



## Review article

## Systematic review of qualitative studies about malaria in Colombia

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## ABSTRACT

**Introduction:** The research about malaria in Colombia has centered mainly on the biomedical (clinical, parasitological, epidemiological and entomological) field, with little focus on qualitative research.

**Purpose:** Analyzing social categories related to malaria in Colombia, based on qualitative studies published among scientific literature.

**Methods:** Systematic review following Cochrane and PRISMA (*Preferred Reporting Items for Systematic Review and Meta-Analysis*) recommendations. An *ex-ante* protocol was applied, comprehensive and reproducible for the search, screening, and extraction of information. Methodological quality was evaluated through SRQR (*Standards for Reporting Qualitative Research*).

**Results:** 10 studies complied with the protocol; these studies interviewed 500 infected or exposed subjects, program administrators, health professionals, and indigenous people. 40 categories were identified, which account for social-economical, cultural and ecological determiners of malaria; insights and ways to understand the disease at an individual level; malaria consequences, and medical attention, disease control and elimination actions.

**Conclusion:** A wide variety of populations and subjects was considered. They show similar qualitative evidence on structural determiners, family-individual effects, and ways to understand malaria. Motivations to participate in disease interventions are less known, and they constitute the central axis for subsequent studies aimed to improve community engagement in disease control and elimination initiatives.

## 1. Introduction

Approximately half of the population in the world is exposed to malaria [1]; around 219 million of cases were reported in 2017 (95 % CI = 203–262 million), with a progressive increase in incidence rates, as well as 435,000 deaths, mainly among infants younger than five years old. In America, the situation is similar, with a progressive increase in the number of cases, mainly in Brazil, Nicaragua, and Venezuela [2]. In 2018, 62,141 cases were reported in Colombia; 25,095 (40% %) were Afro-Colombians, 14,714 (24 %) were indigenous people, 3,808 (6 %) were miners and the rest were foreign population [3].

The epidemiological situation of malaria has put pressure on intensifying prevention measures, whose main impact has been the reduction of mortality rates 29 % from 2010 [1]. Even when resources investment for disease control and elimination has increased (US\$ 3,1 billion were invested in 2017), the achievement of targets for 2030 will require annual support for disease control programs of approximately US\$ 7 billion annually [2]. In Colombia, malaria control has been established as

a central axis of the current government equality plan, defining as a target the complete elimination of the disease by 2022 in prioritized territories and the reduction of mortality over the national territory. But, even after the introduction of these initiatives and other related strategies, the expected results have not been yet obtained by using current disease control strategies, and malaria continues to be a priority for national public health policies [4,5].

In Colombia, research groups activities have followed the work of the National Health Institute since 1990, focusing their efforts in biomedical (clinical, parasitological, entomological and epidemiological) issues with studies on malaria immunology, on the genetic characterization of the parasite, diagnostic methods, as well as research on herbal extracts with antimalarial activity, on the main infection vectors involved, on *Plasmodium vivax* control and, on the disease burden, diagnosis and the epidemiological surveillance of malaria in pregnant mothers [6, 7, 8, 9, 10, 11, 12, 13, 14, 15].

This background shows the predominance of quantitative studies in malaria research in Colombia, with a reduced generation of knowledge

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by qualitative research, understood as approaches and methodologies focusing on linguistic and interpretative phenomenological analyses (greatly influenced by philosophic phenomenology and hermeneutics) made through interviews, and discussion and observation groups, in order to gather and interpret discourse materials and understand experiences, life lessons, and actions that develop within a specific culture [16].

Within the health field, qualitative research is essential to understand social processes that cannot be reduced to statistical variables, usually addressed by “quantitative research”; it includes topics such as the following: *i*) experiences, insights, patterns of behavior and the acceptance or rejection of health actions within communities, leading to their success or failure, *ii*) the ways in which knowledge about health and the disease is socially structured in the voice of infected individuals, their families, the community that has been affected and health professionals, in order to improve critical healthcare processes and public policies, *iii*) possible social responses for healthcare, *iv*) the sociocultural determinants of the specific forms in which the disease occurs within a community and, *v*) the descriptive models of the disease and its treatment, originated within a community, and the perspectives of key players along the health-disease process [17, 18, 19].

Considering the case of malaria in Colombia, there is a limited number of studies that have focused on perceptions, traditional knowledge or social representations about the disease and its prevention, treatment, and control; the few studies available that have addressed these matters, have been conducted in heterogeneous indigenous populations, institutional representatives of health programs or patients [20, 21, 22, 23]. Some of the topics addressed by such studies are the socio-cultural context and the predominant health system of the affected populations, insights about the vector, the parasite and its management, or the consequences and treatment of the disease, using categories that reflect differences in their properties (i.e., the content and characteristics of a category, which define it and provide it with meaning) and dimensions (i.e., the representation of inter-subject variations for a property) according to each population [24].

Currently, no systematic reviews pooling and summarizing the qualitative evidence available about malaria in Colombia have been conducted. And, in this respect, systematic reviews of qualitative studies may have multiple advantages, since they address situations that are beyond the scope of quantitative methods, for example, they help to define and refine research questions that reflect stakeholders' insights; synthesize the available qualitative evidence about beliefs or social representations; widen our understanding of current evidence on the topic and its relevance for patients, their families, health professionals, decision-makers or health policymakers; complement quantitative evidence to add value to political decisions; propose new studies that will guide the formulation of theories, methods and health practices; and finally, explore aspects of interventions' implementation, since qualitative research may improve their relevance, acceptability and usefulness within a community [25,26].

