Use of an educational intervention with audiovisual material to improve knowledge and practices on metaxenic diseases in schoolchildren. Peru

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Abstract. Objective. Identify the level of knowledge and practices on metaxenic diseases in school children before and after an educational intervention with audiovisual material. Methods. Pre post design study developed in three public schools in Arequipa, Peru. Knowledge and practice surveys were applied before and after the educational intervention based on audiovisual material focused on the Aedes Aegypti vector and the role of schoolchildren in the identification and prevention of the disease. Results Surveys were applied to 300 schoolchildren between six and fifteen years. The level of knowledge and practices improved significantly in all students after the educational intervention, both in the aspects of knowledge (global, agent, symptoms, prevention and complications) with those of practices (individual and family). Conclusions It was shown that educational innovation based on multimedia audiovisual products improves knowledge about the Aedes aegypti vector and practices for preventing transmission of metaxenic diseases in schoolchildren.

Keywords: Disease vectors; Education, Knowledge, Attitudes, Practice; Communicable Diseases

1 Introduction

Metaxenic diseases are those that are transmitted to the human host through a non-human animated carrier, called a vector. This group of diseases represents more than

17% of all infectious diseases, causing more than 700,000 deaths annually although that for most of these diseases have the knowledge and tools to prevent them [1]. Human activities such as travel, commerce, and urbanization increase and promote the transmissibility or the occurrence of communicable diseases in areas where previously indigenous cases of the same had not been reported [1,2].

Peru is a megadiverse country with high geographic variability. This characteristic condition the presentation of various metaxenic diseases such as dengue, yellow fever, malaria, Chagas disease, leishmaniasis, bartonellosis [3], and more recently chikungunya [4], and Zika [5,6]. The Ministry of Health of Peru indicates that in the last ten years, at least 150,000 cases of metaxenic diseases have been reported, with malaria, dengue, and bartonellosis in Peru [7]. More than half of the Peruvian population (20 of 31 million people) resides in areas of risk for the acquisition of these diseases, being metaxenic diseases considered as public health problems [8,9]

For the prevention of vector-borne diseases, the usefulness of educational interventions (e.g., audiovisual material) that improve knowledge about the prevention of disease transmission is pointed out, with the school being an educational space to improving knowledge about health prevention [10,11,12,13]. The potential of educational tools to increase the knowledge and practices on these diseases in the Peruvian school population has not been studied. Therefore, the objective of the study was to identify the level of knowledge and practices on metaxenic diseases in school children before and after the development of an educational intervention with audiovisual material.

2 Methods

A pre-post study of educational intervention based on the development and implementation of an educational program with audiovisual material was carried out in the period from January to August 2019, in the region of Arequipa, Peru. Three schools in this region were selected. The selection of a school for each of these areas was based on the difference in exposure to the presence of vectors, as well as environmental conditions and socioeconomic factors. The study population consisted of schoolchildren distributed from 1st to 6th grade of primary school and from 1st to 3rd grade of secondary school. Inclusion criteria were schoolchildren who agreed to enter the study, who participated in the complete educational intervention, and who filled out the questionnaires before and after the intervention. Students who did not complete the educational intervention were excluded, and incomplete questionnaires were eliminated. Regarding the criteria for calculating the sample size, the formula was used for a proportion, a 95% confidence level, 5% accuracy, loss (5%), the final calculated sample size was 300 school children.

