

## **Lessons learned on health information, education and communication for Chikungunya prevention in countries with risk areas: a scoping review**

**Lições aprendidas sobre informação, educação e comunicação em saúde para a prevenção de Chikungunya em países com áreas de risco: uma revisão do escopo**

**Lecciones aprendidas sobre información, educación y comunicación en salud para la prevención del chikungunya en países con áreas de riesgo: una revisión del alcance**

Received: 10/16/2021 | Reviewed: 10/24/2021 | Accept: 11/03/2021 | Published: 11/13/2021

### **Roberto Carlos de Oliveira**

ORCID: <https://orcid.org/0000-0003-2407-8905>  
Universidade Vale do Rio Doce, Brazil  
E-mail: robertocarlosde@gmail.com

### **Dilceu Silveira Tolentino Júnior**

ORCID: <https://orcid.org/0000-0003-2435-7576>  
Universidade Federal dos Vales do Jequitinhonha e Mucuri, Brazil  
E-mail: dilceujunior@bol.com.br

### **César Roberto dos Santos Filho**

ORCID: <https://orcid.org/0000-0002-0370-7381>  
Universidade de Brasília, Brazil  
E-mail: cesar-1233@hotmail.com

### **Yure Rodrigues Araújo Martins**

ORCID: <https://orcid.org/0000-0002-6200-3835>  
Universidade de Brasília, Brazil  
E-mail: yurerodriguesx@outlook.com

### **Luciana Setubal Marques da Silva**

ORCID: <https://orcid.org/0000-0002-3832-7653>  
Universidade de Brasília, Brazil  
E-mail: lucianasetubal@bce.unb.br

### **Denise Bacellar-Nunes**

ORCID: <https://orcid.org/0000-0001-7928-4699>  
Universidade de Brasília, Brazil  
E-mail: denisebacellar@umb.br

### **Ádria Jane Albarado**

ORCID: <https://orcid.org/0000-0003-2519-7690>  
Universidade de Brasília, Brazil  
E-mail: adria.albarado@gmail.com

### **Maria Fátima de Sousa**

ORCID: <https://orcid.org/0000-0001-6949-9194>  
Universidade de Brasília, Brazil  
E-mail: mariafatomasousa09@gmail.com

### **Ana Valéria Machado Mendonça**

ORCID: <https://orcid.org/0000-0002-1879-5433>  
Universidade de Brasília, Brazil  
E-mail: valeriamendonca@gmail.com

### **Abstract**

With the emergence of Chikungunya arboviruses with its outbreaks and changes in its epidemiology in Brazil, the theoretical-methodological framework of Scoping Review was carried out aimed to prepare a systematic summary of global scientific knowledge and understand the practices and prevention programs of Chikungunya with actions information, education, and communication in health developed in countries with risk areas. References were searched in eight databases until October 2018. Of the 376 articles, 177 were duplicates. Applying the exclusion criteria for reading the title and abstract, 145 were excluded, being considered 19 potentially relevant articles. Health information confers its domain in the literature in entomological and epidemiological surveillance, pointing out challenges for the continuing education of health professionals. Actions for vector control and prevention – especially those related to risk communication – have not influenced behavior, driving only punctual changes, that is, attitudes. However, there is a tendency not to consider community and popular knowledge and practices, as well as the active participation and protagonist of the population.

**Keywords:** Health information; Health education; Health communication; Health disease prevention; Chikungunya fever.

## Resumo

Com a emergência da arbovirose Chikungunya com seus surtos e mudanças na sua epidemiologia no Brasil, utilizou-se o referencial teórico metodológico de *Scoping Review* com objetivo de elaborar um resumo sistemático do conhecimento científico global e compreender as práticas e programas de prevenção da Chikungunya com ações de informação, educação e comunicação em saúde desenvolvidas em países com áreas de risco. Realizou-se a busca de referências em oito bases de dados até outubro de 2018. Dos 376 artigos, 177 eram duplicados. Aplicando os critérios de exclusão pela leitura de título e resumo, excluíram-se 145, sendo considerados 19 artigos potencialmente relevantes. A informação em saúde confere o seu domínio na literatura na vigilância entomológica e epidemiológica, aponta desafios para educação permanente dos profissionais da saúde. As ações para prevenção e controle vetorial – em especial às de comunicação de riscos – não têm influenciado o comportamento, impulsionando somente mudanças pontuais, ou seja, atitudes. Percebe-se, entretanto, a tendência em não considerar os saberes e práticas comunitários e populares, bem como a participação ativa e protagonista da população.

**Palavras-chave:** Informação em saúde; Educação em saúde; Comunicação em saúde; Prevenção de doenças; Febre de Chikungunya.

## Resumen

Con el surgimiento de los arbovirus de Chikungunya con sus brotes y cambios en su epidemiología en Brasil, se llevó a cabo el marco teórico-metodológico de *Scoping Review* con el objetivo de preparar un resumen sistemático del conocimiento científico global y comprender las prácticas y programas de prevención de Chikungunya con información de acciones, educación y comunicación en salud desarrollada en países con áreas de riesgo. Se buscaron referencias en ocho bases de datos hasta octubre de 2018. De los 376 artículos, 177 eran duplicados. Aplicando los criterios de exclusión para la lectura de título y resumen, se excluyeron 145, considerándose 19 artículos potencialmente relevantes. La información en salud confiere su dominio en la literatura en vigilancia entomológica y epidemiológica, señalando desafíos para la formación continua de los profesionales de la salud. Las acciones de control y prevención de vectores, especialmente las relacionadas con la comunicación de riesgos, no han influido en el comportamiento, impulsando solo cambios puntuales, es decir, actitudes. Sin embargo, existe una tendencia a no considerar los conocimientos y prácticas comunitarios y populares, así como la participación activa y protagonista de la población.

**Palabras clave:** Información en salud; Educación en salud; Comunicación en salud; Prevención de enfermedades, Fiebre Chikungunya.

## 1. Introduction

The chikungunya virus (CHIK) was first identified during a dengue-like outbreak between 1952 and 1953 on the Makonde plateau in southern Tanganyika Province, now Tanzania (Brouard et al., 2008; Razmy, 2014; Khatun, 2015). The viral disease is transmitted by arthropods to the human body from two types of infected mosquitoes, that are, *Aedes aegypti* and *Aedes albopictus* (Thaikruea et al., 1997; Cherry et al., 2016; Pacheco et al., 2017).

Autochthonous cases of the disease were detected for the first time in history of the Americas in the French overseas territory of Saint Martin in December 2013. Within nine months, the cases led to the rapid spread and transmission of CHIK in Caribbean countries including French Guiana and the Americas (Cherry et al., 2016; Nunes et al., 2015; Fritzell et al., 2016). According to the World Health Organization (WHO), 6.93 million suspected cases and 37.48 million confirmed cases were reported to the regional office of the Pan American Health Organization (PAHO). Among those, 2.65 million suspects occurred in Brazil; 19,000 from Colombia; and 1,700 from Bolivia. Since then, chikungunya has been a threat to the region (Sood & Mahajan, 2017).

In Brazil, the first autochthonous cases of CHIK were identified simultaneously in Oiapoque, Amapá (North of the country), on September 13, 2014. Seven days later, autochthonous cases were also confirmed in Feira de Santana, Bahia (Northeast of Brazil) (Nunes et al., 2015; Silva et al., 2018). The Brazilian reality favored the introduction and spread of the virus. *Aedes aegypti* could be found in more than 4,000 municipalities and *Aedes albopictus* in 3,285. In addition, there is a high vector dispersion, a large flow of people, and a population's susceptibility to infection (Silva et al., 2018).

With the introduction of the disease in Brazil, a scenario marked by the coexistence of arboviruses emerged. The increase in records of severe cases and deaths of autochthonous cases of CHIK resulted in greater demands for health services

and the need for financial and human resources in effective prevention and control measures, to minimize its effects on society (Nunes et al., 2015; Silva et al., 2018).

In this context, the great challenges of governments are to implement effective prevention actions, as well as inform the population about the risks and importance of collaboration for the control of the vectors of these arboviruses (Cherry et al., 2016; Pacheco et al., 2017). It happens that in health surveillance, information that is overly technical or superficial, little or practically null does not reach the general population in an adequate way (Dornelas, Sousa, Mendonça, 2014). Thus, the Information, Education, and Communication (IEC) triad presents itself as a potential area of collaboration for CHIK prevention.

With intrinsic relationships, these areas have separated definitions, however, also jointly, under the acronym “IEC”, a concept created in 1987 by specialists from the WHO and the United Nations Children's Fund, they are presented as a strategy articulating points of each area (Brasil, 1996; 1998; Casas, 2008; Parvanta et al., 2010).

Since then, and especially in Latin America, where diffusionism was vehemently criticized from the 1960s onwards – mainly by Freire, who defended the awareness of subjects (Motta, 2014) –, IEC has been used in actions in various fields in which they seek to spread ideas of transformation, including health.

Defined as a multidisciplinary approach centered on health system users, IEC considers changing or reinforcing beliefs about mechanisms at the origin of disease and also to the adapted protective behaviors and beliefs of fragmented publics regarding specific health risks in pre-determined (Casas, 2008), such as CHIK outbreaks, in this case.

