

Malaria Course in the Amazon Region: the potential of telehealth in the training of health professionals in endemic regions

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Abstract

Introduction: Telehealth has demonstrated all its potential in the distance training of health professionals located in remote regions. In the Amazon region, malaria poses a challenge to public health, especially due to the lack of trained professionals to manage the disease. Methods: The Organization of the Amazonian Cooperation Treaty has already done in partnership with the Federal University of Minas Gerais and FIOCRUZ two editions of an on-line course of short duration for the eight border countries of the Amazon. This paper presents the results of the second edition in 2017. Results: 1104 health professionals from the eight border countries of the Amazon (Brazil, Venezuela, Peru, Ecuador, Colombia, Suriname, Guyana, Bolivia) and Honduras were enrolled. Discussion: The realization of the course has already demonstrated its potential and can be a permanent feature in the Amazon region
Keywords: Continuing Education; Distance Education; Endemic diseases; Malaria; Telehealth; Telemedicine.

Resumen

Curso de la malaría en la Región Amazónica: potencial de la telesalud na capacitación de profisionales de salud umbicados en regiones endémicas.
Introducción: La telesalud ha demostrado todo su potencial en la capacitación a distancia de profesionales de salud ubicados en regiones remotas. En la región amazónica, la malaria representa un desafío para la salud pública en especial por la carencia de profesionales capacitados para manejar la enfermedad. Métodos: La Organización del Tratado de Cooperación Amazónica atenta a ello ya realizó en asociación con la Universidad Federal de Minas Gerias y FIOCRUZ dos ediciones de un curso on line, de corta duración para los ochos países fronterizos de la Amazonia. Este artículo presenta los resultados de la segunda edición realizada en el año 2017. Resultados: Se han inscrito 1104 profesionales de salud de los ocho países fronterizos de la Amazonia (Brasil, Venezuela, Perú, Ecuador, Colombia, Surinam, Guyana, Bolivia) y Honduras. Discusión: La realización del curso ya demostró su potencial y puede ser una acción permanente en la región de la Amazonia
Palabras-clave: Educación Continua; Educación a Distancia; Enfermedades Endémicas; Malaria; Telesalud; Telemedicina.

Resumo

Curso de Malária na Região Amazônica: o potencial da telessaúde na capacitação de profissionais atuantes em regiões endêmicas.
Introdução: A telessaúde tem demonstrado todo o seu potencial na capacitação a distância de profissionais de saúde localizados em regiões remotas. Na região amazônica, a malária representa um desafio para a saúde pública em especial pela carência de profissionais capacitados para manejar a enfermidade. Métodos: A Organização do Tratado de Cooperação Amazônica atenta a isso já realizou em parceria com a Universidade Federal de Minas Gerias e FIOCRUZ duas edições de um curso online, de curta duração para os oito países fronteiriços da Amazônia. Este artigo apresenta os resultados da segunda edição realizada no ano de 2017. Resultados: Foram inscritos 1104 profissionais de saúde dos oito países fronteiriços da Amazônia (Brasil, Venezuela, Perú, Equador, Colômbia, Suriname, Guiana, Bolívia) e Honduras. Discussão: A realização do curso já demonstrou seu potencial e pode se tornar uma ação permanente na região Amazônica.
Palavras-chave: Educação Continuada; Educação a Distância; Doenças Endêmicas; Malária; Telessaúde; Telemedicina.

Introduction

Malaria is a disease of parasitic origin, transmitted by vectors with a high prevalence in a global level in the tropical and subtropical regions.

Malaria in Amazon represents a challenge for public health due to its association with many factors, such as the urbanization of the Amazonian woods, the difficulty of ac-

cess in the diagnosis and precocious management and the lack of reference centers for the monitoring of this and other illnesses. To this factor it must be added the lack of trained personnel, from medical aspects to paramedic and communal prevention, widely known in the region.

The eight countries members of the Amazonian Cooperation Treaty (OTCA) present reports of Malaria cases and is considered one of the higher risk diseases in the Amazonian

Region, due to the amount of cases that are presented and to the difficulty in controlling and managing this disease.

Bearing in mind this necessity and beginning with the obtained results with the execution of a massive capacitation about monitoring and management of Malaria in Amazon in the year 2014, a second edition was proposed, considering the advances in the subject and the need to train personnel of different areas in the region.

The correspondence course in Malaria offered to the countries that constitute the Amazon Region is the result of an association between the Amazonian Cooperation Treaty Organization (OTCA), the Faculty of Medicine from the Minas Gerais Federal University (UFMG) and the Oswaldo Cruz Foundation (FIOCRUZ), and was accomplished through the Center of Health Technology (CETES) with the financial support of the Amazonian Regional Program (PRA). The course was designed to be offered as an extension course to the professional training in the distance modality. This article presents the results of the second application of this of this course (2017 edition), demonstrating all of telehealth's potential in the training of health professionals that can act in endemic regions for Malaria.