The educational intervention included the development of a multimedia audiovisual product, with images, voices, and musical background suitable to be understood by schoolchildren, supported by educational material composed of banners, talks, advertising spots, among others. In the realization of the educational intervention

program, the following stages were followed: *First stage*: construction and validation of an instrument to measure the level of knowledge and practices; *second stage*: design of educational innovation conformed by the multimedia audiovisual product, with images, voices and musical background suitable to be understood by schoolchildren, supported by educational material composed of banners, talks, advertising spots, among others; *third stage*: pilot study of the validation of the questionnaire and the educational program); *Fourth stage*: pre-intervention evaluation of the level of knowledge and attitudes on prevention and control of Aedes aegypti as a vector for malaria, dengue, zika, chikungunya, and yellow fever; *fifth stage*: execution of educational program with the following products: Advertising leaflet, advertising banner and a 3D advertising spot with a duration of 3 minutes, with content on metaxenic diseases, symptoms, diagnosis, prevention and control, as well as individual and family practices for prevention and self-care. The complete development of each educational session had a duration of 20 minutes per classroom.; and *sixth stage*: evaluation of knowledge and post-intervention educational attitudes.

The variables analyzed were the sociodemographic characteristics of the schoolchildren, the level of knowledge, and the type of practices before and after the educational intervention. The variable knowledge on metaxenic diseases was divided into five topics: 1) vector agent, 2) symptoms, 3) prevention against metaxenic diseases, 4) complications, and 5) knowledge about appropriate practices. An index was constructed for each topic and a global score for each stage of the study (before and after the intervention). The data were presented in tables, reporting frequencies, and percentages for the qualitative and average variables and their standard error for the numerical variables. Comparisons were made using the paired t-test for continuous variables. The p-value was set at 0.05 for all comparisons. The statistical software SPSS version 19.0 was used for data processing. This study was approved by the Research Ethics Committee of the Catholic University of Santa María. For the participation of the students, the informed consent of each minor was requested, the informed consent of the parents, the teachers, and the directors of the schools.

3 Results

A total of 300 public school students were surveyed, of which 100 belonged to each of the categories of origin (rural, urban, and urban-marginal), with an age range of six to fifteen years. Of the total, 54.3% were women, 45,7% male, 56.3% were over 11 years old, and 60.3% were in primary education. Regarding the supply of drinking water, only 27.4% of students had water through pipes in their homes. 80% of students residing in the urban area had pipes in their homes, while, for the rural area, 61% reported water supply per mobile water cistern and 38% per water tank. 100% of students in urban-marginal areas have access to water in their homes through the mobile water cistern service.

Table 1. Knowledge on metaxenic diseases before and after the educational intervention in students Before (Bef.) and After (Aft.)

Total population				**Primary students**				**Secondary students**			
Mean ± standard error		**Δ**	**p***			**Δ**	**p***			**Δ**	**p***
Bef.	**Aft.**			**Bef.**	**Aft.**			**Bef**	**Aft**		
Agent : Chikungunya is a mosquito-borne disease											
1± 0.57	75.3 ± 2.5	74. 3	<0.0 01	0.55 ± 0.5	81.2 ± 2.9	80. 6	<0. 001	1.68 ± 1.2	66. 4 ± 4.4	64 .7	<0.0 01
Agent : Dengue is transmitted by a mosquito											
0.6± 0.47	74± 2.5	73. 4	<0.0 01	0.55 ± 0.5	79.5 ± 3.0	78. 9	<0. 001	0.84 ± 0.8	65. 5 ± 4.4	64 .6	<0.0 01
Agent : Malaria is transmitted by a mosquito											
2.3± 0.87	74± 2.5	71. 7	<0.0 01	2.20 ± 1.1	78.4 ± 3.1	76. 2	<0. 001	2.52 ± 1.4	67. 2 ± 4.3	64 .6	<0.0 01
Agent : Yellow fever is transmitted by a mosquito											
2.6± 0.93	76.3 ± 2.5	73. 7	<0.0 01	3.31 ± 1.3	81.7 ± 2.9	78. 4	<0. 001	1.68 ± 1.2	68. 0 ± 4.3	66 .3	<0.0 01
Agent : Zika is transmitted by a mosquito											
1.3± 0.66	76± 2.5	74. 7	<0.0 01	1.10 ± 0.8	82.3 ± 2.8	81. 2	<0. 001	1.68 ± 1.2	66. 4 ± 4.3	64 .7	<0.0 01
Agent :The mosquito that transmits malaria, Dengue, Chikungunya or yellow fever is called Aedes Aegypti											
0.6± 0.47	76.3 ± 2.5	75. 7	<0.0 01	0	82.3 ± 2.8	82. 3	<0. 001	1.68 ± 1.2	67. 2 ± 4.3	65 .5	<0.0 01
Symptoms: Fever											
1.3± 0.6	77.3 ± 2.4	76	<0.0 01	1.10 ± 0.8	82.3 ± 2.8	81. 2	<0. 001	1.68 ± 1.2	69. 7 ± 4..2	68 .0	<0.0 01
Symptoms: Rashes											
1± 0.57	75 ± 2.5	74	<0.0 01	1.10 ± 0.8	79.0 ± 3.0	77. 9	<0. 001	0.84 ± 0.8	68. 9 ± 4.3	68 .0	<0.0 01
Symptoms: Conjunctivitis											
1.6± 0.74	87 ± 1.94	85. 4	<0.0 01	1.6± 0.95	82.9 ± 2.8	81. 3	<0. 001	2.52 ± 1.4	93. 2 ± 2.3	90 .6	<0.0 01
Symptoms: Muscle pains											
3 ± 0.98	74.3 ± 2.5	73. 3	<0.0 01	2.76 ± 1.2	72.9 ± 3.3	70. 1	<0. 001	1.68 ± 1.2	76. 5 ± 3.9	74 .8	<0.0 01