In response to the emergency and current outbreaks of CHIK and changes in its epidemiology in Brazil, we ask: what are the lessons learned about Information, Education, and Communication (IEC) practices and programs for the prevention of Chikungunya in the population of countries with risk areas? Thus, this study aims to prepare a systematic summary of global scientific knowledge and understand the practices and prevention programs of chikungunya fever with IEC actions developed in countries with risk areas.

The lessons learned about controllability practices, derived from the perceived abilities to cure or prevent Chikungunya by adopting an adapted protective behavior based on social representations of public health risk with IEC actions deserve further analysis and discussion detailed.

In general, information about IEC is always very intertwined, since there is no communication without information (Wolton, 2010) and the purpose of to investigat articles involves exploring issues regarding the community mobilization with the respective use of educational actions - either by indication or demonstration as a successful practice - for change of behavior (Dornelas, Sousa, Mendonça, 2014; Toro & Werneck, 2004). Nevertheless, the three actions were separated as a category of analysis for a more in-depth discussion of the findings.

## **2. Methodology**

### **2.1 Research question**

For this study, we performed a Scoping Review using the guidelines of Arksey and O'Malley (2005) and the Joanna Briggs Institute Manual (Peters et al., 2005). A detailed protocol was prepared and reviewed by the research team, which included an epidemiologist, a sanitarian, a health communicator, and librarians specializing in data management. It is available upon request from the corresponding author. The PRISMA-ScR (Tricco et al., 2018) Scoping Reviews guidelines were followed to guide the development of this study.

This study was conducted by the research question formulated using the PICO process: “What lessons can we learn from research articles published in the literature on Health Information, Education and Communication practices and programs for the prevention of Chikungunya in the population of countries with risk areas?”

## 2.2 Database and search strategies

To maximize the relevant literature, searches were carried out with three librarians from the University of Brasília and the research team. The descriptors used in this search step were: 1) Health Information, 2) Health Education, 3) Health Communication, 4) Health Prevention, and 5) Chikungunya. The synonyms were identified and organized in the search bases of MeSH (Medical Subject Headings) and DeCS (Descriptors in Health Sciences) descriptors to structure a mixed strategy.

A combination of the synonyms of the MeSH and DeCS descriptors was organized for each descriptor using the Boolean operators. Given the extensive research question, librarians recommended searches segmented by level of approaches (health information, health education, health communication) (Mayo, Asano & Pamela, 2013).

We sought to expand the references in English, Spanish and Portuguese in the databases. This combination was used as a search strategy for the “entry terms” of the MeSH and DeCS descriptors to expand the findings. In the first search, the terms MeSH and DeCS were combined only from the English language. In the second, the same terms in English were added to the terms in Spanish and Portuguese.

The textual syntax used to fill in the article location fields in the databases was considered as a search strategy. The syntax is understood as the harmonious arrangement between MeSH and DeCS descriptors combined with Boolean operators "OR" and "AND", forming a sentence or a pre-defined textual code for filling different types of search fields online databases. The syntax of the search strategy was adapted to each database (Table 1). When necessary, “Advanced” and “Expert” searches were used.

The search was carried out in seven databases related to health research and one to education (Eric):

- 1) PubMed <https://www.ncbi.nlm.nih.gov>
- 2) Cochrane <https://onlinelibrary.wiley.com>
- 3) Science Direct <https://www.sciencedirect.com>
- 4) Ebsco Portal (Academic Search Premier) <https://www.pooltext.com/ebsco>
- 5) Scopus <https://www.scopus.com>
- 6) Eric <https://eric.ed.gov>
- 7) BVS/Lilacs <https://lilacs.bvsalud.org>
- 8) ISI of Knowledge/Web of Science <https://webofknowledge.com>

The term ‘chikungunya’ was researched with the option “Title” and the others – prevention, health information, health education, health communication – through “All Text”. A time interval was not estimated to delimit the search for references. All published up to February 2018 have been included.

The main terms were searched for in the first and last five pages of the search results for each database. After a pilot testing a series of terms, the final search sentences were combined by applying the recommended search details in each database.

**Table 1** - Database search syntax.

#	BASE	LANGUAGE	VIRUS	PREVENTION	IEC APPROACH (here we used only Communication approach as a syntax example)
1	PUBMED	English	dengue	prevention	((chikungunya[Title]) AND prevention) AND (“communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media”)
2	PUBMED	3 languages	dengue	prevention OR prevencion OR prevencao	((chikungunya[Title]) AND (prevention OR prevencion OR prevencao)) AND (“communications media” OR “medios comunicacion” OR “meios comunicacao” OR “mass media” OR “medios comunicacion masas” OR “meios comunicacao massa” OR “interdisciplinary communication” OR “comunicacion interdisciplinaria” OR “comunicacao interdisciplinar” OR “health communication” OR “comunicacion em salud” OR “comunicacao em saude” OR “social media” OR “medios de comunicacion sociales” OR “midias sociais”)
3	SCIENCE DIRECT	English	dengue	prevention	TITLE(chikungunya) and (prevention AND “communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media”).
4	SCIENCE DIRECT	3 languages	dengue	prevention OR prevencion OR prevencao	TITLE(chikungunya) and (prevention OR prevencion OR prevencao) and (“communications media” OR “medios comunicacion” OR “meios comunicacao” OR “mass media” OR “medios comunicacion masas” OR “meios comunicacao massa” OR “interdisciplinary communication” OR “comunicacion interdisciplinaria” OR “comunicacao interdisciplinar” OR “health communication” OR “comunicacion em salud” OR “comunicacao em saude” OR “social media” OR “medios de comunicacion sociales” OR “midias sociais”)
5	EBSCO	English	dengue	prevention	TI chikungunya AND prevention AND (“communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media”)
6	EBSCO	3 languages	dengue	prevention OR prevencion OR prevencao	TI chikungunya AND (prevention OR prevencion OR prevencao) AND (“communications media” OR “medios comunicacion” OR “meios comunicacao” OR “mass media” OR “medios comunicacion masas” OR “meios comunicacao massa” OR “interdisciplinary communication” OR “comunicacion interdisciplinaria” OR “comunicacao interdisciplinar” OR “health communication” OR “comunicacion em salud” OR “comunicacao em saude” OR “social media” OR “medios de comunicacion sociales” OR “midias sociais”)

7	SCOPUS	English	dengue	prevention	( TITLE ( chikungunya ) AND ALL ( prevention ) AND ALL ("communications media" OR "interdisciplinary communication" OR "social communication" OR "mass media" OR "environmental communication" OR "health communication" OR "social media" ) )
8	SCOPUS	3 languages	dengue	prevention OR prevencion OR prevencao	( TITLE ( chikungunya ) AND ALL ( prevention OR prevencion OR prevencao ) AND ALL ( "communications media" OR "medios comunicacion" OR "meios comunicacao" OR "mass media" OR "medios comunicacion masas" OR "meios comunicacao massa" OR "interdisciplinary communication" OR "comunicacion interdisciplinaria" OR "comunicacao interdisciplinar" OR "health communication" OR "comunicacion em salud" OR "comunicacao em saude" OR "social media" OR "medios de comunicacion sociales" OR "midias sociais" ) )
9	BVS	English	dengue	prevention	(ti:(chikungunya)) AND (tw:(prevention)) AND (tw:(“communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media”))
10	BVS	3 languages	dengue	prevention OR prevencion OR prevencao	(ti:(chikungunya)) AND (tw:(prevention OR prevencion OR prevencao)) AND (tw:(“communications media” OR “medios comunicacion” OR “meios comunicacao” OR “mass media” OR “medios comunicacion masas” OR “meios comunicacao massa” OR “interdisciplinary communication” OR “comunicacion interdisciplinaria” OR “comunicacao interdisciplinar” OR “health communication” OR “comunicacion em salud” OR “comunicacao em saude” OR “social media” OR “medios de comunicacion sociales” OR “midias sociais”))
11	WEOFSCIENCE	English	dengue	prevention	Título: (chikungunya) AND Tópico: (prevention) AND Tópico: (“communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media”)
12	WEOFSCIENCE	3 languages	dengue	prevention OR prevencion OR prevencao	Título: (chikungunya) AND Tópico: (prevention OR prevencion OR prevencao) AND Tópico: (“communications media” OR “medios comunicacion” OR “meios comunicacao” OR “mass media” OR “medios comunicacion masas” OR “meios comunicacao massa” OR “interdisciplinary communication” OR “comunicacion interdisciplinaria” OR “comunicacao interdisciplinar” OR “health communication” OR “comunicacion em salud” OR “comunicacao em saude” OR “social media” OR “medios de comunicacion sociales” OR “midias sociais”)
13	COCHRANE	English	dengue	prevention	chikungunya in Record Title and prevention and “communications media” OR “interdisciplinary communication” OR “social communication” OR “mass media” OR “environmental communication” OR “health communication” OR “social media” in Other Reviews'

14	COCHRANE	3 languages	dengue	prevention OR prevencion OR prevencao	chikungunya in Record Title and prevention OR prevencion OR prevencao and "communications media" OR "medios comunicacion" OR "meios comunicacao" OR "mass media" OR "medios comunicacion masas" OR "meios comunicacao massa" OR "interdisciplinary communication" OR "comunicacion interdisciplinaria" OR "comunicacao interdisciplinar" OR "health communication" OR "comunicacion em salud" OR "comunicacao em saude" OR "social media" OR "medios de comunicacion sociales" OR "midias sociais" in Title, Abstract, Keywords in Trials'
15	ERIC	English	dengue	prevention	title: chikungunya AND prevention AND "communications media" OR "interdisciplinary communication" OR "social communication" OR "mass media" OR "environmental communication" OR "health communication" OR "social media"
16	ERIC	3 languages	dengue	prevention OR prevencion OR prevencao	title: chikungunya AND prevention OR prevencion OR prevencao AND "communications media" OR "medios comunicacion" OR "meios comunicacao" OR "mass media" OR "medios comunicacion masas" OR "meios comunicacao massa" OR "interdisciplinary communication" OR "comunicacion interdisciplinaria" OR "comunicacao interdisciplinar" OR "health communication" OR "comunicacion em salud" OR "comunicacao em saude" OR "social media" OR "medios de comunicacion sociales" OR "midias sociais"

Source: Authors (2021).