Method

Initially the characteristics of the course were described, which was presented to the Health Ministries of the Amazonian Countries with the purpose of promoting the participation of the people who inhabit the amazonian regions of such countries, and by doing that, ensuring a bigger number of possible participants from the region. Additionally it was programmed to be carried out in the period between September 09th and December 3rd, 2017, 100% as a correspondence course, with a workload of 80 hours. It proposed to orient the course to medical and paramedical personnel of the Amazonian Region, with the participation of the eight countries members of the OTCA: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Surinam and Venezuela. Moreover, it was included in the training to Honduras as requested by the request from the country, due to the precedent of participation in the previous course and to the necessity that exists in the country to strengthen the monitoring and management of the disease.

The matter of the classes and the depth of the management of the themes were discussed by a panel constituted by the professors that participated in the development of the lessons and in the follow-up of the students. The classes were provided for the students via web, through a Moodle platform developed for the theme, to which students, tutors and professors had access to by a personal password released in the database (online). This facilitated the follow-up of the academic activities and the development of the course activities by country and by student. Each group of 100 stu-

dents was supervised by a tutor, responsible for supporting the platform and the meeting of deadlines and activities (the desertion rate is high when the student is not accompanied by a tutor in his activities, experience that has been acquired during the previous version of the course). The students had access to the discussion forums to answer to the questions and discussions about the matter. This forum was accompanied by a specialist in Malaria. The course, in short, used the Moodle platform and many web conferences during the program, using and taking advantage of the existing telehealth structure in the participant countries and with the monitoring of the participant institutions.

The program content was structured with 10 classes divided in 3 modules and one final component (module) for the adjustments of presentation of proofs and issue of licenses as described in table 1.

Table 1 - Program content of the Malaria course.

Mouth	Activity	Workload
1	Module I: Etiology and Physiology of Malaria	24 hours
	Lesson 1: Etiology	30 points
	Lesson 2: The cycle of Malaria	
2	Lesson 3: Physiopathology of the Disease	40 hours
	Module II: Epidemiology / Clinic and Diagnosis	
	Lesson 4: Epidemiology of Malaria	
	Lesson 5: Main aspects of major Malaria	
	Lesson 6: Infection by asymptomatic plasmodium	
3	Lesson 7: Differential diagnosis	40 points
	Lesson 8: Treatment	
	Evaluation Exercise	
	Module III: Main aspects of the disease's vector in the Amazonian Region (control, elimination and eradication)	
	Lesson 9: Control aspects	
4	Lesson 10: Control, eradication and elimination: Is it possible?	16 hours
	Evaluation Exercise	
	Execution of the Evaluation post Course to the participants	
	Evaluation of the course (feedback about the activity)	
	Issuing of Certificates	30 points

Source: Coordination of the course

¹ OTCA is the intergovernmental organization established by the south american countries that have Amazon Region for the articulation of various themes for the protection of the biodiversity, population and resources of the region.

² Amazon Regional Program. Cooperation Agreement of the German and Dutch Governments with OTCA's Permanent Secretary. (BMZ/DGIS/GIZ).

In addition to the theoretical classes, 3 discussion forums were organized and 3 evaluation tests were carried out at the end of each module.

For the content management a virtual platform in Moodle was used.

The student received a connection to a personalized access, sent to the electronic mail of records, informed by the Health Ministry of the participating country. In the platform the participant could do the following:

- To familiarize with the platform and its resources.
- Perform the PRE-TEST, necessary requirement to start the course.
- Access and read the following base documents:
 - General guide of the course and information about the platform;
 - How to remotely study and how to explore the resources from the Moodle platform;
 - How to insert your photo - (this activity is mandatory);
- Activity calendar.

Contents were developed to be consulted directly in the platform, including animations of the contagion processes, development of the disease inside the host and treatment. The content were also available to be downloaded in PDF form to facilitate its subsequent reading, or for the access in places where the internet quality is lower.

The certificates were issued by the Federal University of Minas Gerais (UFMG-Brazil) for students that had been approved in the contents and with a participation bigger than 70% of the course.