Symptoms: Other symptoms such as yellow skin											
2 ± 0.81	88.6 ± 1.8	84. 6	<0.0 01	3.31 ± 1.3	87.8 ± 2.4	84. 4	<0. 001	1.68 ± 1.2	89. 9 ± 2.8	88 .2	<0.0 01

*Student's T test was used for paired data.

In the Table 1, regarding the level of knowledge about the vector agent, during the pre-intervention evaluation a regular global knowledge was found in almost all students (99%), maintaining these values according to the student's school of origin (99%, 98%, 100% according to rural, urban or urban-marginal origin, respectively). No students with good or very good knowledge were found. As for the knowledge of the causative agent, this was bad in 54.3% of schoolchildren. 27.3% and 70.7% had a bad and regular knowledge, respectively, about the symptoms of metaxenic diseases. Regarding knowledge about the prevention of metaxenic diseases, this was bad and regular in 27.7% and 71.7%, respectively.

Regarding the knowledge about complications of metaxenic diseases, this was bad or regular in 72.7% and 27.3%, respectively, not finding any student with a good knowledge about this aspect. In the post-intervention evaluation, improvement in the global knowledge about metaxenic diseases was found, being that 3.7% and 96.3% of participants had a good or very good level of knowledge, not finding students with bad or very bad knowledge post-intervention. (Table 2).

Table 2. Knowledge and practices on metaxenic diseases before and after the educational intervention in students. Before (Bef.) and After (Aft.)

Total population mean ± standard error		**p***	**Primary students mean ± standard error**		**p***	**Secondary students mean ± standard error**		**p***
Bef.	**Aft.**		Bef.	**Aft.**		Bef.	**Aft.**	
Complication: Dengue, Zika, Chikungunya or yellow fever, malaria can cause the death of a patient.								
0	89.9 ± 1.7	<0.001	0	87.3 ± 2.5	<0.00 1	0	94.1 ± 2.2	<0.001
Complication: You should visit the nearest Health center to receive medical attention in case you have suffered a sting and have any of the symptoms (fever, rashes, muscle aches, etc.)								
0	84.6± 2.1	<0.001	0	80.1 ± 2.9	<0.00 1	0	91.5 ± 2.6	<0.001
Prevention; To prevent mosquito bites you have to keep the houses clean.								
4.6 ± 1.22	84 ± 2.12	<0.001	4.97±1.6	82.3 ± 2.8	<0.00 1	4.2 ± 1.84	85.7 ± 3.2	<0.001
Prevention; To prevent the breeding of mosquitoes, it is necessary to cover bottles, buckets or containers that accumulate water.								
1.3 ± 0.6	83.6±2.1	<0.001	2.20±1.1	80.6 ± 2.9	<0.00 1	0	88.2 ± 2.9	<0.001
Prevention; It is necessary to cover and clean once a week any water tank								