Although within some contexts, qualitative studies on health issues have increased in number, malaria has shown a slower development. On this point, many systematizations of qualitative research are available worldwide, which have focused on understanding social and cultural aspects related to the adherence to interventions against malaria-associated to pregnancy, as well as on sociocultural aspects conditioning the search for treatment, and other behaviors related to this disease [27, 28, 29, 30]. These previous studies evidence that the systematic review of qualitative studies about malaria is centered in Africa and the main topics addressed have been the use of treatments and mosquito nets, with little research analyzing the disease *per se*. In Colombia, no research synthesis focused on qualitative studies is available, and we assume this country will show results that differ from the available qualitative evidence for other countries, due to the distinctive features and heterogeneity of the affected territories.

The description above supports the necessity of carrying out a systematization that allows identifying central categories about malaria that have been studied in Colombia; the principal designs and methodological tools; as well as achievements, problems or challenges within this field. Likewise, qualitative evidence about malaria is essential to guide political, healthcare, and individual decision-making; to explain, interpret and apply the results derived from different initiatives for disease prevention, treatment and control; and, generally, to increase our knowledge of the disease in its natural dimension and the interpretations or insights that people have about malaria [25].

**The purpose of this research** was to analyze the social categories of malaria in Colombia reported by qualitative studies published in international scientific literature; understanding social categories as a concept or cluster of concepts operating as an abstraction of the characteristics and attributes of a sociocultural reality described from the point of view of the subject's experiences and life lessons, which can only be known within a subjective and inter-subjective framework, and cannot be reduced to statistical variables [16].

## 2. Methods

Type of study: Systematic review of qualitative studies, i.e., a study developed with the purpose of collecting all the scientific evidence available on a topic, which must comply with a series of inclusion and exclusion criteria, defined *ex-ante*, in order to answer a research question, trying to reduce biases for drawing more reliable and valid conclusions and providing recommendations [25].

### 2.1. PICo (population or problem, interest or context) question

Population: Participants of qualitative studies on malaria in Colombia, including patients, people exposed, health personnel or subjects related to control programs.

Interest: Pre-established or emerging social categories in the studies, to understand malaria from the perspective of central actors of this disease.

Context: Endemic areas for malaria in Colombia.

### 2.2. Search and selection protocol according to the cochrane community recommendations [25] and the phases outlined in PRISMA editorial guidelines [31]

A query was made in DeCS (*Health Sciences Descriptors*, translation of the terms of the MESH thesaurus into different languages, particularly into Spanish, in relation to the scope of the review and some of the databases consulted) y MeSH (*Medical Subject Headings*) in order to identify synonyms for the terms ‘malaria’ and ‘qualitative research’; for the first term, the words *Plasmodium* y paludism were found; for the second, we found the terms hermeneutic, Cultural Anthropology, Ethnographies, Ethnography, Ethnopsychology, Grounded Theory, Community-Based Participatory Research, Participatory Research y Community-Based Research. This process was complemented with a process of “pearl harvest” [32], which produced two additional terms: Research participatory action and Participatory action research.

The combination of the terms ‘malaria’, ‘*Plasmodium*’ o ‘paludism’, along with every synonym found for ‘qualitative research’, rendered twelve different search strategies, which were applied in English and Spanish in PubMed, EMCare/Ovid, Embase, Campbell Collaboration/ Cochrane Library, ScienceDirect, Scielo, Jstor, HAPI and Web of Science, which includes the Main Collection of Web of Science (since 1985), BIOSIS Citation Index (1926 to date), Current Contents Connect (since 1998), Data Citation Index (since 1900), Derwent Innovations Index (since 1963), KCI - Korean Journal Database (since 1980), MEDLINE® (since 1950), Russian Science Citation Index (since 2005), ScELO Citation Index (since 2002) y Zoological Record (since 1864). This search was complemented with a review of publications about malaria in Redalyc, as