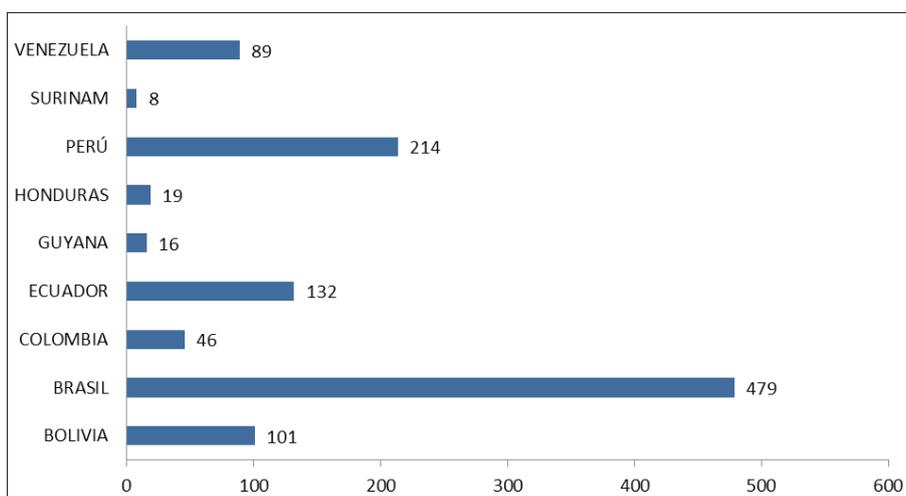
In the Moodle platform, a registration of the students and of the activities that were being developed were structured, with the intention to collect in a continuous way the data relative to the development and participation in the course. This data allowed the construction of a general characterization of the course, considering aspects relative to the conclusion of the course and to the performance of the students in each country. The obtained information was analyzed and structured in a way that allowed a panoramic view of the course in general and how was its performance by country.

Results And Discussion

Entries of candidates from nine countries were received, with a total of 1104 participants from Bolivia, Brazil, Colombia, Ecuador, Guyana, Honduras, Peru, Surinam and Venezuela, were entered. Each country sent its list of nominees and the participants were registered in the platform by technical support team.

Still, each country nominated a delegate inside the Health Ministry to support the monitoring of the students. The distribution of the participants by country is shown in figure 1.

Figure 1 - Number of students entered by country.

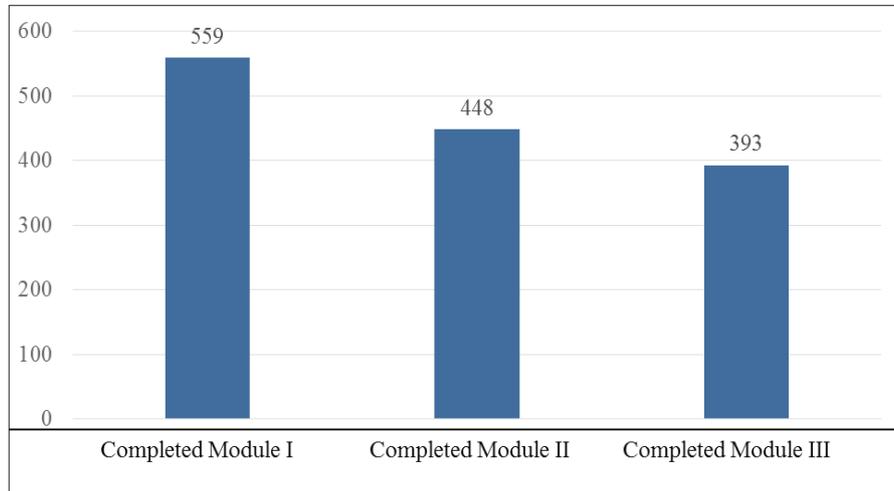


Source: report of entrants.

Brazil had the biggest number of registered participants in the platform with 43,39% of the enrolled participants, followed by Peru (19,38%) and Ecuador (11,96%). The other countries had entries below the expected number of candidates, considering the diffusion and the manifestation of intention to participate in the activity: Bolivia had 101 participants, equivalent to 9,15%, Venezuela 8,06%, Colombia 4,17%, Honduras (1,72%), Guyana (1,45%) and Surinam with 0,72%. As for Guyana and Surinam one of the incident factors was to not count with the course in english, the participants of these countries are bilingual with Spanish and/or Portuguese.

As for the students that remained active in the platform (752 participants), 74,33% finished the module I, 59,57% finished module I+II and 52,26% of the students completed the modules I, II and III. Figure 2 presents the general result by module.

Figure 2 - Number of students by completed module.



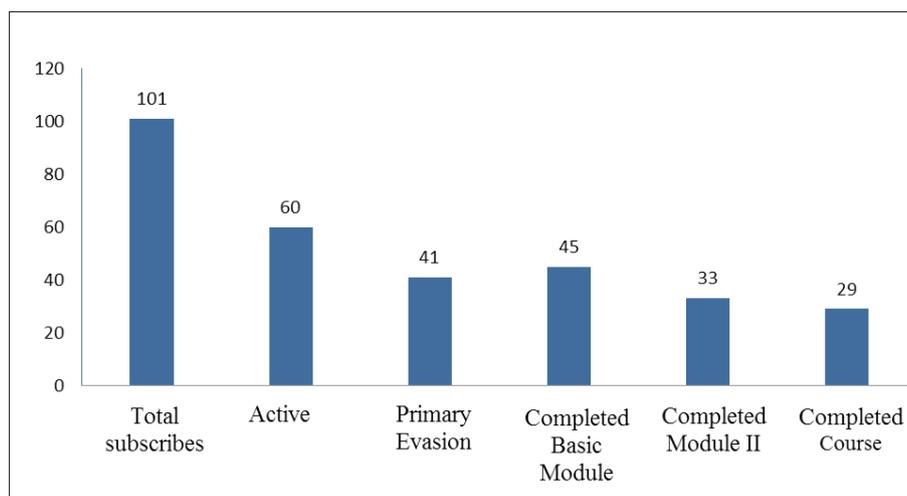
Source: report of entrants.