### **2.3 Citation management**

References were imported for further management in IEC Health Dimension-Segmented Libraries (Motta, 2014) using the EndNote Reference Manager. Given the overlapping of information on IEC (Wolton, 2010), a unique library was built. The De-duplication (Bramer et al., 2016) method was used for EndNote, to exclude duplicated references more efficiently.

### **2.4 Theoretical framework for addressing the relevance of studies**

Empirical studies conducted on the social representations of public health risks - beliefs, ideas, images, feelings, and attitudes - held by individuals to a particular health threat are important models to explain variations in health conditions among populations (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984).

The results of studies that used approaches based on these behaviors showed that morbidity and mortality, associated with chronic or infectious diseases (AIDS, diabetes, hypertension, etc.), reflect a broader social and economic heterogeneity. According to Leventhal et al. (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984), these associations cannot be reduced to purely biological mechanisms. These results had a considerable influence on the selection and performance of strategies used to prevent and/or control the disease (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984). Although the model by Leventhal et al (1980; 1984) was initially created to study chronic diseases, it provides conceptual tools relevant to the analysis of attitudes and beliefs about infectious diseases such as arboviruses.

From this model, an analytical matrix was built that unites the guiding ideas of this research, comprising the guiding dimensions of the representations of risk of the disease (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984) Chikungunya of this study.

### **2.5 Selection of relevance by title and abstract and eligibility criteria**

Before the reference selection procedures, the reviewers went through two moments of alignment and leveling of knowledge from the theoretical references (Arksey & O'Malley, 2005; Peters et al., 2005; Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984).

At the first level of selection of references, only the title and abstract of the references were analyzed. An instrument for screening the title and relevance of the abstract was developed by the authors and reviewed by the research team. The form with inclusion and exclusion criteria was pre-tested by two reviewers (O.R.C.; M.Y.R.A.) using 20 references to assess inter-reviewer agreement. Instrument adjustments were made following the reviewers' recommendations.

The title and abstract of the other references were independently analyzed by the two reviewers (O.R.C.; M.Y.R.A.). The kappa agreement index was applied (Dohoo, Martin & Stryhn, 2012). Reviewers were not masked for author or journal name. The "can't say" options were selected if the article was considered relevant. In these cases, the final decision was given by the health communicator (M.A.V.M.), Expert in IEC after reading the full article.

Two reviewers excluded systematic reviews; editorials; abstracts; manuals; government publications; short communications; as well as theoretical documents; theses; dissertations and gray literature. Also excluded were bench articles that include research on microbiology; vaccines; clinical trials; drug development; and other studies that did not contemplate health information, education, and communication strategies for the prevention of chikungunya (O.R.C.; S.F.CR).

### **2.6 Data characterization**

Then, the studies were analyzed by two reviewers (O.R.C.; M.Y.R.A.) to confirm the relevance of the data contained in the included articles. The same inclusion and exclusion criteria were again applied to confirm whether the evidence was eligible for inclusion and data extraction. Duplicates were identified and removed manually in EndNote.

By reading the full text of the references that met the eligibility criteria, the researchers identified the most relevant results of the studies, classifying them according to the dimensions of the model by Leventhal et al (1980; 1984).

These were transferred to a .txt file and later translated into Portuguese. A database of the main findings of the lessons learned from research on health information, education, and communication for the prevention of CHIK from the existing literature was built.

## **2.7 Data Summary and Synthesis**

Based on the guiding theoretical framework developed through a literature review, conducting a conceptual map and evaluating scholars in the areas, categories, and subcategories of dimensions were identified through the recurrence of codes identified in these excerpts. This technique was used to discover and understand the core meanings relevant to the topic studied and how often they appear. This technique was necessary to group the results of the articles among the five guiding dimensions of the analytical matrix and prepare a descriptive synthesis of the bibliographic reference to describe and summarize the available literature.

The Update of publications was carried out on October 2, 2018. This procedure was necessary to add publications that appeared in the period between February 27 and October 2, 2018. New searches were carried out in the eight databases and with the same methodology, however, with the time filter for the period 2018 and 2019. The results have been incorporated into the EndNote library.

Metric analysis of the references was carried out via Software Publisher or Perish to obtain a spreadsheet with information on publications, which allowed estimating the length of time, the number of citations and publications per year, as well as the identification and number of publications by periodicals.

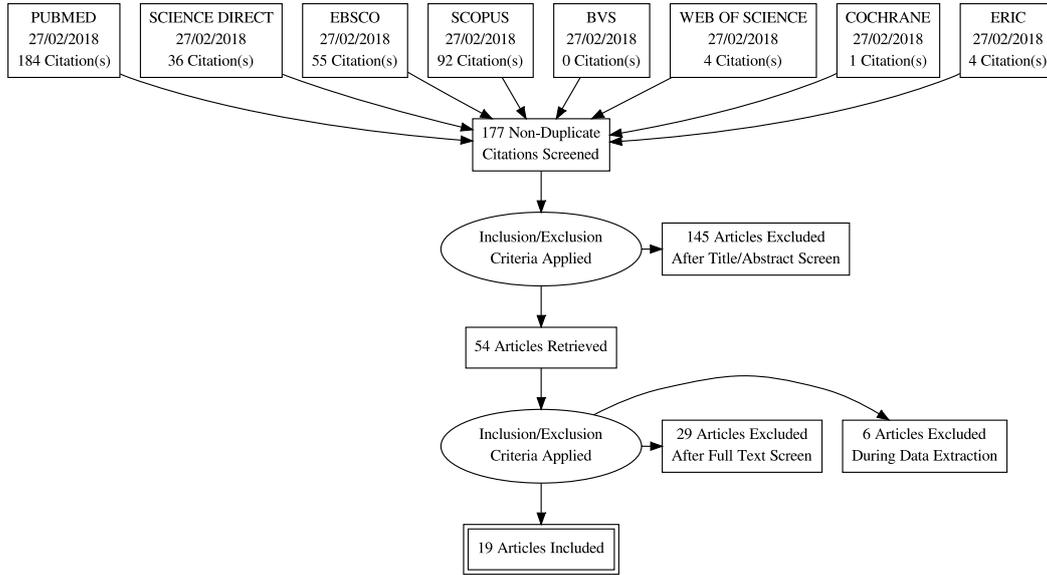
## **3. Results and discussion**

### **3.1 Descriptive Analysis of Scoping Review**

Of the 376 articles downloaded from the databases, 177 were duplicates. Soon, 199 articles were obtained. Applying the exclusion criteria for reading the title and abstract at the first level, 145 were excluded, being considered 19 articles accepted as research / potentially relevant primary data (Figure 1). The global inter-reviewer kappa agreement indices at these levels were 0.90 and 0.908, respectively. A kappa greater than 0.8 is considered a high level of agreement (Cicchetti & Sparrow, 1981).

Data from these 19 articles were extracted and categorized. The selected studies represent the scientific efforts of 108 authors from 25 public health institutions and 40 universities and/or research centers distributed in 15 countries (Figure 2).

**Figure 1** - Flow of references during the Scoping Review process last updated on October 2, 2021.



Source: Page et al (2021).

The general characteristics of the included articles are described in Table 2, and the 19 references of the selected articles are displayed at the end of the references. Of the included reports (17; 89.5%) it was available in English and only two articles were published in Spanish. More than half of the research body was carried out in the Americas (12; 63.2%), followed by Asia (5; 26.3%), with one in Europe and one in the African continent (Figure 2). Regarding the timeline, the first published article that answered the research question of the respective study is from 2007. As for the temporal analysis of publications, there is a range of 11 years, whose interval is from 2007 to 2018 (Table 3).

**Figure 2** – Distribution of published studies according to the country where the studies were carried out.



Source: Authors (2021).