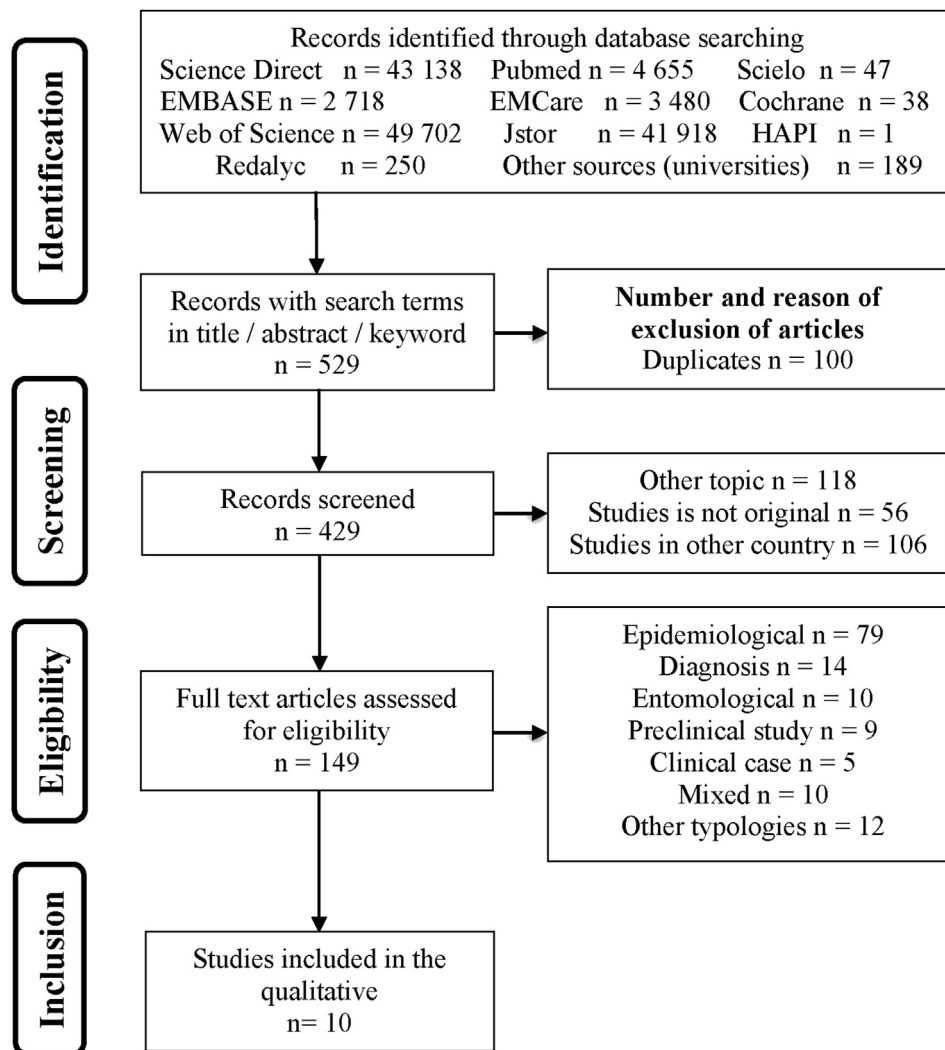


Figure 1. PRISMA flowchart of search and selection of articles.

well as in the system of libraries and institutional repositories of Universidad de Antioquia, Universidad del Valle, Universidad de Los Andes y Universidad Nacional de Colombia, for a total of 108 different search strategies that ensure the comprehensiveness of the search (Supplementary material 1).

Articles were screened applying the following criteria: includes our search terms in its title, abstract or keywords; its central subject was the study of malaria; it was an original study (discarding reviews, editorials and book chapters); and, it was a study conducted in Colombia. At the beginning of this phase, a flat-file database with all the titles obtained was developed, in order to eliminate any duplicates; no retrospective limits were applied, and the last update of the search protocol was on August 31, 2019.

After screening, we read every article completely, in order to apply exclusion criteria, which were used for eliminating epidemiology studies (cross-sectional studies, case and control studies, and clinical trials), studies evaluating diagnostic tests, entomology studies, non-clinical studies (*in-vitro* or *in-vivo* models), clinical cases studies, mixed studies with a higher quantitative focus (and marginal attention to qualitative issues), historical studies, bioinformatics studies or studies analyzing the implementation of different programs from a quantitative point of view.

Articles that approved the previous phases were systematized through a qualitative synthesis of the following components: title, authors, year of publication, study location, number and main characteristics of the study subjects, data collection tools, main topic in relation with the study's

purpose, categories used at each study, main results, conclusion, and use of the SRQR Guide (*Standards for Reporting Qualitative Research*) criteria [33].

### 2.3. Reproducibility and evaluation of the methodologic quality

Prior to its application, the search and selection protocol was validated by experts in qualitative and malaria research (two researchers different from the authors of this review). The reproducibility of the search protocol and articles selection as well as the reproducibility of data extraction (of all the categories analyzed in the studies included in the systematic review) were validated through a review performed by three researchers; it was determined *a priori* that disagreements would be solved by consensus. The methodological rigor of each study was evaluated based on the SRQR Guide criteria [33].

### 2.4. Information analysis

The main categories reported by studies were described; the percentage of studies that complied with each one of the SRQR Guide criteria was calculated; for each study, the percentage of compliance with methodological quality criteria was calculated; and the categories defined by each study were described, considering their properties and dimensions [23]. Initially, the categories (or concepts that represent the study phenomenon) included in each investigation were extracted; for

**Table 1.** Description of the ten studies included in the systematic review, according to place, study subjects, purpose and data collection tools applied.

Study	Year	Place	Subjects	Data collection tools
Correa A [21]	1999	Atrato Medio (Antioquia)	8 people from Embera ethnicity (jaibanás (shamans), health care promoter, nursing auxiliary, community teachers and majors)	In-depth interviews and field notes
Casas E [34]	2003	Urabá (Antioquia)	25 indigenous people from the Tule-Kuna ethnicity	Open, semi-structured interview, observation, and field notes
Pineda F [22]	2004	Leticia, Puerto Narino (Amazonas)	17 administrative personnel from the program and 33 indigenous individuals from the zone	Semi-structured interview
Pineda F [35]	2005	(Amazonas)	23 focal groups (6–10 indigenous individuals)	Focal group
Carvajal R [36]	2010	Buenaventura (Valle)	14 community individuals	Semi-structured interview and document analysis
Polanco Y [37]	2012	Turbo (Antioquia)	87 childcarers, and healthcare professionals (western medicine physicians, pharmacists and healers)	Semi-structured interview
Patino S [20]	2012	Turbo (Antioquia)	35 community members (community leaders, fishermen, farmers, housewives, students, and technicians)	Interviews and participant observation
Peiter P [38]	2013	(Amazonas)	47 public health managers, students, community members, and indigenous individuals	Interview
Santo Domingo A [39]	2016	Riohacha (Guejira), Tibú (Norte de Santander)	25 indigenous individuals and members of the healthcare team (directors, technicians, entomologists, epidemiologists)	Semi-structured interview, focal groups, georeferencing, and participant observation
Rincón D [23]	2016	Medellín (Antioquia)	13 adult patients in a malaria clinic	Semi-structured interview, field notes, participant observation

each category were described its properties, that is, its different characteristics or delineation of meanings in the investigations. After this process, the dimensions of each category were analyzed, that is, the scales of variation of the meanings found in each category, which allow it to be given specificity and scope to the theorizing that that was founded on data or social narratives.

Finally, two groups of conceptual fields were created, the first describes general health systems with three categories: *i*) Social representations, insights, life lessons, and experiences of the process health-disease in general, *ii*) Wisdom and practices related to the health-disease process, and *iii*) Meanings about the general health-disease process and its material, spiritual and cultural realities. The second field is directly related to malaria in Colombia, which consists of four broad categories: *i*) Structural or social determinants, *ii*) Subject's wisdom and interpretations, *iii*) Effects and need for medical attention, and *iv*) Interventions and elimination; each one with its respective subcategories, that is, concepts that belong to the same category and give it clarity and specificity.