In terms of the performance by country there is a relation that was directly proportional to the working conditions and connectivity of each country.

- Bolivia

Of a total of 101 enrolled students, 41 never accessed the platform. Of the 60 active ones, 75% completed the basic module and 48,33% completed the course in its entirety. Bolivia presented the biggest percentage of students without previous experience in distance learning. 92% of the students reported never had done a distance course, which can be one of the causes for the performance presented by country.

Figure 3 - Bolivia's performance.

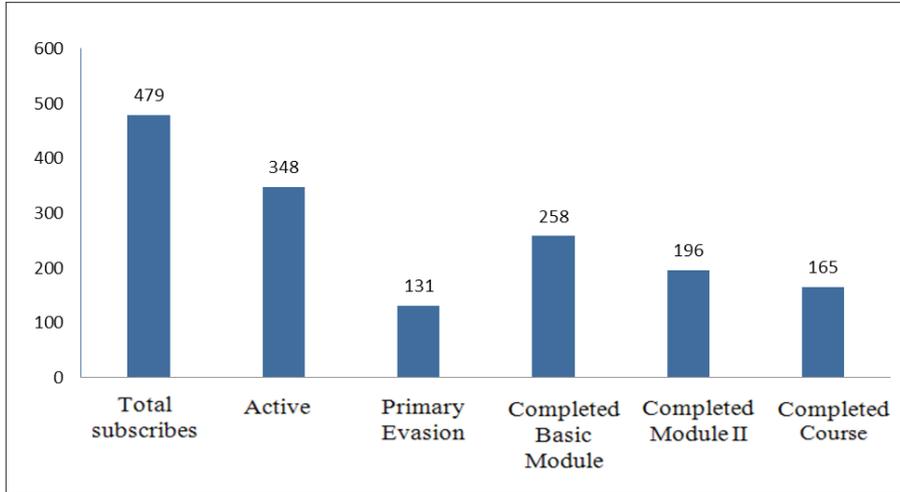


Source: report of entrants.

- Brazil

Brazil had the biggest number of enrolled students. Of a total of 479 students, 131 never accessed the platform. Of the 348 who were active, 74,13% completed the basic module and 47,41% completed the course.

Figure 4 - Brazil's performance.

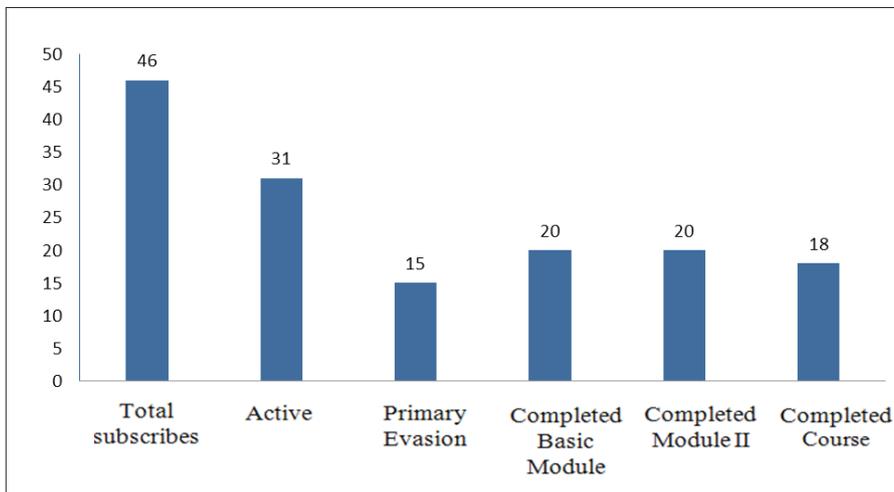


Source: Record of participation.

- Colombia

Of a total of 46 enrolled students, 15 never accessed the platform. Of the active students (31), 64,51% completed the basic module and 58,06% completed the whole course.

Figure 5 - Colombia's performance.