1± 0.57	85.6±2.0	<0.001	1.65 ± 0.9	86.7 ± 2.5	<0.00 1	0	84.0 ± 3.4	<0.001
Prevention; Repellent should be used								
1.3 ± 0.66	77.2±2.4	<0.001	1.65 ± 0.9	75.5 ± 3.2	<0.00 1	0.84 ± 0.8	79.8 ± 3.7	<0.001
Prevention; It is necessary to wear clothes that cover arms and legs								
0.6 ±0. 47	86.6±1.9	<0.001	0.55 ± 0.5	86.6 ± 2.5	<0.00 1	0.84 ± 0.8	86.5 ± 3.1	<0.001
Prevention; The mosquito net and insect repellent have utility in the prevention of malaria, yellow fever, Dengue, Zika and Chikungunya.								
0.3 ±0. 3	83.9±2.1	<0.001	0.55 ± 0.5	79.4 ± 3.0	<0.00 1	0	90.7 ± 2.6	<0.001
Prevention; Fumigation is a key factor in the prevention of Malaria, Chikungunya, Zika, Dengue or yellow fever								
0.3 ± 0.3	85.9 ± 2.0	<0.001	0.55 ± 0.5	86.1 ± 2.6	<0.00 1	0	85.7 ± 3.2	<0.001
Prevention; Dengue, Zika, Chikungunya or yellow fever, malaria can cause the death of a patient.								
0	89.9 ± 1.7	<0.001	0	87.3 ± 2.5	<0.00 1	0	94.1 ± 2.2	<0.001
Prevention; You should visit the nearest Health center to receive medical attention in case you have suffered a sting and have any of the symptoms (fever, rashes, muscle aches, etc.)								
0	84.6±2.1	<0.001	0	80.1 ± 2.9	<0.00 1	0	91.5 ± 2.6	<0.001

*Student's T test was used for paired data.

Regarding the practices regarding metaxenic diseases, adequate practices against metaxenic diseases were not found during the pre-intervention evaluation at a global level or the individual or family level. For the post-intervention evaluation, 87.7% and 94.7% of schoolchildren with appropriate individual and family practices, respectively, were found regarding metaxenic diseases.

Hence, an increase in the appropriate practices on metaxenic diseases was found in schoolchildren evaluated post-intervention (Table 3).

Table 3. Practices on metaxenic diseases before and after the educational intervention in students. Before (Bef.) and After (Aft.)