### 3. Results

#### 3.1. Number of studies

The application of our search terms during the study of all sources generated 146,236 papers. After limiting our search to titles, abstracts or keywords, 529 articles were obtained, but only 10 (2 %) complied with the protocol (Figure 1).

All 10 studies were published between 1999 and 2016, and they were conducted mainly in Antioquia (50 %) and Amazonas (30 %). 9 studies used interviews, 4 used participant observations [20,23,34,39], 3 used field notes [21,23,34], 2 used focal groups [35,39], and 1 used document analysis [36]. The studies population was approximately 500 subjects, including disease control programs administrators, members of endemic communities, health professionals, child caregivers, patients and indigenous people (Table 1). 6 studies included an indigenous population of approximately 300 subjects (some studies did not report an exact number of indigenous subjects) [35,38], which included traditional practitioners, healers and community members at Indian reservations (Table 1).

#### 3.2. Methodological quality of studies

The quality level was low, Casas [34], Polanco [37] and Rincón [23] studies were the ones that complied with most of the criteria, with a compliance rate of 83 %, 79 %, and 75 %, respectively. The least applied criteria were: declaration of conflicts of interest (10 %), source of the financial support (30 %) and results implications (40 %); and, among methods, the use of techniques to ensure credibility (30 %), the description of the approach (40 %) and the description of the theoretical paradigm (10 %) had lowest rates. Only 4 studies described their methodological approach: 3 were ethnographic studies [20,34,36], and one had a grounded-theory approach [22]; only one described its theoretical paradigm, which was the symbolic interactionism theory [23] (Figure 2). It should be noted that most of these studies had a very low financial support by research-promoting entities in our country.

#### 3.3. Themes and categorization systems of the studies included

Table 2 describes these two aspects, where global social issues related to the general health-disease process, traditional medicine systems in the case of indigenous communities, and conventional health services are included. Particularly in the case of malaria, categories related with structural aspects were observed, which explain why the disease appeared in the community: wisdom, knowledge and insights about the disease, the consequences of suffering from the disease; and, the most recurrent, categories related to symptoms, diagnosis, treatment and control of the disease (Table 2).



























Standards for Reporting Qualitative Research (SRQR)	% studies that fulfill the criteria	
<b>Title and abstract</b>		
Title indicate that is qualitative or the approach		50
Quality of abstract		80
<b>Introduction</b>		
Problem formulation		70
Purpose or research question		60
<b>Methods</b>		
Qualitative approach		40
Research paradigm		10
Researcher characteristics and reflexivity		60
Context		90
Sampling strategy		50
Ethical issues pertaining to human subjects		60
Data collection methods		90
Data collection instruments and technologies		90
Units of study		90
Data processing		80
Data analysis		70
Techniques to enhance trustworthiness and credibility of data		30
<b>Results/findings</b>		
Synthesis and interpretation		100
Links to empirical data		40
<b>Discussion</b>		
Integration with prior work		70
Implications and transferability		40
Contribution(s) to the field		80
Limitations		60
<b>Other</b>		
Conflicts of interest		10
Funding		30

Figure 2. Methodological quality assessment.

Based on these aspects, a categorizing system was developed for malaria in Colombia, integrated by five groups of categories: *i)* general aspects about the health-disease process; *ii)* structural or social determinants of malaria; *iii)* individual wisdom and insights regarding malaria of the subjects studied; *iv)* effects or consequences of the disease and the need to find medical attention in health services; and, *v)* categories regarding actions (interventions) for disease prevention and control (Figure 3).

3.3.1. General aspects of the health-disease process

In this group, studies include categories related to social representations, meanings, insights, wisdom, life lessons, experiences and practices on the health-disease process. Both for the indigenous population and the mestizo population, the medical system of each Indian reservation, or the traditional health system (folk tradition) are described, using categories such as nosology, wisdom, knowledge, beliefs, practices and therapeutic schedules of each group. Health is regarded as happiness, body, treasure, movement, the ability to perform daily activities (working, studying, eating), the availability of a hospital or as a gift from God; on the contrary, disease is seen as a disruption with nature, as an autonomous entity, an alarm or related to hunger [20,21,34]. This group of categories addresses the importance of a collaboration between traditional medicine and western medicine to treat multiple diseases, and the general ways to prevent disease; and, subsequently, this group frames the malaria case within this network of meanings.

3.3.2. Structural or social determinants of malaria

This group includes four categories: the origin of malaria, its relation to life and work conditions, and the importance of home and family. As