**Table 2 - Main characteristics of the 19 selected studies.**

N	AUTHORS	COUNTRY	YEAR	TÍTULO	OBJECTIVES	STUDY DESIGN	COUNTRY STUDY PLACE	RESULTS
1	Jain S, Kadri S, Venkatesh S, Lal S, Katyal R.	India	2007	Epidemiological investigation of an outbreak of chikungunya in hyderabad and nalgonda districts of andhra pradesh, India.	To develop skills to investigate and learn outbreak response and control methodology in a field situation.	Cross-sectional observational study	India	Given the significance of the high Household Index, all three study areas remain at significant risk of future outbreaks if appropriate control measures are not put in place. Community support and participation are also crucial for preventing future outbreaks and improving the health and well-being of the population studied.
2	Raude J, Setbon M.	France	2009	The role of environmental and individual factors in the social epidemiology of chikungunya disease on Mayotte Island.	To estimate the frequency and social distribution of chikungunya disease and identify its main cognitive, behavioral, and environmental determinants	Cross-sectional observational study	Mayotte Island (France)	Without knowledge of how and why individuals and groups choose to respond to an emerging infectious disease, health promotion efforts tend to be less fruitful than desired. Only the degree of control that people believe they exert over the risk of CHIKV infection seems to play a key role in adopting effective protective measures. Attempts to contain chikungunya by providing biomedical information about the causes and consequences of the disease would be futile, or even counterproductive. However, health policies could accommodate them in public strategies to influence the perceived controllability of this infectious risk. At the end of this first wave of the chikungunya epidemic, there is an urgency to develop theoretical and empirical frameworks to improve the effectiveness of health interventions.
3	Nagpal BN, Saxena R, Srivastava A, Singh N, Ghosh SK, Sharma SK, et al.	India	2012	Retrospective study of chikungunya outbreak in urban areas of India.	To understand the distribution and determinants of the chikungunya fever outbreak in India.	Cross-sectional observational study	India	Sociodemographic characteristics such as education and occupation were not related to the emptying/drying in water containers in places of high incidence. Strengthening surveillance activities with case follow-up, information, education, and communication (IEC) in partnership with the community can contribute to the prevention of chikungunya outbreaks in the future. Stakeholders should be more involved in outbreak management and future planning.
4	Khatun S, Chakraborty A, Rahman M, Nasreen Banu N, Rahman MM, Hasan SM, et al.	Bangladesh, United States	2015	An Outbreak of Chikungunya in Rural Bangladesh, 2011.	To identify the etiology of the outbreak, describing the clinical presentation of cases, and identification of associated vectors.	Cross-sectional observational study	Bangladesh	The high attack rate of CHIKV suggests that the infection was new to this area, and the increased risk among adult women indicates that the risk of transmission may have been greater around households. Chikungunya is an emerging infection in Bangladesh, and current surveillance and prevention strategies are insufficient to mount an effective public health response.

5	Lima Pereira P, Meza Z, Santander F, Ferreira L.	Paraguay	2015	Temas y actores frente al Chikungunya en medios de la prensa escrita de Paraguay. Topics and actors against the Chikungunya in the press media of Paraguay.	To describe the issues and actors relevant to Chikungunya fever that emerged in the media in Paraguay during the first phase of the coping plan, between June and October 2014, and analyze how the information provided by the public service spokesperson is replicated in the private press media.	Retrospective descriptive study and content analysis of publications in the Paraguayan press from June to October 2014.	Paraguay	It is concluded that according to the analysis of official publications and private media about the contingency against Chikungunya from June to October, the standard principles of risk communication were taken into account. Official publications have insisted on messages of prevention and planning, issues that were not always published verbatim in the press but allowed to maintain an acceptable level of confidence, reflected in the general replicability of official information.
6	Nunes MRT, Faria NR, Vasconcelos JM, et al.	Brazil, United Kingdom, United States	2015	Emergence and potential for spread of Chikungunya virus in Brazil.	To describe the epidemiological and genetic characteristics of the emergence of CHIKV in Brazil and provide a forecast of the risk of importation and establishment of CHIKV in each Brazilian municipality in the next year.	Descriptive cross-sectional study with serological and virological analysis of CHIKV for risk prediction.	Brazil	The etiological strains associated with the initial outbreaks of CHIKV in Brazil belong to the Asian and African genotypes. Ongoing surveillance and vector mitigation strategies are needed to reduce the future public health impact of CHIKV in the Americas.
7	Cherry CC, Beer KD, Fulton C, Wong D, Buttke D, Staples JE, et al.	United States U.S. Virgin Islands	2016	Knowledge and use of prevention measures for chikungunya virus among visitors - Virgin Islands National Park, 2015.	To assess Virgin Islands National Park visitors' knowledge of CHIK-V and its mosquito bite prevention practices.	Cross-sectional observational study (CASP)	U.S. Virgin Islands	Most of the visitors interviewed did not research health issues related to the destination and were unaware of CHIKV. However, knowledge of CHIKV has been associated with the use of multiple prevention measures to reduce the risk of disease. These results underscore that the need to protect traveler health is growing as more people travel and the reach of disease expands. Educating visitors at your travel destination is important and may require innovative and creative approaches to capturing a transient audience.
8	Feldstein LR, Ellis EM, Rowhani-Rahbar A, Halloran ME, Ellis BR.	United States, U.S. Virgin Islands	2016	The First Reported Outbreak of Chikungunya in the U.S. Virgin Islands, 2014-2015.	To describe the clinical epidemiology of the first CHIKV outbreak in the US Virgin Islands during 2014-2015, considering the demographic risk factors associated with symptomatic CHIKV infection.	Cross-sectional observational study	U.S. Virgin Islands	Contact with a newly ill household member was associated with a positive laboratory case. This is typical of diseases spread by <i>A. aegypti</i> and <i>A. albopictus</i> mosquitoes which tend to be domestic/peridomestic in nature with limited flight ranges (78-230 m). Mosquitoes that breed close to a household are capable of infecting people who live a certain distance from that house, and the greater the number of people living within that range, the greater the opportunity for the mosquito to transmit CHIKV to a household human.
9	Fritzell C, Raude J, Adde A, Dusfour I, Quenel P, Flamand C.	French Guiana (France)	2016	Knowledge, Attitude and Practices of Vector- Borne Disease Prevention during the Emergence of a New Arbovirus: Implications for the Control of Chikungunya Virus in French Guiana	To describe and explore experiences, practices, and perceptions of a new health threat related to vector-borne Chikungunya fever among students in French Guiana; and, identify the main factors that are associated with the practice of protective behaviors.	Cross-sectional observational study (CASP)	French Guiana	Given the importance of public understanding of certain diseases in adopting effective protective behaviors, this study reinforced the value of educational campaigns aimed at improving lay people's understanding of these diseases. They can be a useful prerequisite for programs that encourage community participation in vector control.

10	Ndeffo-Mbah ML, Durham DP, Skrip LA, Nsoesie EO, Brownstein JS, Fish D, et al.	United States	2016	Evaluating the effectiveness of localized control strategies to curtail chikungunya.	To evaluate the effectiveness of perifocal mosquito control around homes with detected cases, as well as transmission reduction measures that decrease contact between infected humans and CHIK mosquitoes.	Stochastic vector transmission model	United States	Early case detection, combined with perifocal vector control and transmission-reducing measures, can be an effective approach to mitigating outbreaks. A proactive and well-targeted approach to chikungunya containment would complement traditional vector control measures commonly employed against dengue and other mosquito-borne diseases. If chikungunya continues to be inadequately addressed, the threat this poses to many regions of the world is likely to increase as mosquito vectors continue to expand geographically.
11	Choo MS, Blackwood RA.	United States	2017	School-based health education in Yucatan, Mexico about the Chikungunya virus and mosquito illness prevention.	To educate the community about the prevention and control of mosquito-borne diseases, CHIKV, and document the perception of the 6 to 18-year-old student population in Sudzal about mosquito behavioral patterns and prevention.	Mix study	Mexico	Although the importance of risk communication in preventing vector-borne diseases is recognized, and strategic plans have been formulated in several countries, in the case of Chikungunya, little has been done in their implementation. Aspects such as a single voice, that is, the designation of a single official source of information delivery as a strategy to maintain an effective flow of communication between public entities, from health to the media may not have had an adequate government strategy. This unique voice has contributed to the media acting as a reproducer of myths and beliefs that affect the perception of risk.
12	Curtis A, Quinn M, Obenauer J, Renk BM.	United States, Nicaragua	2017	Supporting local health decision making with spatial video: Dengue, Chikungunya and Zika risks in a data poor, informal community in Nicaragua.	To show how Space Video can be used to create a spatial scale hazard map for a resource-poor urban area in Nicaragua.	Spatial scale risk mapping	Nicaragua	School health education for CHIKV fever prevention showed effective results with residents on various prevention strategies, increasing average test scores by 67% after education. This includes applying repellent, maintaining hydration during recovery, and cleaning household water storage containers to eliminate breeding sites. In addition, the questionnaire captured resident behavior patterns to CHIKV and mosquito prevention and identified cultural, ecological, and socioeconomic factors that hampered the effective implementation of vector control.
13	Freitas ARR, Cavalcanti L, Von Zuben AP, Donalisio MR.	Brazil	2017	Excess Mortality Related to Chikungunya Epidemics in the Context of Co-circulation of Other Arboviruses in Brazil.	To evaluate mortality associated with the chikungunya epidemic in Brazil comparing chikungunya mortality before and during chikungunya epidemics.	Mortality rate studies	Brazil	The spatial video technique used to collect fine-scale spatial data can map the risk regions that can be used to suggest where disease risk is greatest and therefore where to target intervention strategies. The technique revealed several people contributing to formations of spaces with standing water from the street, which suggests that the community does not consider these spaces as a risk, but rather as part of their day-to-day activity.
14	Guzzetta G, Trentini F, Poletti P, Baldacchino FA, Montarsi F, Capelli G, et al.	Italy	2017	Effectiveness and economic assessment of routine larviciding for prevention of chikungunya and dengue in temperate urban settings in Europe.	To assist European municipalities in planning and preventive vector control, assess the potential epidemiological impact of chikungunya and dengue, and the resulting economic benefits for the health system, produced by routine larvicide against <i>A. albopictus</i>	Mosquito monitoring (through the capture of adult mosquitoes)	Italy	The experimental results highlight the advantages of using fog (fog) and cloud computing services to achieve network efficiency, high quality of service, and minimal response time in real-time notification generation compared to a cloud-only model (cloud ). The results reveal that the proposed framework achieves bandwidth efficiency, minimum execution time, and minimum delay in generating real-time notifications.