Total population mean ± standard error		**p***	**Primary students mean ± standard error**		**p***	**Secondary students mean ± standard error**		**p***
Bef.	**Aft.**		Bef.	**Aft.**		**Bef.**	**Aft.**	
Individual Practices: It is important that you comply with the instructions provided by the Ministry of Health								
0.6±0.47	75.6±2.5	<0.001	0.55±0.5	80.1 ± 2.9	<0.001	0.84 ±0.8	68.9 ± 4.2	<0.001
Individual Practices: It is important that you wear long-sleeved shirts and / or long pants if there are mosquitoes								
0.6 ± 0.47	78.6 ± 2.4	<0.001	0.55 ± 0.5	86.2 ± 2.6	<0.001	0.84 ± 0.8	67.2 ± 4.3	<0.001
Individual Practices: It is important that you use repellent.								
0.3 ± 0.33	81 ± 2.26	<0.001	0.55 ± 0.5	82.3 ± 2.8	<0.001	0	78.9 ± 3.7	<0.001
Family practices: It is important that your family keep the house clean								
14.7 ± 2.0	87 ± 1.94	<0.001	18.2 ± 2.8	89.5 ± 2.3	<0.001	9.24 ± 2.7	83.2 ± 3.4	<0.001
Family practices: It is important that your family allows MINSA to enter your home in the fumigation days.								
0.3 ± 0.33	49 ± 2.89	<0.001	0.55 ± 0.5	53.6 ± 3.7	<0.001	0	42.0 ± 4.5	<0.001
Family practices: It is important that your family keep buckets containing covered water at home.								
5.6 ± 0.93	89.3 ± 1.8	<0.001	8.28 ± 2.0	88.4 ± 2.4	<0.001	1.68 ± 1.2	90.7 ± 2.6	<0.001
Family practices: It is important that your family frequently changes the water of plants at home.								
2.6 ± 0.93	82.3 ± 2.2	<0.001	3.86 ± 1.4	85.1 ± 2.6	<0.001	0.84 ± 0.8	78.1 ± 3.8	<0.001
Family practices: It is important that your family eliminate possible mosquito breeding sites in your home.								
18.7 ± 2.2	88.6 ± 1.8	<0.001	16 ± 2.73	90.6 ± 2.2	<0.001	22.7 ± 3.8	85.7 ± 3.2	<0.001

*Student's T test was used for paired data.

4 Discussion

We found a low level of knowledge and practices about metaxenic diseases in school children before receiving the educational intervention. A previous study on dengue in Peru reports that one of the factors associated with the high incidence of metaxenic diseases is the level of knowledge and practices of populations exposed to vectors, where only 65.4% had acceptable knowledge [14]. In school population, it has been described that in an endemic area of Ica, Peru, the level of knowledge about Chagas disease is limited, finding an insufficient level in more than half of those evaluated [15]. This evidence would indicate that in general, the knowledge about vector-borne diseases would be low in Peru, including the school population. This scenario necessitates the development of strategies that empower schoolchildren against these diseases through knowledge and appropriate practices according to their abilities.

As part of the results, an improvement was found on knowledge and practices on metaxenic diseases in schoolchildren. Previous experiences in the Latin American region and the rest of the world, find improvements in the level of knowledge about diseases transmitted by vectors after educational interventions in school based on audiovisual materials or games, including programs specifically oriented to the Aedes aegypti mosquito or dengue [10,11,16-18]. Educational interventions, although useful to improve knowledge in various health topics, must additionally identify practices that support or hinder the progress of disease control programs Transmissible within multidimensional contexts in which people live in a community with a view to better knowledge being reflected in preventive practices useful for disease control [19]. On the other hand, although educational programs for the improvement of knowledge and attitudes about vector-borne diseases show that both aspects are improvable, obtaining benefits from participation in educational programs oriented to this health issue, retention assessment is necessary. of the improvement in the population that receives these programs in order to ensure that the benefit of the programs is sustainable over time [20]. In recent years, outbreaks of vector-borne diseases in South America have increased, mainly arbovirosis transmitted by the Aedes aegypti vector, such as dengue, Zika and Chikungunya [21]. Therefore, WHO, through In its document The Global vector control response (GVCR) 2017–2030, it proposes realigning vector control programs through greater technical capacity, better infrastructure, strengthened monitoring and surveillance systems and greater community mobilization, highlighting the need to generate a change in behavior in people as a crucial element for the control of vector-borne diseases, with emphasis on providing education regarding protection measures against these diseases for the population [22]. In Peru, given the burden of disease due to metaxenic diseases, prevention is the fundamental pillar for the control of this public health problem. Therefore, in the National Strategy for metaxenic diseases, lifestyles for disease control are recognized and the need to increase the interaction and participation of the agriculture, education, fisheries and labor sectors is noted, as well as the need for improve inadequate knowledge, attitudes and practices for individual, family and community protection [7].