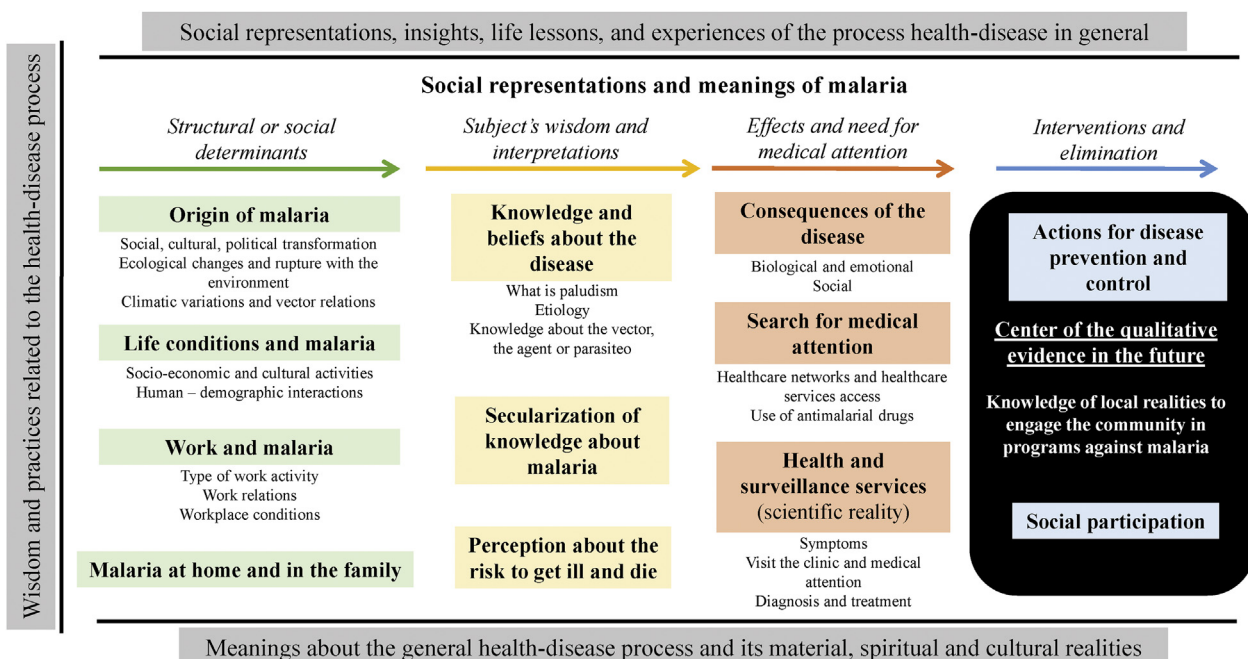
for the origin category, malaria is considered to arise within communities as a product of major social, cultural and political transformations, as well as ecological conditions related to disruptions (and alterations) between man and its surrounding environment, climate change, and the contact with disease vectors [21,34]. Even the mixture between the western discourse and the knowledge locally acquired within the environment (experiences and relationships) is considered as a part of the origin [21].

Other studies suggest that the disease presence is determined by the type of social, cultural and economic activities of each community and the type of human interactions that dominate such activities [23,39]. In this regard, work was defined as a determinant category to understand the incidence of the disease; particularly, the type of job, work relations and material conditions of the workplace. Most of the affected people are informal workers who work in mining or agriculture, have long working hours and low salaries; work at geographical locations with a difficult access in places that are not permanent and are often located next to the main rivers of the country, in regions with a hot climate and high humidity where there is a high level of exposure to the disease vector. These work characteristics force people to perform some community activities at night. At the same time, these work conditions are a key factor that reveals the inequality in health conditions associated with the distribution of malaria and the social inequality associated with healthcare [23, 39].

Finally, home and family are two categories that arise as central aspects in the malaria case, since they represent the central space and interaction scenario of individuals with the disease, determining, at the same time, the type of initial actions that will be taken to deal with the disease [23].

**Table 2.** Description of the themes and category system in the studies included.

Study	Main Topic	Malaria-related categories
Correa A [21]	Wisdom and practices regarding malaria	Origin of the disease; specific symptoms that allow to name it; possible causes; disease agent; treatment and prevention
Casas E [34]	General and specific health-disease practices regarding malaria	Origin of the disease; prevention; self-medication; western medicine and culture-specific treatments; given names; malaria diagnosis and symptoms
Pineda F [22]	Evaluation of the malaria program before and after Law 100	Policies to fight VBDs (vector-borne diseases); decentralization; Development Plan; local health plans for primary healthcare; inter-sector coordination; social participation; scope and coverage of the program to fight VBDs; access to diagnosis and treatment; surveillance and priority problems
Pineda F [35]	Insights, attitudes, and practices regarding malaria	Names are given to the disease; associated symptoms; treatments used; diagnosis; identified risk populations, locations and periods of the day or year with a higher incidence; preventive measures and limitations to take them.
Carvajal R [36]	Design, validation, and implementation of educational materials about malaria	Community educational materials; community participation; interventions against malaria (scientific reality) and malaria control (social reality)
Polanco Y [37]	Insights and responses (healthcare actions and barriers to providing treatment) with regards to malaria symptoms in children	Search for treatment, symptoms, and severity; antimalarial drugs knowledge; time to find treatment and time to raise the alarm; definition of a successful and failed treatment; healthcare services provided by a physician, a healthcare center, a healer or a pharmacist
Patiño S [20]	Social representations (wisdom, knowledge, beliefs, experiences, feelings and roles) regarding malaria	Place of paludism in the local classification of diseases; hot climate diseases (fast death, active patient, it does not hinder body movements); religious classification of health conditions; feeling of resignation after getting ill (placing oneself in the hands of the doctor); doctor-patient relationship; mosquitoes and paludism; disease prevention and control
Peiter P [38]	Malaria surveillance in the triple frontier of Colombia, Brazil, and Perú	Health and living conditions; healthcare services; surveillance and control
Santo Domingo A [39]	Ecohealth schedule and the socioecological dynamics; focus on malaria	Prevention, surveillance, and control; socioeconomic and cultural activities; animals and vectors; human-demographic interactions and climate
Rincón D [23]	Insights and life experiences regarding the disease	Life conditions; work, home, and family conditions; getting ill with paludism; search for medical attention; attention in healthcare services and consequences of malaria



### 3.3.3. Individual wisdom and insights regarding malaria in study subjects

Within the individual domain, three basic categories were found: traditional knowledge and wisdom about paludism; the importance that the secularization of knowledge about malaria has had; the perception of different communities about the risk to get infected with the disease and die from malaria.