					within urban locations in temperate climates.			
15	Pacheco Ó, Martínez M, Alarcón A, Bonilla M, Caycedo A, Valbuena T, et al.	Colombia	2017	Estimation of underreporting of Chikungunya virus infection cases in Girardot, Colombia, from November 2014, to May, 2015.	To estimate the overall underreporting of Chikungunya cases in the municipality of Girardot between November 2014 and May 2015; describe the social and demographic characteristics of the affected people.	Cross-sectional observational study	Colombia	Due to the possible overlapping of the transmission areas of CHIKV and ZIKAV with regions with the circulation of other flaviviruses - mainly Dengue and Yellow Fever - the correct clinical and laboratory differential diagnosis between acute infection by ZIKAV, CHIKV, and DENGUEV will contribute to the prognosis of patients and lead surveillance actions. More studies are needed to address the effects of these competing arbovirus infections in Brazil and neighboring countries. Efforts to develop vaccines and therapies need to be accelerated.
16	Zambrano LI, Sierra M, Lara B, Rodriguez-Nunez I, Medina MT, Lozada-Riascos CO, et al.	Honduras, Brazil, Chile, Colombia, United Kingdom	2017	Estimating and mapping the incidence of dengue and chikungunya in Honduras during 2015 using Geographic Information Systems (GIS).	To estimate dengue and chikungunya incidence rates in 2015 for Honduras and develop GIS-based epidemiological maps.	Retrospective cross-sectional observational study	Honduras	The use of GIS-based epidemiological maps allows guiding decision-making on prevention and control of diseases that still represent significant problems in the region and country, but also in emerging conditions. In addition, the maps are also useful in the future when planning to develop vaccine candidate trials, which are ongoing and now available in some countries for dengue, as well as in the future for chikungunya and Zika.
17	Khan AW, Taylor-Robinson AW.	Italy	2018	Is Pakistan becoming a safe haven for chikungunya virus? Current status and proposed measures to curtail this emerging public health threat. Infection, Disease & Health. 2018.	To know the current status and proposed measures to reduce the emerging threat of CHIK-V to public health.	Case retrospective study	Pakistan	There is a pressing need for a consolidated program of improved vector control, accurate infection diagnosis, dedicated disease surveillance, and well-managed border control as a public health priority.
18	Mallhi TH, Khan YH, Tanveer N, Bukhsh A, Khan AH, Aftab RA, et al.	Pakistan	2018	Awareness and knowledge of Chikungunya infection following its outbreak in Pakistan among health care students and professionals: A nationwide survey.	To evaluate the perception and knowledge of CHIK infection among students and health workers in Pakistan.	Cross-sectional observational study	Pakistan	Approximately half of the participants were unaware of the CHIKV infection, and those who were aware had insufficient knowledge about the disease. The findings of the present study underscore the dire need for educational interventions, not only for health professionals, but also for students, regardless of the study discipline.
19	Silva NMD, Teixeira RAG, Cardoso CG, Siqueira Junior JB, Coelho GE, Oliveira ESF.	Brazil	2018	Chikungunya surveillance in Brazil: challenges in the context of Public Health.	To describe the challenges in implementing the chikungunya surveillance and prevention system in Brazil.	Case series study	Brazil	Given the imminent introduction of CHIKV in Brazil in 2014, there was an advance in the preparation of public health to minimize its effects on society. The implementation of the surveillance system has improved the collection of information about the disease, but many challenges can be seen in practice, given the increased incidence of cases. This requires greater movement capacity in this sector.

Source: Page et al. (2021).

**Table 3** – Distribution of published studies according to the country of origin of the researchers' institutions.

COUNTRIES OF RESEARCHERS	2007	2009	2012	2015	2016	2017	2018	TOTAL
India	1		1					2
Mayotte Island, France		1						1
Bangladesh, United States				1				1
Brazil, United Kingdom, United States				1				1
Paraguay				1				1
French Guiana, France					1			1
U.S. Virgin Islands, United States					2			2
U.S					1	1		2
Brazil						1	1	2
Colombia						1		1
Nicaragua, United States						1		1
Honduras, Brazil, Chile, Colombia, United Kingdom						1		1
Italy						1	1	2
Pakistan							1	1
<b>TOTAL</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>19</b>

Source: Authors (2021).

According to studies, there is historical evidence that CHIK originated in Africa and spread to Asia (Nagpal et al., 2012; Feldstein et al., 2016). A distinctive feature of CHIK is that it causes explosive outbursts, before apparently disappearing for several years to decades (Nagpal et al., 2012; Feldstein et al., 2016; Jain et al., 2007).

Such evidence corroborates the evidence from conducting studies on CHIK on these continents. With the arrival of the virus in the Americas, from 2015, the countries of the American continent, in four years, published more than half of the articles studied in this review.

The 19 studies analyzed represent the scientific efforts of public health institutions and universities and/or research centers distributed in 15 countries: Bangladesh; Brazil; Chile; Colombia; U.S; France; French Guiana; Honduras; India; US Virgin Islands, Italy; Nicaragua; Pakistan; Paraguay; United Kingdom) (Figure 3).

**Figure 3** – Distribution of published studies according to country of origin of the researchers' institutions.



Source: Authors (2021).

As for the type of research approach used in the 19 studies, it was observed that 15 (79%) of the studies were quantitative. Only a qualitative study on risk communication in Paraguay's media and a health education intervention study with qualitative and quantitative approaches. What is noteworthy is the absence of prospective cohort studies that contemplate the follow-up of chronic cases of arthralgia.

Only two works reported information, education, and communication strategies for the control and prevention of CHIK, one investigated the comparative effectiveness of introducing fish in the biological control of larvae. The second described the issues and relevant actors in the health communication process about outbreaks of Chikungunya fever that emerged in the media.

### 3.2 Lessons Learned

About information, it is observed its relevance and implicit relationship with decision-making and that the production of scientific material regarding this category is much higher compared to the others. The issue of decision-making permeates entomological and epidemiological surveillance actions, as they are essential prerequisites for the control of diseases transmitted by *Aedes aegypti* and *A. albopictus* (Ndeffo-Mbah et al., 2016). Restricting the creation of these vectors associated with transmission of fever to humans is crucial to limiting the spread of CHIK infection (Khan & Taylor-Robinson, 2018).

From this perspective, functioning, updating, and advances in information systems are emphasized. Silva et al. 2018 emphasize that the introduction and dissemination of data on mandatory notification diseases at the three levels of government, in real-time, provide fast and complete information for analysis and decision-making in health, including in emergencies. Therefore, the authors point out the need for continuous assessment to reduce the magnitude of the epidemic and the deaths caused by them through quick and effective interventions (Silva et al., 2018; Freitas et al., 2017). In addition, the use of epidemiological maps based on geographic information systems makes it possible to integrate strategies and public health policies for joint control of these vector-borne diseases. With the recent arrival of CHIK and Zika viruses in the Americas, these important tools can be incorporated into prevention and control measures (Zambrano et al., 2017).

The training of health professionals – both formal and permanent – is highlighted by Pacheco et al. 2017 and Mallhi et al. 2018 to avoid underreporting and obtain appropriate knowledge about the disease. The report by Mallhi et al. 2018 draws attention to the fact that health professionals and students obtained the first information about chikungunya through the media. Despite being a new issue, there is a curious movement: the media guiding the knowledge of health actors. This leads to reflections on the articulation and posture of health and teaching institutions in the face of the emergence of diseases such as CHIK. But this agenda and intersectoriality will be addressed in the communication category.

Also concerning decision-making, urban and cross-border mobility for the control and prevention of CHIK was a concern in the analyzed studies. Ndeffo-Mbah et al. 2016 argue that if CHIK continues to be inadequately treated, the threat it poses to many regions of the world will likely increase as mosquito vectors continue to expand geographically. Several authors point out that effective, targeted, and sustained viral surveillance measures, accurate diagnosis of infection and good border management have the potential to prevent the invasion of CHIK and prevent the crushing of universal health systems, such as the Brazilian Health Unified System (SUS), one of the largest health systems in the world (Cherry et al., 2016; Ndeffo-Mbah, 2016; Khan & Taylor-Robinson, 2018).

The relevance of observing the social, economic, and environmental determinants of health (Buss & Pellegrini Filho, 2007; Galvão, Finkelman & Henao, 2011; Carvalho, 2013) combined with vector control was also demonstrated, as it favors the creation of spaces for participation for affected populations, and may generate alternative proposals for prevention and control of the habitat of the vector (Pacheco et al., 2017). These factors are also important for the perception and behavioral response to health threats, as they permeate experiences, practices, and beliefs (Fritzell et al., 2016; Rangel-S, 2007; 2009; Almeida, 2007).

