of the knowledge, attitudes, and practices of people who travel to endemic areas are not adequate.

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Annex - Questionnaire of knowledge, preventing, attitude related to Malaria in north-cost of Peru

Questions about knowledge of malaria	Correct answer
1. How do you consider the risk of contracting malaria in your destination?	Tarapoto, Bagua / Yes
2. What is the causative agent of malaria?	Protozoon
3. How is malaria transmitted mainly?	Mosquito Bite
4. What is the insect responsible for the transmission of malaria?	Anopheles
5. What is the main symptom of malaria?	Fever
6. What is the time of day when you are most at risk of becoming infected with malaria?	Any time of the day
7. Who can get malaria?	Anyone can get the disease
8. Malaria infection can be completely cured?	Yes
9. Is there adequate treatment to fight malaria infection?	Yes
Questions about preventing malaria	Options
10. Do you use repellants to prevent malaria?	Yes / No / maybe; I do not know
11. Do you wear long-sleeved polo shirts and long pants to prevent the spread of malaria?	Yes / No / maybe; I do not know
12. Do you incense kill mosquitoes and is it effective in preventing malaria?	Yes / No / maybe; I do not know
13. Do you use of medications helps prevent a malaria infection?	Yes / No / maybe; I do not know
14. Do you use mosquito nets prevents malaria?	Yes / No / maybe; I do not know
15. Do you use deodorants and perfumes to prevent malaria?	Yes / No / maybe; I do not know
16. Burning anti-mosquito coils or lighting bonfires to drive away mosquitoes, malaria is prevented?	Yes / No / maybe; I do not know
17. Spraying the house, malaria is prevented?	Yes / No / maybe; I do not know
18. Using uncontaminated water for personal hygiene, malaria is prevented?	Yes / No / maybe; I do not know
19. Wearing sunglasses is effective in preventing malaria?	Yes / No / maybe; I do not know
Questions about attitudes towards malaria	Options
20. Do you consider malaria to be a major issue or problem in the area where you travel?	Agree / Disagree / Neither agree nor disagree
21. There is a high risk of contracting malaria on this trip?	Agree / Disagree / Neither agree nor disagree
22. If you had fever, chills, headache, and malaise in general, during their stay at the destination or the first days of return, they would go to the nearest health facility?	Agree / Disagree / Neither agree nor disagree
23. In a pharmacy, a person with malaria can be properly treated?	Agree / Disagree / Neither agree nor disagree
24. Going to a health center is best suited to treat a person with malaria?	Agree / Disagree / Neither agree nor disagree
25. An experienced naturopath or healer can effectively treat a person with malaria?	Agree / Disagree / Neither agree nor disagree
26. If you were to contract malaria, you would want that information to remain confidential?	Agree / Disagree / Neither agree nor disagree
27. Do you would take malaria medications provided by health personnel if presented?	Agree / Disagree / Neither agree nor disagree
28. Do you have enough information about malaria?	Agree / Disagree / Neither agree nor disagree
29. If you answer this to the previous question was, disagree or neither agree nor disagree, do you want to know more about malaria?	Agree / Disagree / Neither agree nor disagree

Conflict of interests

The authors does not have any conflict of interests.

Authors' contributions

Sebastian Iglesias-Osores: Conceptualization, Methodology, Software. Supervision. Writing-Reviewing and Editing

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