**3.3.3.1. Traditional knowledge and wisdom about paludism.** We are here concerned with contents associated to symptoms and signs that help each community to identify the disease, its etiology and its link with the presence of disease vectors or the absence of preventive methods, social representations about mosquitoes and their familiarity with the term *Plasmodium*, identified as the causal agent. For example, the Embera ethnic population has identified and named malaria just a few years ago: “before, we only suffered from *beumía* or *tarí*, but not paludism”. This term was adopted by communities after the program for disease prevention and control of the National Service for Eradication [Servicio Nacional de Erradicación] was introduced [21]. Also, the introduction of the microscope in Indian reservations as a tool to help in the diagnosis of malaria or paludism and in the explanation of terms such as *Plasmodium falciparum* (equivalent to *poni kortikit kantikit* in Kuna language), which is characterized by an “intense headache” and “fever episodes every day”, and *Plasmodium vivax* (*poni kortikit nologuat* in Kuna language), associated with headaches of moderate intensity and intermittent fever episodes [34].

Other populations describe malaria as a group of hot climate diseases that are characterized by a “fast death”, and do not interfere with the activities or the movements of the patient, who can remain active, even when suffering the effects of the disease [20]. Currently, caregivers and traditional healers have a concept of malaria that goes beyond the spiritual matters; in their understanding of the disease, there is a mixture with the biomedical explanation of the disease, and they use traditional and home treatments for its symptoms, which may, from a biomedical perspective, lead to an inadequate management of the patient [37].

The mosquito is identified as the causal agent, and its management, before biomedicine influence, was based on traditional cultural practices aimed to control the troubles mosquitoes caused, but they were not linked to the causality of disease. After the introduction of biomedical information, mosquitoes became one of the primary causes of malaria, associated with the subjects' presence in regions with a hot climate, high humidity, and wet weather. The control of mosquitoes population is highlighted as one of the main methods to prevent the disease, and, in some communities, conflicts arise with respect to vector control, since “it is not possible to kill to the mosquitoes” for prohibitive reasons [20,21,23].

**3.3.3.2. Importance of the secularization of scientific knowledge about malaria.** In these articles, secularization is defined as the information provided by officers who are part of government programs for malaria control and health services [21]. This category explains, to some extent, the similarity or confluence between popular language and scientific language. Also, this category focuses on how the malaria concept appears in the language of some indigenous or rural communities due to the introduction of government programs for disease control. For example, among the Embera ethnic population, malaria is not regarded as a disease sent by God, but by men; therefore, its description, treatment and management require the attention of a “white doctor”, and generally, signs and symptoms are identified using terms based on conventional medicine [21]. Thus, changes in representations about the disease come from contact with conventional medicine, the western culture, health professionals (biomedicine practitioners) and, in some cases, they are born from the reflection of communities on their own experiences with the disease and their life conditions [21].

**3.3.3.3. Perception of different communities regarding the risk to get infected and die from malaria.** This perception is influenced by the type of knowledge and wisdom (scientific, official and traditional) that merged at each territory, as well as the previous experience with the disease (individual or family experiences).

Even when reports suggest that the people who better know the measures for disease prevention and control are those who are in high risk of infection with malaria or who know the importance of eliminating mosquitoes breeding sites, it is also reported that such knowledge is not put into practice, due to a lack of time, interest and community organization [22,35].

### 3.3.4. Effects or consequences of malaria and the need to find medical attention in healthcare services

Three categories merge in this group: biological, social and emotional consequences of the disease; factors associated with finding medical attention and treatment for the disease; and healthcare systems (symptoms management, visits clinics, medical attention, diagnosis and treatment).

The biological, social and emotional consequences force affected individuals to make changes in their lifestyle, their family life, and work-life, due to organic damage and incapacitating symptoms. At an emotional level, the disease generates fear and apathy towards life; and, at a social level, the disease (and the exposure to environments with a high mosquito population) makes individuals consider the possibility to migrate with their families or quit their jobs. It is important to note that these consequences are associated with the stages of the disease as perceived by infected individuals, such as unspecific manifestations, the appearance of the typical symptoms of paludism, the need to change daily routine activities when suffering from the disease and the moment when the disease is confirmed or accepted (“ill with malaria”) [23]. Also, a final stage was identified, when a feeling of resignation appears after getting ill, and patients “place themselves in the doctor's hands” establishing an asymmetric doctor-patient relation [20].

Other subjects describe the particular steps they follow when seeking medical attention, such as “think, wait and take a decision”, where the support networks of the patient, the help provided by other people (family members, neighbors) and the visits to healthcare services are essential; especially the last one, which is considered an obligation by the government, who should grant healthcare services that provide an initial management of the symptoms, a timely diagnosis and antimalarial treatment [23].

Likewise, the factors that influence the search for help and medical attention at healthcare services depend on the availability of diagnostic centers and centers for medication dispensing, the quality of healthcare services (presence of physicians, healers, prayers, medical technicians and other types of healthcare professionals), the distance from healthcare centers, the type of job the patient has, the treatment costs and the knowledge about the consequences of having the disease [37].

In this group of categories, most of the studies [21,22,35,37] conducted in indigenous populations, as well as African-Colombian and mestizo populations, explain that the access to treatment concentrates in pharmacological approaches provided by conventional medical services. They are generally prescribed by agents such as an indigenous health promoter (who is trained by the government health services) or a hospital since traditional medicine considers malaria as a foreign disease and cannot provide adequate treatment, as it is not part of its traditional conceptions [21]. This course of action is also associated with difficulties in the access to diagnosis and pharmacological treatment (the disease often arises within populations that are far from urban centers, and are affected by the armed conflict and other problems) which result in different social narratives regarding self-medication problems in high-risk populations. Most of the treatments in such populations are

home remedies used to manage fever, rigors, headaches, vomit and languor; usually, herbal baths and antipyretic medicines [22,35,37].

### 3.3.5. Categories associated with actions (interventions) for disease prevention and control

Finally, categories associated with various actions for disease control were grouped under this classification. This group is different from the others previously described since it shows the greatest potential of implementation for qualitative research conducted in Colombia. It is the field with the greatest heterogeneity, where authors show the most limited knowledge and where no saturation exists about findings in different populations.