WHO guidelines suggest exploring research to develop and test cost-effective methods to identify and respond to outbreaks of mosquito-borne infections in developing countries. According to Khatun et al. (2015) ecological studies to better describe the spatial and temporal distribution of vector habitats could help explain why outbreaks remain geographically limited and could be used to target interventions in populations at higher risk of vector-borne diseases. In addition, environmental interventions, such as the destruction of natural and man-made mosquito breeding sites in and around homes, may be more cost-effective than chemical methods to kill larvae and adult mosquitoes (Khatun, 2015; Nagpal et al., 2012).

As for education, it is noticed that it improves the prevention of chikungunya fever. This is because the proper understanding and knowledge about the mechanism and treatment of the disease, and possible places of reproduction of the vector, facilitate the effective participation and mobilization of people both in the management sphere, as well as in individual and community care (Choo & Blackwood, 2017). This finding is surprising, as previous studies have revealed only a weak association between health literacy and practices aimed at reducing the risk associated with vector-borne diseases (Fritzell et al., 2016).

The relationship between communication and education has been known since the first hygienist sanitary advertisements but in the vertical and transmissive logic of the year 1920 (Araújo & Cardoso, 2007; Pessoni, 2009). After the crisis of capitalism and the strong criticism of diffusionism from the 1970s onwards, communication and education actions aimed at transforming social realities began to be widely discussed and adopted, especially in developing countries, as an alternative to knowledge-centered medicine medical and technological and, even today, appear as adequate strategies for health promotion (Parvanta et al., 2010; Motta, 2014).

Choo and Blackwood<sup>43</sup> state that it is essential to consider socioeconomic and cultural factors in the development of more decentralized and community-oriented health education programs. Jain et al. 2007 confirm the relevance of the support and participation of the population to prevent outbreaks and improve the health and well-being of the population, for this, researchers and health professionals – to which managers should be added – must stay away of total trust in the passive compliance of the members of a community, characteristic of vertical and centralized models in the execution of any health policy (Choo & Blackwood, 2017). The removal must also occur in communication actions, as will be seen later.

Apart from the cognitive perspective as a social factor, the category is discussed as a formal and permanent training of health professionals and students – as mentioned in the information – and an intersectoral strategy. Once again, the studies highlight the importance of education in the prevention and control of the mosquito that transmits CHIK and for health care, but this time with an organic discussion, not only with punctual actions, and with special emphasis on public health and moments of emergency (Malhi et al., 2018). This finding is in line with the issues addressed by Frenk et al. 2010 in the discussion about the need for changes in professional training in health, taking into account the realities of health systems and population needs, as well as intersectoral articulation for effective improvements in health.

Intersectoral articulation was emphasized as necessary to educate the masses about chikungunya fever (Nagpal et al., 2012). Educating travelers about their travel destination is important and may require innovative and creative approaches to capturing a transient audience (Cherry et al., 2016). The authors pointed out that a limited number of travelers research specific subjects about health issues regarding the destination before traveling and that the distribution of educational materials can also be done in hotels, resorts, and inns, as well as during transit, on plane trips, ships, buses, among others.

For researchers, these partnerships may have the potential to reach a wider audience compared to traditional public health messaging efforts (Cherry et al., 2016). Notes such as those by Wolton (2010) and Mendonça (2014) collaborate to affirm this assumption and introduce discussions regarding the category of communication. The last author states that for communication to occur, it is necessary to seek the other, socialize, listen, relate, which occurs in the example of educational communication mentioned above. The second defends communication in health as:

[...] “accessibility and access through welcoming and building autonomy, promoting a commitment to dialogue, understanding of the law, empowerment, and humanization of relationships. It is to enable integration, integrality, inclusion, participation, reflection, resoluteness, respect, and solidarity. [...] transformation of the bond building and citizenship duty” (Mendonça, 2014).

Regarding communication, there is a close relationship with the media and its performance – especially in situations of risk – and the recognition of the use of awareness campaigns. There is little information about beliefs, attitudes, and behaviors to vector-borne diseases (Fritzell et al., 2016). Tóth and Laro (2009) discuss the limited potential of massive communication campaigns to transform social behaviors and conclude that it is necessary to use complementary strategies that consider alternative instruments and local specificities.

Based on the diffusionist model, year after year, the strategy has lost its supposed efficiency with the public that should reach and influence behavior changes to improve individual and collective health (Albarado, 2018). The vertical format that understands reception as a simple passive step distances possibilities of citizen participation on the part of people and communities in which they belong.

In addition to this debate, the traditional campaigns consume huge public resources, which is vehemently criticized by Bucci (2015). The author emphasizes the lack of logical connection and coherence between the volume of resources employed and the decision-making processes by which campaigns are conceived and defined and the purpose for which they are intended.

Furthermore, there is a lack of knowledge about CHIK by the population and even by health professionals and students in the study by Choo and Blackwood (2017), as well as an appointment by the media with those who said they knew about the disease. The novelty of the disease influences the issue, but the schedule exists. Xavier (2006) ratifies the statement and illustrates that not even when specialists offer the media what they want, the scheduling no longer occurs, because, in fact, one buys the illusion that the media is guiding – especially the press – is bought when in reality it guides managers, professionals, health communication advisors, with their requests and respective news values and gatekeepers (Tranquina, 1993; White, 1993; Wolf, 2012; Martins, 2017), depriving them of their social function.

Part of this function is to promote knowledge to collaborate in decision making, as well as anticipate in situations of epidemic outbreaks, calm and guide people during emergencies (WHO, 2005; OMS, 2009). The newsworthiness criteria of the press and the difference between the coverage of private and public media can be observed in the discussions of the study carried out with the written media in Paraguay (Pereira et al., 2015). According to the authors, the risk of introducing the Chikungunya virus in Paraguay required the design and implementation of a Communication Action Plan so that both public service and media actors could respond to the demands of an eventual epidemic outbreak. The plan followed the WHO Outbreak Communication Guidelines (WHO, 2005) and the Risk Communication Strategy proposed by PAHO (2011).

A descriptive retrospective study with content analysis of publications in print media aimed to describe how the problems and stakeholders related to chikungunya appeared in the Paraguayan media and to analyze how the information provided by the public service spokesperson was reproduced in the private media. It was observed that the coverage of the private media – 53.5% of the analyzed news – was greater than that of the public, 46.5%. However, the central axis of the news in the first one was the announcement of new cases, while in the public the central focus was the existence of a contingency plan. It was also observed that 46% of the news reproduced all or part of the information provided by the Paraguayan Ministry of Health, demonstrating confidence in relation to the official spokesperson (Pereira et al., 2015).

It appears that the alert attracts greater media interest compared to control plans, in addition to the confirmation of prioritization of official sources. Such situations are frequent in communication in situations of risk, especially due to the guidelines in the WHO manuals and the centralization of information in the Government. Lindenmeyer and Martins (2015) analyze the discourse of international organizations on health communication based on the cited manuals. The authors consider

that the performance of WHO and PAHO is determined by the logic of intervention and tends to erase social inequalities produced by the societal form of capital at national and global levels. For them, logic is expressed in the senses of the terms population; emergency and disaster; and communication recorded in the manuals.

The conclusion of both indicates the production of discursive-ideological effects as a disconnection among emergency and disaster and social life; legitimization of inter-nation inequality; lack of responsibility of the national State about inhuman social health conditions; and, linear and instrumental perspective of communication. The socioeconomic, cultural and environmental factors highlighted in the information and education categories are similarly relevant in communication, as well as the intersectoriality to promote healthy environments and the need for investments in educational actions to reduce risks (Curtis et al., 2017).

### **3.3 Limitations of this Scoping review**

This review may not have identified all references in the existing global literature, despite attempts to be as comprehensive as possible. Our search algorithm included terms in three different languages. Although our search includes seven health databases and one education database (Eric), the overall search strategy may have been biased toward the health sciences. Scoping Reviews that used other bibliographic databases may have generated published studies with additional references. For this review, the peer reviewers used their judgment to determine whether each reference as a whole sufficiently met our study definition of a scoping review. On another note, the characterization and interpretation of the reviews included were also subject to reviewer bias.

## **4. Final Considerations**

The adoption of information, education and communication actions in chikungunya prevention and vector control programs and practices is presented several times, but great credibility can still be seen in the functional logic of the diffusionist paradigm, in which receptor is passive and mere detail in transmission of messages. In the same way, the articulation of the three areas – explicit, as in the case of information and communication or, implicitly, as between communication and education – is suggested as strategic in the search for the success of the referred programs or practices.

However, the way to do it is still superficially demonstrated, raising questions about the details of the methodologies and approaches used, as well as findings of the need to carry out research and evaluations on the effectiveness, efficiency and effectiveness of these actions and, also, of their impact on behavior change for health prevention. As in the Brazilian case, in which the country experienced an international public health emergency in 2016, it reduced the number of cases over the next two years and in 2019 it faces an outbreak with a 303% increase in the notification of dengue cases over the same period of 2018, it is observed that the actions – especially those related to risk communication – have not influenced behavior, driving only punctual changes, that is, attitudes.

Likewise, the studies are unanimous regarding the need to consider socioeconomic, cultural and environmental factors; invest in education and new information and communication technologies to prevent chikungunya and control the proliferation of Aedes. However, there is a tendency not to consider community and popular knowledge and practices, as well as the active participation and protagonist of the population, despite references to social mobilization.