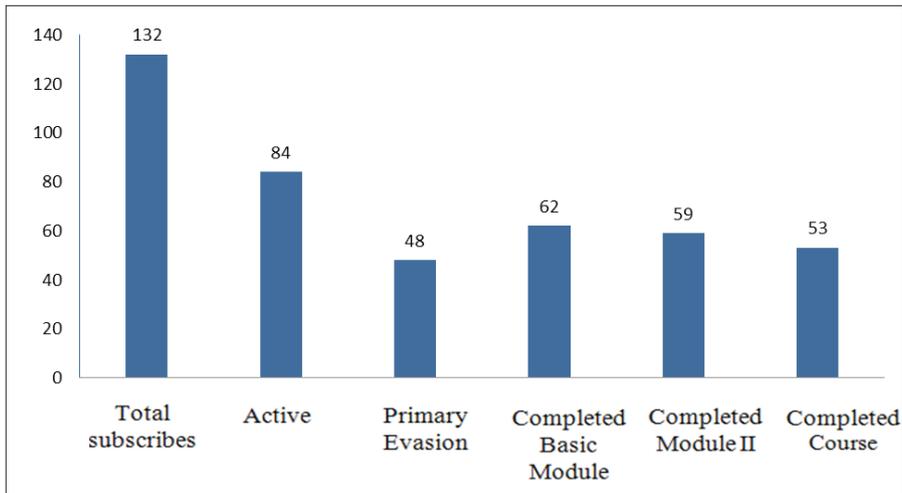


Source: Record of participation.

- Ecuador

Of a total of 132 enrolled students, 48 never accessed the platform; 18 of these participants were from the region of Morona where there is no internet and it wasn't possible for them to continue with the course. Of the active students, 73,8% completed the basic module and 63,09% completed the course. The beginning of the course coincided with the vacation of some students that are Cuban doctors. 56% of the enrolled students didn't have previous experience with distance learning.

Figure 6 - Ecuador's performance.

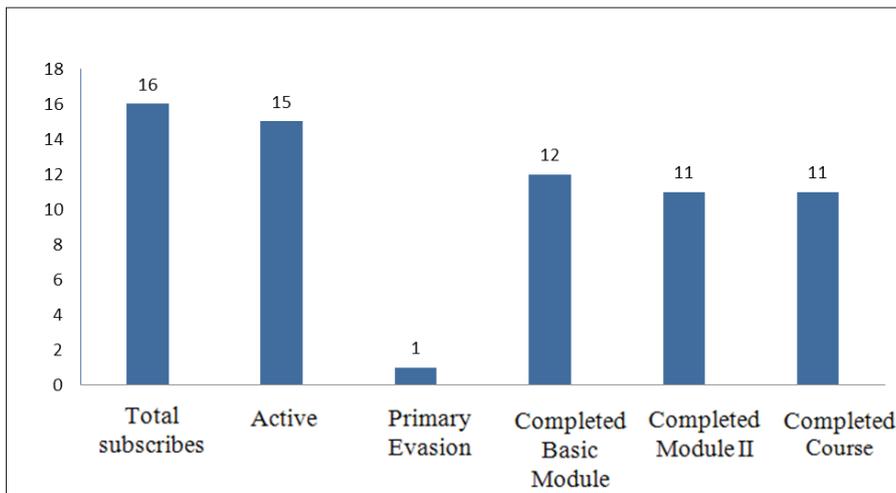


Source: Record of participation.

- Guyana

Of a total of 16 enrolled students, only one not accessed the platform. Of the 15 active students, 80% completed the basic module and 73,33% completed the course. The country had the smallest index of primary evasion of the best performance among the countries. There weren't reports of difficult accessibility or problems with connectivity.

Figure 7 - Guyana's performance.



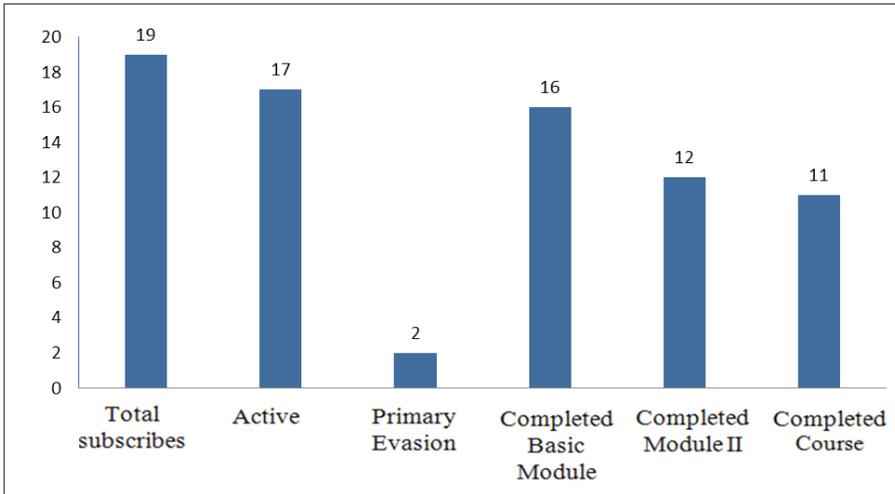
Source: Record of participation.

- Honduras

Honduras, although isn't a country that borders the Amazonian Region, requested the accession to the course, considering the need to train personnel and additionally solicited a subsequent raise of more participants totaling 19 enrolled students.

Of a total of 17 active students, 94% completed the basic module, 65% completed the whole course. Only one case of withdrawal was presented and no problems with access or connectivity were reported.