The first category of this group addresses the measures that study subjects take in order to prevent and control the disease, which includes the use of herbal medicine beverages or baths, the fumigation of residences [34], and the use of mosquito nets and traditional practices, such as the use of plant or animal materials to repel mosquitos [23].

The second category addresses the need to know community motivations, in order to encourage social participation. It is claimed that, even if the etiology, the symptoms, causes, high-risk population, high exposure zones and periods of higher incidence are identified, this information is not enough to encourage people's actions for preventing and controlling malaria. These studies reveal the need for more research aimed at understanding how behavioral factors in populations exposed to malaria may promote or hinder interventions for disease control. Others show the need to develop educational materials that are aligned with the cultural and ethnographic characteristics of the population studied; on the basis that public health interventions should be grounded on the results of scientific projects, but control strategies must be based on the knowledge of local realities, using pluralistic approaches for taking decisions on healthcare issues [22, 35, 36, 37].

Generally, communities have developed a wide variety of meanings about control strategies; but the term malaria is associated to a relatively consistent cluster of community wisdom, where “*subjects use this term going from one meaning to another, fluently and without fearing to deliver a confusing message for their recipients*”. However, it is necessary to aim for a closer reconciliation with the social representations of local people about the disease, in order to improve the communication doctor-patient and the understanding of subjective experiences on the management and control of this disease and to overcome conceptual and cultural barriers within the context of community-based interventions. This becomes more important if one considers that local dynamics are changeable and depend on multiple contextual factors [20,39].

Finally, some studies compared institutional (programs for disease control) and community elements, and they suggest that before and after the creation of a new social security system in Colombia, the program for malaria control still faces difficulties, such as geographical accessibility, population displacement, the lack of continuity for disease control actions and for the surveillance and evaluation of such activities, the inadequate structural capacity of institutions that provide healthcare services, the insufficient coverage of the diagnostic network, the limited number of physicians specialized in malaria at local hospitals, insufficiency and high rotation of human resources, limited resources for promotion and prevention activities, low coordination between stakeholders, as well as low inter-sector and citizen participation [22,35, 38]. Also, there are additional threats for health programs, such as the lack of control of illicit activities (drug trafficking, herbal medicines contraband), poor life conditions, low housing quality, increasing vulnerability due to ecotourism, working populations that do not perceive the risk even when they are constantly exposed to the disease, low social mobilization for health topics in general and malaria in particular [38].

## 4. Discussion

A synthesis of the qualitative evidence about malaria in Colombia with approximately 500 participants (infected and exposed subjects, program administrators, healthcare professionals, and indigenous people) was developed, where 40 categories were identified, which account for socioeconomic, cultural and ecological determinants of malaria; wisdom and ways to understand the disease in the individual and family settings; consequences of paludism and actions for medical attention, control and elimination. No significant differences were found among the groups studied, which may initially suggest that the penetration of biomedical knowledge generates a kind of homology of meanings or consistency in the properties and dimensions of the category system described [24]. It is also important to consider that endemic zones are under political, social and economic conditions that cause a high vulnerability to the disease; this may explain why these studies are comparable in the identification of social aspects that determine the incidence of malaria. This is consistent with a systematic review about the social determinants of this disease, which evidences the link between paludism and agroforestry activities, migration, low income, low levels of education and poverty [40,41].

Most of the studies were conducted in two departments (Antioquia and Amazonas); they concentrate the two ethnicities with the higher number of cases, such as the indigenous peoples and African-Colombians, and the places where the higher risk of malaria transmission has been identified, according to the API (Annual Parasitic Index); for example, in 2018, La Pedrera (Amazonas) registered 245 per 1000 exposed inhabitants and Vigía del Fuerte (Antioquia) registered 154 cases per 1000 exposed inhabitants [3]. From these results, it is possible to infer that the saturation reported in some categories is supported by the fact that most of the studies were conducted in two zones. This raises the need to study groups from other endemic regions, in order to achieve a true saturation of narratives about social determinants, individual insights and the consequences of malaria in Colombia.

Given the similarity of categories that include structural determinants, subject wisdom and malaria effects on the study groups, it is worth asking: what are the practical or theoretical elements that would help to explain why socially and culturally different groups share common concepts and languages about the disease? Four central descriptive points could be formulated: secularization; social convergences or shared cultural features in the Colombian territory; the absence of studies about other important populations, such as miners; and the limitations of systematized qualitative studies for addressing everyday knowledge or the specificity of the social context.

### 4.1. Secularization

We could suggest that the presence of shared languages about the disease is grounded on the symbolic efficacy of the biomedical discourse in endemic territories, as well as the accumulation of a pattern of similar life experiences with the disease. This explanation would have grounds on the history of malaria in Colombia, where the disease has been a health problem during the colonization of a considerable part of the territory (16<sup>th</sup> century); on the presence of disease vectors in regions where black and indigenous communities have settled; on the parallelism between the presence of the disease and the extractive economy history of the country; and on the multiple public health efforts that have been officialized since 1957 through the Service for Malaria Eradication (SEM), which has played an important role in endemic regions of the country, carrying out actions for diagnosis, treatment, vector control and health education [22,42].



The similarities of subjects' representations about paludism in this study could be supported on the contact of communities with biomedicine and the presence of the personnel belonging to programs for disease control in endemic zones around the country, which results in a sort of penetration of new linguistic forms of the disease in communities. This secularization of wisdom, beliefs, knowledge, perceptions about risk and disease management (or miscegenation, in the case of indigenous populations) has strengthened in Colombia, due to the influence of the western education and health systems on rural communities; the programs addressed to promote intercultural relations regarding health issues in order to align the communities' symbolic universe with the biomedical knowledge; and the need to deal with diseases that are not part of the socio-cultural heritage or constructions of these populations [43,44,45]. This is aligned with the initiatives promoted by the Pan-American Health Organization and the World Health Organization, which have encouraged inter-cultural approaches in order to help indigenous, Afro-descendant and rural communities to face their problems of access to health services, integrating standards for adjusting services to the particular cosmovision of each population [46].