This scope review identified and characterized the global literature on CHIK (until October 27, 2018) and identified gaps in knowledge regarding the absence of prospective cohort studies that contemplated the follow-up of chronic cases of arthralgia and investment in developmental studies of protective behaviors for CHIK among professionals and population. Future updates of this review will likely demonstrate improved evidence and understanding of CHIK and its impact on public health.

## References

- Albarado, A. J. (2018). *Campanhas audiovisuais do Ministério da Saúde contra dengue, Zika e chikungunya nos anos de 2014 a 2017: análise das estratégias de comunicação em saúde* [dissertação]. Brasília: Universidade de Brasília.
- Almeida, L. M. (2007). *Comunicação do Risco em Saúde Pública*. In: Soares CG, Teixeira A, Antão P. Riscos Públicos e Industriais. Lisboa: Edições Salamandra, Lda. 2007.
- Araújo, I. S. & Cardoso, J. M. (2007). *Comunicação e saúde*: SciELO-Editora FIOCRUZ.
- Arksey, H. & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 8(1):19-32.
- Bramer, W. M., Giustini, D., de Jonge, G. B., Holland, L. & Bekhuis, T. (2016). De-duplication of database search results for systematic reviews in EndNote. *J Med Libr Assoc*. 104(3):240.
- Brasil. (1996). Ministério da Saúde. *Projeto Nordeste. Ações de Informação, Educação e Comunicação: Uma estratégia para o SUS*. Brasília: Coordenação de IEC (MS).
- Brasil. (1998). Ministério da Saúde. *Ações de Informação, Educação e Comunicação: Perspectivas para Avaliação*.
- Brennan, B. & Gutiérrez, V. (2011). *Guía para la elaboración de estrategias de comunicación de riesgo: De la teoría a la acción*. Washington DC: Organización Panamericana de la Salud.
- Brouard, C., Bernillon, P., Quatresous, I., Pillonel, J., Assal, A., De Valk, H. et al. (2008). Estimated risk of Chikungunya viremic blood donation during an epidemic on Reunion Island in the Indian Ocean, 2005 to 2007. *J Transfus*. 48(7):1333-41.
- Bucci, E. (2015). *O Estado de Narciso: A comunicação pública a serviço da vaidade particular*: Editora Companhia das Letras.
- Buss, P. M. & Pellegrini, Filho A. (2007). *A saúde e seus determinantes sociais*. Physis. 17:77-93.
- Carvalho, A. I. (2013). *A saúde no Brasil em 2030: prospecção estratégica do sistema de saúde brasileiro: população e perfil sanitário*. Rio de Janeiro: Fundação Oswaldo Cruz. Determinantes sociais, econômicos e ambientais da saúde; 19-38.
- Casas, L. (2008). La Comunicación para la salud: prácticas diversas, saberes concurrentes y problemas comunes. In: CONGRESO REDCOM (10º). Conectados, Hipersegmentados y Desinformados en la Era de la Globalización. Salta, 4 a 6 de setembro de 2008. *Anais do 10º Congress Redcom*. Universidad Católica de Salta.
- Cherry, C. C., Beer, K. D., Fulton, C., Wong, D., Buttke, D., Staples, J. E. et al. (2016). Knowledge and use of prevention measures for chikungunya virus among visitors - Virgin Islands National Park, 2015. *Travel Med Infect Dis*. 14(5):475-80.
- Choo, M. S. & Blackwood, R. A. (2017). School-based health education in Yucatan, Mexico about the Chikungunya virus and mosquito illness prevention. *Infect Dis Rep*. 9(2):53-7.
- Cicchetti, D. V. & Sparrow, S. A. (1981). Developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. *Am J Intellect Dev Disabil*.
- Curtis, A., Quinn, M., Obenauer, J. & Renk, B. M. (2017). Supporting local health decision making with spatial video: Dengue, Chikungunya and Zika risks in a data poor, informal community in Nicaragua. *Appl Geogr*. 87: 197-206.
- Dohoo, I. R., Martin, W. & Stryhn, H. (2012). *Methods in Epidemiologic Research*. VER Inc.: Charlottetown, Prince Edward Island.
- Dornelas, R., de Sousa, M. F. & Mendonça, A. V. M. (2014). *As concepções de voz saudável e de qualidade de vida e voz dos participantes de uma campanha da voz*. Distúrbios da Comunicação. 26(3).
- Feldstein, L. R., Ellis, E. M., Rowhani-Rahbar, A., Halloran, M. E. & Ellis, B. R. (2016). The First Reported Outbreak of Chikungunya in the U.S. Virgin Islands, 2014-2015. *Am J Trop Med Hyg*. 95(4):885-9.
- Freitas, A. R. R., Cavalcanti, L., Von Zuben, A. P. & Donalisio, M. R. (2017). Excess mortality related to chikungunya epidemics in the context of co-circulation of other arboviruses in Brazil. *PLoS Curr*;9.
- Frenk, J., Chen, L., Bhutta, Z. A., Cohen, J., Crisp, N., Evans, T. et al. (2010). Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet*; 376(9756):1923-58.
- Fritzell, C., Raude, J., Adde, A., Dusfour, I., Quenel, P. & Flamand, C. (2016). Knowledge, Attitude and Practices of Vector-Borne Disease Prevention during the Emergence of a New Arbovirus: Implications for the Control of Chikungunya Virus in French Guiana. *PLoS Negl Trop Dis*. 10(11).
- Galvão, L. A. C., Finkelman, J. & Henaó, S. (2011). *Determinantes ambientais e sociais da saúde*. Brasília: OPS-FIOCRUZ, 601p.
- Jain, S., Kadri, S., Venkatesh, S., Lal, S. & Katyál, R. (2007). Epidemiological investigation of an outbreak of chikungunya in hyderabad and nalgonda districts of andhra pradesh, India. *Int J Health Sci*. 1(2):303-8.
- Khan, A. W. & Taylor-Robinson, A. W. (2018). Is Pakistan becoming a safe haven for chikungunya virus? Current status and proposed measures to curtail this emerging public health threat. *Infect Dis Health*. 23(4):237-42.
- Khatun, S., Chakraborty, A., Rahman, M., Nasreen, Banu, N., Rahman, M. M., Hasan, S. M. et al. (2015). An Outbreak of Chikungunya in Rural Bangladesh, 2011. *PLoS Negl Trop Dis*. 9(7): e0003907.

- Leventhal, H., Meyer, D. & Nerenz, D. R. (1980). The commonsense representation of illness danger. In: Rachman, S. (Ed.), *Contributions to Medical Psychology*, 1980; Pergamon Press, 17–30.
- Leventhal, H., Nerenz, D. R. & Steele, D. J. (1984). Illness representations and coping with health threats. In: Baum, A., Taylor, S. E. & Singer, J. E. (Eds.), *Handbook of Psychology and Health*, vol. 4. Lawrence Erlbaum Associates, Hillsdale, 219–252.
- Lindenmeyer, L. & Martins, C. M. (2015). Comunicação e saúde nos manuais dos organismos internacionais para situações de emergência e desastre: intervenção e hegemonia. *Interface-Comunicação, Saúde, Educação*. 19:299-310.
- Mallhi, T. H., Khan, Y. H., Tanveer, N., Bukhsh, A., Khan, A. H., Aftab, R. A., et al. (2018). Awareness and knowledge of Chikungunya infection following its outbreak in Pakistan among health care students and professionals: A nationwide survey. *PeerJ*. (8).
- Mayo, N. E., Asano, M. & Pamela, B. S. (2013). When is a research question not a research question? *J Rehabil Med*. 45(6):513-8.
- Martins, L. M. S. (2017). *Teoria da comunicação: ideias, conceitos e métodos*. (5th ed.), Editora Vozes.
- Mendonça, A. V. M. (2014). Informação e Comunicação para o Sistema Único de Saúde no Brasil: Uma Política Necessária. In: Sousa F, Franco MS, Mendonça AVM. (Org.). *Saúde da família nos municípios brasileiros: os reflexos dos 20 anos do espelho do futuro*. Brasília: Saberes, p. 701-719.
- Motta, L. G. (2014). Difusão de inovações. In: Citelli, A., Berger, C. L. B. R. K., Baccega, M. A., de Lopes, M. I. V., França, V. V., Camargo, R. Z, Bendassolli, P. F. *Dicionário de comunicação: escolas, teorias e autores*. Editora Contexto, 111-119.
- Nagpal, B. N., Saxena, R., Srivastava, A.; Singh, N., Ghosh, S. K., Sharma, S. K. et al. (2012). Retrospective study of chikungunya outbreak in urban areas of India. *Indian J Med Res*. 135:351-8.
- Ndeffo-Mbah, M. L., Durham, D. P., Skrip, L. A., Nsoesie, E. O., Brownstein, J. S., Fish, D. et al. (2016). Evaluating the effectiveness of localized control strategies to curtail chikungunya. *Sci Rep*. 6:23997.
- Nunes, M. R. T., Faria, N. R, de Vasconcelos, J. M., Golding, N., Kraemer, M. U., de Oliveira, L. F. et al. (2015). Emergence and potential for spread of Chikungunya virus in Brazil. *BMC med*. 13(1):102.
- Pacheco, Ó., Martínez, M., Alarcón, Á., Bonilla, M., Caycedo, A., Valbuena, T. et al. (2017). Estimation of underreporting of Chikungunya virus infection cases in Girardot, Colombia, from November, 2014, to May, 2015. *Biomedica*. 37(4):507-15.
- Parvanta, C., Nelson, D. E., Parvanta, S. A. & Harner, R. N. (2010). *Essentials of public health communication*: Jones & Bartlett Publishers.
- Peters, M., Godfrey, C., McInerney, P., Soares, C. B., Khalil, H. & Parker, D. (2015). Methodology for JBI scoping reviews. The Joanna Briggs Institute Reviewers manual: *The Joanna Briggs Institute*; 2015. p. 3-24.
- Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A. & McEwen S. A. (2014). A scoping review of scoping reviews: advancing the approach and enhancing the consistency. *Res Synth Methods*. 5(4):371-85.
- Rangel-S, M. L. (2007). Comunicação no controle de risco à saúde e segurança na sociedade contemporânea: uma abordagem interdisciplinar. *Cien Saude Colet*; 12:1375-85.
- Rangel-S, M. L. (2009). Comunicação em vigilância sanitária. In: Costa EA. (Org.) *Vigilância Sanitária: temas para debate*. Bahia: *EDUFBA*, 153-170.
- Razmy, A. M. (2014). Clinical features of chikungunya infection in Sri Lanka. *Asian Pacific Trop Med Infect Dis*. 4(2):131-4.
- Silva, N. M. D., Teixeira, R. A. G., Cardoso, C. G., Siqueira Junior, J. B., Coelho, G. E. & Oliveira, E. S. F. (2018). Chikungunya surveillance in Brazil: challenges in the context of Public Health. *Epidemiol Serv Saude*. 2018; 27(3):e2017127.
- Sood, S. K. & Mahajan, I. (2007). Wearable IoT sensor based healthcare system for identifying and controlling chikungunya virus. *Comput Ind*. 91:33-44.
- Thaikrua, L., Charearnsook, O., Reanphumkarnkit, S., Dissomboon, P., Phonjan, R., Ratchbud, S. et al. (1997). Chikungunya in Thailand: a re-emerging disease? *Southeast Asian J Trop Med Public Health*. 28(2):359-64.
- Toro, A. J. B., Werneck, N. M. D. (2004). *Mobilização Social: Um modo de construir a democracia e a participação*. Belo Horizonte: Autêntica.
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D. et al. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 169(7):467-73.
- Pessoni, A. (2009). *História da Interface Comunicação e Saúde*. In: Paulino FO. *Comunicação e Saúde*. Brasília: Casa das Musas; 31-42.
- OMS. (2009). *Comunicação eficaz com a mídia durante emergências de saúde pública*. Brasília: Ministério da Saúde.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C, Mulrow, C. D. et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71
- Pereira, P. L., Meza, Z., Santander, F. & Ferreira, L. (2015). Temas y actores frente al Chikungunya en medios de la prensa escrita de Paraguay. *Revista de Comunicación y Salud: RCyS*. 5(1):16-35.
- Tóth, M. & Laro, R. (2009). *O Potencial Limitado das Campanhas Massivas de Comunicação para a Transformação de Comportamentos Sociais*. In: Paulino FO. *Comunicação e Saúde*. Brasília: Casa das Musas, 45- 53.
- Traquina, N. (1993). *Jornalismo: questões, teorias e "estórias"*. Vega, 167-76.