Figure 8 - Honduras' performance.

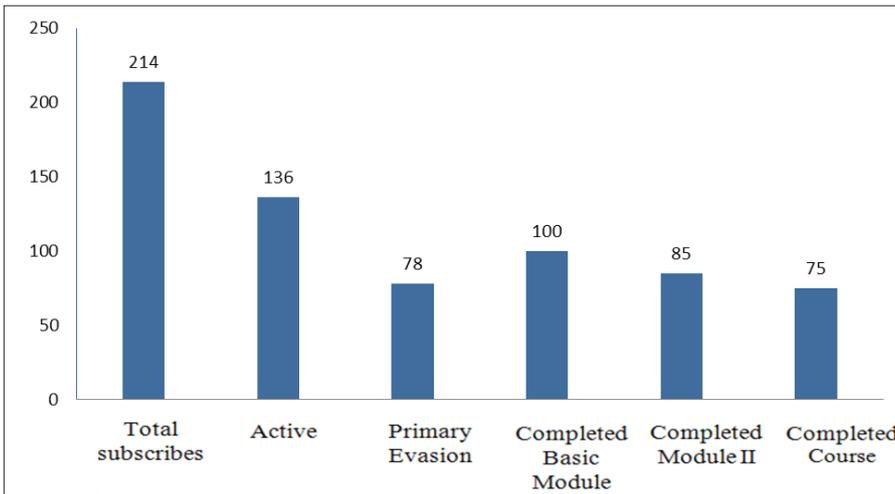


Source: Record of participation.

- Peru

Peru had the second biggest number of enrolled student. Of a total of 214 students, 78 never accessed the platform. Of the 136 who were active, 73,52% completed the basic module and 55,14% completed the course. The contacted students claimed lack of time or connectivity problems. Many students weren't located because many phone numbers were registered incorrectly in the record sheet, inactive or constantly in the message box.

Figure 9 - Peru's performance.

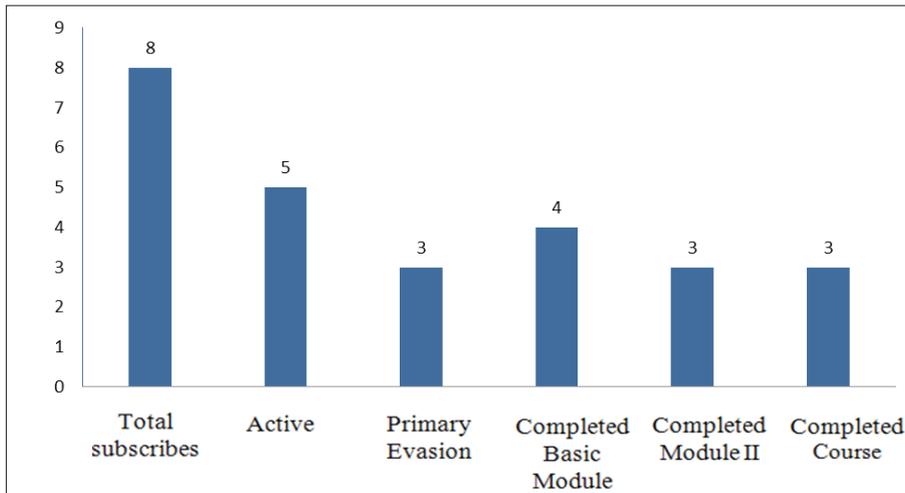


Source: Record of participation.

- Surinam

Surinam presented the smallest number of enrolled students, given that one (1) student formalized withdrawal claiming personal reasons, 2 never accessed the platform. Of a total of 8 enrolled and 5 active, 4 students (80%) completed the basic module and 3 students (60%) the whole course.

Figure 10 - Surinam's performance.

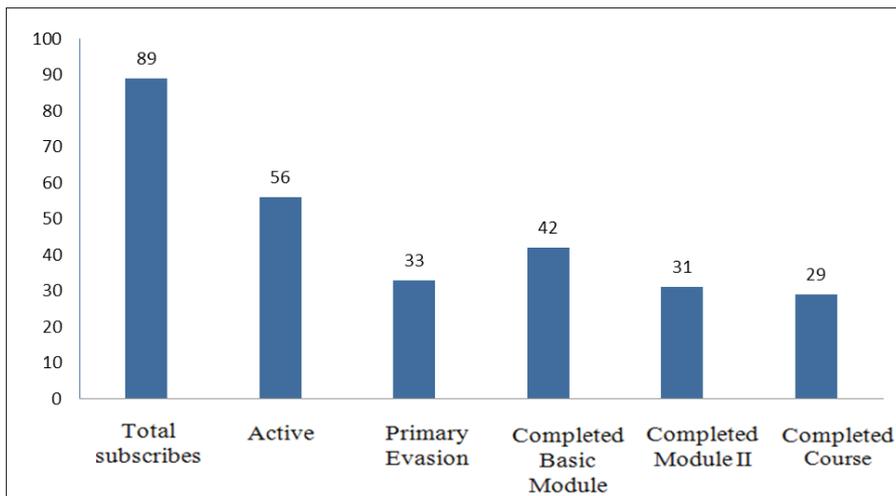


Source: Record of participation.