Although the use of an educational intervention for the improvement of knowledge and practices regarding metaxenic diseases in schoolchildren was found useful through the use of an educational intervention with audiovisual material, it should be specified that,

since the selection of schools for performing the study was not determined randomly, the generalization of the results is limited. On the other hand, the study did not contemplate carrying out a follow-up control to evaluate the retention of knowledge and practices in the students evaluated, which does not allow to know the stability of the improvement obtained with the intervention used. Furthermore, it is not possible to determine how much of the increasing knowledge about metaxenic diseases resides in the quality of the information transmitted and how much in its didactic formulation since the audiovisual material was not compare to another educational tool. In spite of this, we consider that the results of the study would be a useful first approximation on the use of an educational intervention with audiovisual material for schoolchildren in geographical areas vulnerable to problems due to metaxenic diseases. The material had cultural adaptation, considering that many of the children came from Altonadian areas [23]. Health education plays an important role in disease prevention, especially if this has been given to young populations [24], there is also evidence that a comprehensive training program should include the development of educational materials for school teachers about vector-borne diseases such as ZIKA disease [25], and for elementary school-aged children [26].

In conclusion, it was found that an educational intervention based on multimedia audiovisual products for the recognition of the Aedes aegypti vector and the diseases transmitted by this vector was an effective tool to improve the knowledge and practices of prevention and control of metaxenic diseases in schoolchildren in the region from Arequipa. Given the increasing boom in the use of educational interventions to improve the knowledge and practices of the population on health issues, deepen the evaluation of the impact of the use of this type of tools for improvement, in addition to the study of strategies to enhance retention of the benefits obtained with the use of these programs is necessary to make the improvements sustainable.

5 References

1.World Health Organization. Vector-borne diseases [Available from: https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases] (2017).

2. Huang Y-JS, Higgs S, Vanlandingham DL. Emergence and re-emergence of mosquito-borne arboviruses. Current opinion in virology.Vol. 34, No. 104, pp. 9-6, (2019).

3. Ordaya EE, Maguiña CP. Bartonellosis: Carrion's Disease and Other Bartonella Infections. Hunter's Tropical Medicine and Emerging Infectious Diseases: Elsevier; p. 604-7,(2020).

(4. Maguiña-Vargas C. Fiebre de Chikungunya: Una nueva enfermedad emergente de gran impacto en la salud pública. Revista Médica Herediana. Vol.26 No. 1, pp.55-9, (2015).

5. Maguiña C, Galán-Rodas E. El virus Zika: una revisión de literatura. Acta médica peruana. Vol.33, No. 1, pp.35-41, (2016)

6. Rodríguez Morales A, Willamil Gómez W. El reto de Zika en Colombia y América Latina: Una urgencia sanitaria internacional. Infectio.[Internet]. [Accessed on 10 Ago 2019]; Vol. 20, No.2: pp 59-61, (2016).

7. Ministerio de Salud. Estrategia Nacional de Prevención y Control de las Enfermedades Metaxénicas y Otras Transmitidas por Vectores, MINSA.

8. Ministerio de Salud. [Available from: http://www.minsa.gob.pe/portada/esnemo_default.asp.

9. Ministerio de Salud. Estrategia Sanitaria Nacional de Enfermedades Metaxénicas y Otras Transmitidas por Vectores de la Dirección general de Salud de las Personas y coordinada por la Oficina General de Comunicaciones [Available from: http://www.minsa.gob.pe/portada/esnemo_default.asp.