White, D. M. (1993). *O gatekeeper: uma análise de caso na seleção de notícias*. In: Traquina N. *Jornalismo: questões, teorias e “estórias”*, 2, 142-151.

WHO. (2005). *Strengthening health security by implementing the International Health Regulations*. WHO Library.

Wolf, M. (2012). *Teorias das comunicações de massa*. (6th ed.) Editora WMF Martins Fontes.

Wolton, D. (2010). *Dominique*. Informar não é comunicar, Sulina.

Xavier, C. (2006). *Mídia e saúde, saúde na mídia. Caderno Mídia e Saúde Pública Belo Horizonte*: Escola de Saúde Pública/Funed. 43-55.

Zambrano, L. I., Sierra, M., Lara, B., Rodriguez-Nunez, I., Medina, M. T., Lozada-Riascos, C. O. et al. (2017). Estimating and mapping the incidence of dengue and chikungunya in Honduras during 2015 using Geographic Information Systems (GIS). *J Infect Public Health*. 2017; 10(4):446-56.

## References of selected articles

Jain, S., Kadri, S., Venkatesh, S., Lal, S. & Kalyal, R. (2007). Epidemiological investigation of an outbreak of chikungunya in hyderabad and nalgonada districts of andhra pradesh, India. *International journal of health sciences*. 1(2):303-8.

Raude, J. & Setbon, M. (2009). The role of environmental and individual factors in the social epidemiology of chikungunya disease on Mayotte Island. *Health & Place*; 15(3):689-99.

Nagpal, B. N., Saxena, R., Srivastava, A., Singh, N., Ghosh, S. K., Sharma, S.K. et al. (2012). Retrospective study of chikungunya outbreak in urban areas of India. *The Indian journal of medical research*; 135:351-8.

Khatun, S., Chakraborty, A., Rahman, M., Nasreen Banu, N., Rahman, M. M., Hasan, S. M. et al. (2015). An Outbreak of Chikungunya in Rural Bangladesh, 2011. *PLoS neglected tropical diseases*; 9(7): e0003907.

Lima, P. P., Meza, Z., Santander, F. & Ferreira, L. (2015). Temas y actores frente al Chikungunya en medios de la prensa escrita de Paraguay. *Topics and actors against the Chikungunya in the press media of Paraguay*; 5:16-35.

Nunes, M. R. T., Faria, N. R., de Vasconcelos, J. M., Golding, N., Kraemer, M. U., de Oliveira, L. F. et al. (2015). Emergence and potential for spread of Chikungunya virus in Brazil. *BMC med*. 13(1):102.

Cherry, C. C., Beer, K. D., Fulton, C., Wong, D., Buttke, D., Staples, J. E. et al. (2016). Knowledge and use of prevention measures for chikungunya virus among visitors - Virgin Islands National Park, 2015. *Travel medicine and infectious disease*; 14(5):475-80.

Feldstein, L. R., Ellis, E. M., Rowhani-Rahbar, A., Halloran, M. E. & Ellis, B. R. (2016). The First Reported Outbreak of Chikungunya in the U.S. Virgin Islands, 2014-2015. *The American journal of tropical medicine and hygiene*; 95(4):885-9.

Fritzell, C., Raude, J., Adde, A., Dusfour, I., Quenel, P. & Flamand, C. (2016). Knowledge, Attitude and Practices of Vector-Borne Disease Prevention during the Emergence of a New Arbovirus: Implications for the Control of Chikungunya Virus in French Guiana. *PLoS neglected tropical diseases*; 10(11).

Ndeffo-Mbah, M. L., Durham, D. P., Skrip, L. A., Nsoesie, E. O., Brownstein, J. S., Fish, D. et al. (2016). Evaluating the effectiveness of localized control strategies to curtail chikungunya. *Scientific reports*; 6:23997.

Choo, M. S. & Blackwood, R. A. (2017). School-based health education in Yucatan, Mexico about the Chikungunya virus and mosquito illness prevention. *Infectious Disease Reports*; 9(2):53-7.

Curtis, A., Quinn, M., Obenauer, J. & Renk, B. M. (2017). Supporting local health decision making with spatial video: Dengue, Chikungunya and Zika risks in a data poor, informal community in Nicaragua. *Applied Geography*; 87: 197-206.

Freitas, A.R.R. C. L., Von Zuben, A.P., Donalísio, M. R. (2017). Excess Mortality Related to Chikungunya Epidemics in the Context of Co-circulation of Other Arboviruses in Brazil.

Guzzetta, G., Trentini, F., Poletti, P., Baldacchino, F. A., Montarsi, F., Capelli, G. et al. (2017). Effectiveness and economic assessment of routine larviciding for prevention of chikungunya and dengue in temperate urban settings in Europe. *PLoS neglected tropical diseases*; 11(9): e0005918.

Pacheco, Ó., Martínez, M., Alarcón, Á., Bonilla, M., Caycedo, A., Valbuena, T. et al. [Estimation of underreporting of Chikungunya virus infection cases in Girardot, Colombia, from November, 2014, to May, 2015]. *Biomedica: Revista Del Instituto Nacional De Salud*. 2017; 37(4):507-15.

Zambrano, L. I., Sierra, M., Lara, B., Rodriguez-Nunez, I., Medina, M. T., Lozada-Riascos, C. O. et al. Estimating and mapping the incidence of dengue and chikungunya in Honduras during 2015 using Geographic Information Systems (GIS). *Journal of infection and public health*. 2017; 10(4):446-56.

Khan, A. W. & Taylor-Robinson, A. W. Is Pakistan becoming a safe haven for chikungunya virus? Current status and proposed measures to curtail this emerging public health threat. *Infection, Disease & Health*. 2018.

Mallhi, T. H., Khan, Y. H., Tanveer, N., Bukhsh, A., Khan, A. H., Aftab, R. A. et al. (2018). Awareness and knowledge of Chikungunya infection following its outbreak in Pakistan among health care students and professionals: A nationwide survey. *PeerJ*; 2018(8).

Silva, N. M. D., Teixeira, R. A. G., Cardoso, C. G., Siqueira Junior, J. B., Coelho, G. E. & Oliveira, E. S. F. (2018). Chikungunya surveillance in Brazil: challenges in the context of Public Health. *Epidemiol Serv Saude*; 27(3):e2017127