- Venezuela

Of a total of 89 enrolled students, 33 students never accessed the platform. Of the 56 active students, 75% completed the basic module and 52% completed the whole. There weren't cases of formalized withdrawal of the course.

Figure 11 - Venezuela's performance.



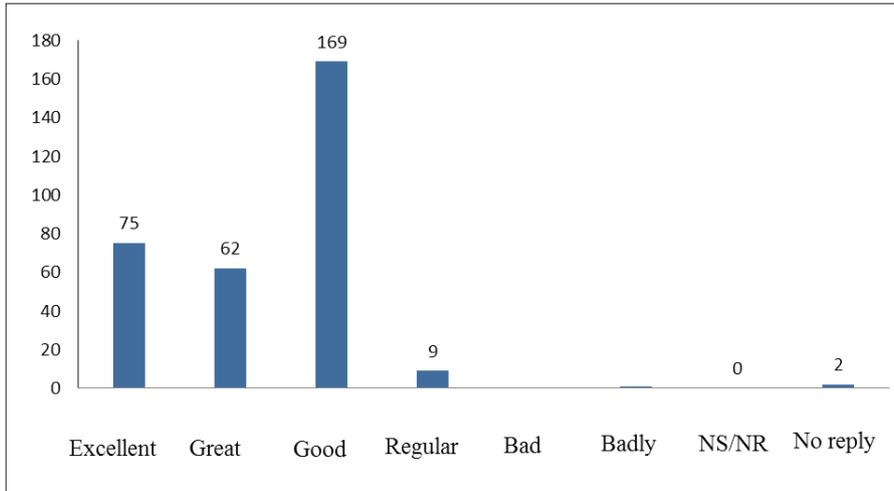
Source: Record of participation.

Evaluation of the course

At the end of the course the students were invited to fill out a questionnaire of general satisfaction with the course. 318 (42,2% of the active students) answered the sent questionnaire. The questionnaire was characterized by nominal variables.

Among the results of the course evaluation it is worth to highlight that of the 318 students that filled out the test, 75 students (23,58%) considered the course to be excellent, 62 (19,5%) great, 169 (53,14%) good. Nine students considered it regular (2,38%) and only one (0,31%) considered it terrible. Overall, it was considered that to the students that filled out the survey the level of satisfaction was 96,22%, number that was considered to be very good, showing that in general, the course was well received by the students.

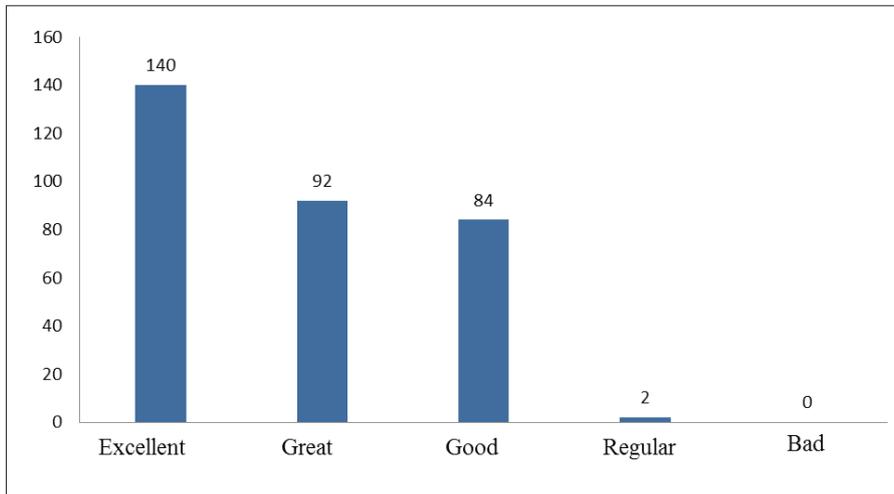
Figure 12 - General satisfaction with the course.



Source: Evaluations of the course.

Regarding the management of the course's contents, many positive comments, about the kind of language, graphics and the activities that were used, were received, being suggested the elaboration of contents in the english language, solution that will be analyzed in the conclusion. In general, of the students that sent the survey, 44,02% (140 students) considered the contents excellent, 28,93% considered them to be great (92 students) and 26,41% (84 students) considered them to be good, which, for the internal evaluation parameters of the work group represented a level of satisfaction with the contents of 99,36% of the students that filled out the survey. The shortcomings that were reported are related to the absence of contents in the english language considering the participation of countries like Guyana and Surinam.

Figure 13 - Level of satisfaction regarding the content of the course.