10. Deepthi R, Naresh Kumar S, Prasanna Kamath B, Rajeshwari H. Participatory school health education on vector-borne diseases: engaging children as change agents. International Journal of Health Promotion and Education. Vol.52, No.2, pp. 68-77, (2014).
11. LaBeaud AD, Glinka A, Kippes C, King CH. School-based health promotion for mosquito-borne disease prevention in children. The Journal of pediatrics. Vol.155, No.(4), pp.590-592, (2009).
12. Montgomery M, Manuelito B, Nass C, Chock T, Buchwald D. The Native Comic Book Project: native youth making comics and healthy decisions. Journal of cancer education. Vol.27, No.1, pp.41-6, (2012).
13. Branscum P, Sharma M, Wang LL, Wilson B, Rojas-Guyler L. A process evaluation of a social cognitive theory–based childhood obesity prevention intervention: The comics for health program. Health promotion practice. Vol.12, No.2, pp.189-98, (2013).
14. Jamanca R, Touzett A, Campos L, Jave H, Carrión M, Sánchez S. Estudio cap de dengue en los distritos de Cercado de Lima, La Victoria y San Luis. Lima, Perú. junio 2004. Revista Peruana de Medicina Experimental y Salud Pública. Vol.22, No.1, pp.26-3, (2005).
15. Cabrera R, Mayo C, Suárez N, Infante C, Náquira C, García-Zapata MTA. Conocimientos, actitudes y prácticas sobre la enfermedad de Chagas en población escolar de una zona endémica del Perú. Cadernos de Saúde Pública. Vol.19, pp.147-54, (2003).
16. Vivas E, Guevara de Sequeda M. Un juego como estrategia educativa para el control de Aedes aegypti en escolares venezolanos. Revista panamericana de salud pública. Vol.14, pp.394-401, (2003).
17. Swain S, Pati S, Pati S. 'Health Promoting School'Model in Prevention of Vector-Borne Diseases in Odisha: A Pilot Intervention. Journal of tropical pediatrics. 2019.
18. Jayawardene WP, Lohrmann DK, YoussefAgha AH, Nilwala DC. Prevention of dengue fever: An exploratory school-community intervention involving students empowered as change agents. Journal of School Health.Vol.81, No.9, pp.566-73, (2011).
19. Dlamini SV, Liao C-W, Dlamini ZH, Siphepho JS, Cheng P-C, Chuang T-W, et al. Knowledge of human social and behavioral factors essential for the success of community malaria control intervention programs: The case of Lomahasha in Swaziland. Journal of Microbiology, Immunology and Infection. Vol.50, No.2, pp.245-53, (2017).
20. Mowbray F, Amlôt R, Rubin GJ. Ticking all the boxes? A systematic review of education and communication interventions to prevent tick-borne disease. Vector-Borne and Zoonotic Diseases. Vol.12, No.9, pp.817-25 (2012).
21. Díaz-Vélez C. Prevención de enfermedades metaxénicas: Repelentes, arma importante pero poco usada. Revista del Cuerpo Médico del HNAAA. Vol.11, No.2, pp.67-8, (2018).
22. World Health Organization. Global vector control response 2017-2030. Global vector control response (2017)
23. Muñoz del Carpio Toia Agueda, Dueñas Ancco André, Sánchez Rodríguez Kristell, Begazo Muñoz Lucia. Adecuación cultural y capacitación acerca del proceso de consentimiento informado en proyecto sobre nutrición escolar en un pueblo indígena aymara de Perú. pers.bioét. Jan; Vol. 21, No 1, pp. 78-91. (2017)
24. Escudero-Támara, Ena; Villareal-Amaris, Gloria. Intervención educativa para el control del dengue en entornos familiares en una comunidad de Colombia. Revista Peruana de Medicina Experimental y Salud Pública. Vol. 32, No 1, pp. 19-25. (2015)
25. Gregorio Jr, Ernesto R., et al. Knowledge, attitudes, and practices of public secondary school teachers on Zika Virus Disease: A basis for the development of evidence-based Zika educational materials for schools in the Philippines. PloS one. Vol.14, No 3, pp. e0214515. (2019)
26. Shadick, Nancy A., et al. A school-based intervention to increase Lyme disease preventive measures among elementary school-aged children. Vector-Borne and Zoonotic Diseases.Vol.16, No 8, pp. 507-515. (2016)