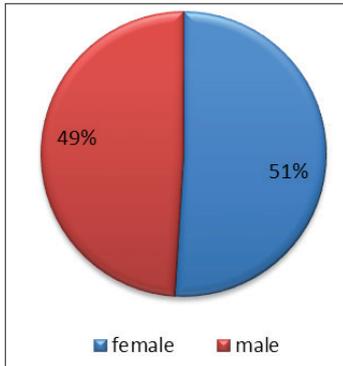


Source: Evaluations of the course.

Profile of the participants

Regarding the profile of the participants there wasn't any significant difference between the participants' gender, being that 51% were female and 49% were male (figure 14). The prevailing ages were between 26-45 years (67,6%) and 46-55 years (18,8%), which means that the age group of the participants were between the 18 and 65 years (figure 15).

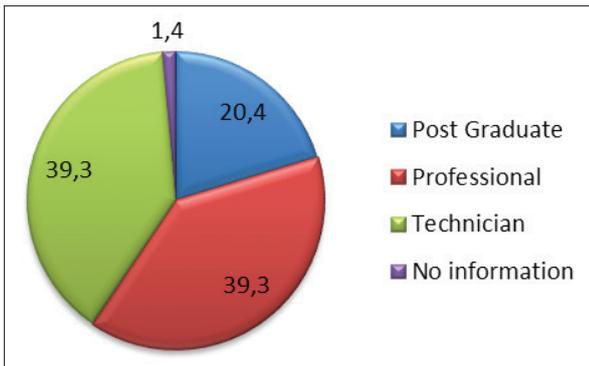
Figure 14: Gender of the participants.



Source: Record of entrants.

In regards of the education there wasn't any significant difference between the participants of higher education with a postgraduate degree (39,3%) and higher education without a postgraduate degree (38,9%) and 20% of the participants informed to have medium level (figure 15).

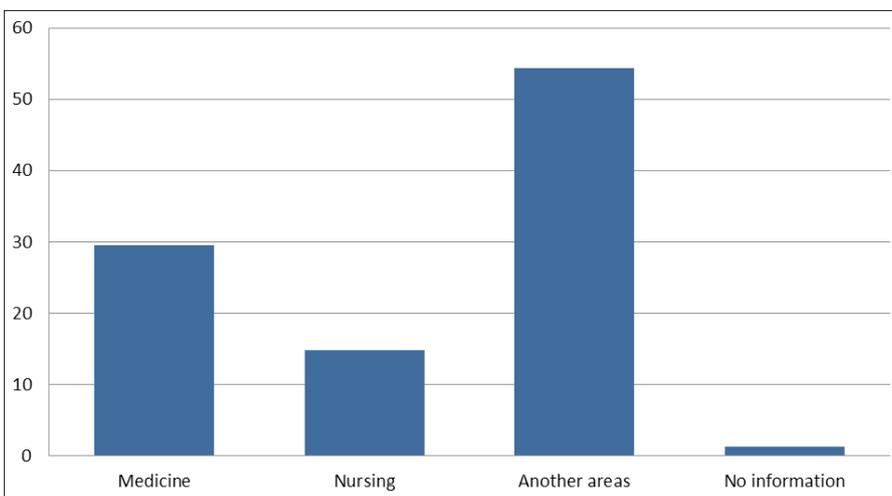
Figure 15: Education of the participants.



Source: Record of entrants.

While the formation of 29,5% of the participants count with medical formation, 14,7% with nursing formation and 54,4% with other areas such as biology, biomedicine, pharmacy, management and more (figure 16).

Figure 16: Education of the participants.



Source: Record of entrants.

Conclusion

Malaria is a disease that is considered as preventable, treatable and eliminable. In order to succeed in the combat and elimination of the illness it is necessary to act in various perspectives, which include the formation of sanitary personnel, both communal and school. The fight against Malaria is included in the Objectives of Sustainable Development (ODS) and is one of the priorities of Monitoring, Control and Management of the Countries Members of the OTCA and in general of the countries affected by this disease.

It is necessary to implement tools and strategies that help in the fortification and dissemination of the knowledge required to understand and manage this illness. To the inhabitants of Amazon it is useful to generate strategies that reduce the limitations created by the geographic isolation and by the little access to education centers (usually concentrated in the urban centers). This course is evidence to the capability that the new technologies have when used collectively to get a bigger number of participants in dispersed geographic areas with the optimization of resources.

The correspondence course is an ideal teaching method for the training of health teams in territories like Amazon. One of its applications is the formation of health professionals and the recognition and management of the diseases linked to the main causes of mortality.

The challenge in carrying out the Malaria course and the obtained results in the editions open paths to the permanent execution of action in correspondence courses in a coordinated and collaborative way between the countries of the Amazon Region and to Latin America in general.

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³ The ODS 3.3 established that "For 2030, to put an end to the SIDA's epidemics, the tuberculosis, malaria and the Unattended Tropical Diseases and to combat hepatitis, the diseases transmitted by water and other transmittable illnesses".