#### 4.2. Social and cultural convergences

We must consider the fact that insights, perceptions, and behaviors associated to health issues are related to culture or, they are cultural systems that are framed within the wider social realities that originate them, where healthcare systems have a considerable influence in the response against the disease. It is important not to miss those insights about the disease arise from the organization of institutional resources, the material living conditions, power relations and symbolic resources; and the first three would have a higher potential for describing the convergences found during this review [47].

**Absence of qualitative studies conducted in endemic territories** that have problems of access due to geographical conditions or due to the armed conflict; or studies conducted in populations of interest, such as miners, who are one of the three groups that show a higher incidence of malaria in Colombia. This means that the convergence of results may be attributed to the fact that the studies included in the systematic review have been developed in relatively static and accessible populations for researchers [3]. This would raise the need to improve efforts for developing qualitative studies in regions with a difficult access, suffering from the effects of armed conflict, populations in a high internal mobility or migration, populations with a high exposure to disease vectors due to their economic activities, and other groups that could contribute to widen the category system synthesized in this research [48].

#### 4.3. Methodological limitations of the studies included in the systematic review

They did not analyze qualitative research topics thoroughly, such as the analysis of community networks, social relations or the interactions that determine the health-disease process; the deep and complex nature of the health-society relationship; the social, cultural and historical causality of the disease; and the development of descriptive models originated in the community; among others [17, 18, 19]. At this point it is important to take into account that qualitative research about health issues must consider at least four elements: interpreting subjective meanings, describing the social context, concentrating more on everyday or popular knowledge, and extend the concern for techniques to the historical, cultural, sociological and philosophical importance of non-scientific knowledge [49].

The methodological considerations above could also help us to understand the differences we found in association with social or community responses to different initiatives for prevention and control, a dimension that the studies included in the systematic review fail to capture efficiently. This is the reason why the associated factors or the motivations behind risk or protective practices in endemic zones are still

unknown, a problem that should be treated further by qualitative research in the future. It is interesting to note that this is the least explored category domain in Colombia, given that in the international scientific literature, qualitative evidence is highly concentrated in these issues. For example, Win's group, based on the systematization of 28 studies, identified multiple models of intervention against the disease. Intervention models that were developed with the community's participation increased the use of impregnated mosquito nets and improved the preventive treatment of pregnant mothers and the timely search of medical attention, reducing mortality. However, the high heterogeneity of analyzed actions and outcomes raises the need to generate evidence for each specific context [50]. Another review study, that systematized 35 studies about different interventions for malaria (elimination, education, treatment, and prevention), concludes that the main challenges for malaria elimination are the strengthening of health systems, community leadership, effective surveillance systems, regional collaboration and a wider knowledge of individual behaviors [51].

Other syntheses of qualitative evidence, similar to the present study conducted in Colombia, have identified as relevant topics for malaria interventions, the understanding and perception of the risk of infection, risk behaviors, factors related to finding a treatment [52], the importance to increase health conscience and the mobilization of local or community health professionals for disease prevention, early detection and the search for pharmacological treatment [41]. This confirms the confluence of the types of categories analyzed, but with significant differences in their properties and dimensions, thus demonstrating the need to develop studies adapted to each locality [41,52].

For interventions specifically focused on vaccination, systematic reviews have concluded that effective implementation of the programs requires careful consideration of the sociocultural context of each community. The acceptance of an intervention may improve significantly if the beneficiaries' insights are incorporated and adjusted adequately; this requires the community's participation, and the provision of acceptable information through reliable communication channels [53].

Moreover, the comparison between community and institutional narratives (health professionals or disease control program managers) in this and other systematic reviews suggests that the factors that determine the development and the effective implementation of programs against malaria involve aspects such as the nature of personnel training, the types of compensation, the availability of medication and financial resources, the nature of workplaces, the trust in healthcare professionals, the use of services by community, the community dynamics, and the nature of the connection and support the community provides to healthcare professionals [54].

Despite the advantages of the systematic reviews on qualitative studies described in this article, we must acknowledge the persistence of multiple debates about this type of synthesis of scientific literature, due to the diversity of qualitative methods; the differences in approaches and theoretical paradigms aimed at extending meanings of subjective topics on the disease; and the assessment of methodological quality. Some authors still reject the standardization of accurate criteria, since qualitative studies are highly variable, while there are others who consider that rigorous research, regardless of its design, requires a careful evaluation of its quality before it can be used within the academic, clinical or political settings [25].

Additionally, it is appropriate to mention that few standards have been established for the critical evaluation of qualitative studies; this is the reason why we want to underscore the efforts of the SRQR Guide authors, who have systematized publications on reporting standards and critical evaluation criteria for qualitative studies appeared on PubMed, Web of Science and Google, in order to formulate and define criteria, preserving the necessary flexibility to adjust multiple paradigms, approaches and methods [33]. This becomes more important in the case of the qualitative evidence about malaria in Colombia, which showed a poor methodological quality. Few studies describe clearly the methods and theoretical paradigms used in research. Additionally, most of the

studies fail to report structural aspects of qualitative research; only a few define the focus of the study, such as life lessons, experiences, social representations, comprehension, interpretation, or other key elements for this type of study [16].

Among this study's limitations, we find the lack of standardization of editorial considerations regarding qualitative research publications; this may have resulted in a failure to capture some studies, since not all publications require writing an abstract, and some studies show problems in their structure, which does not allow them to be identified as qualitative studies. Despite the exhaustiveness of the search and selection protocol, this does not totally rule out the presence of potential publication and language biases, especially for publications that do not include the abstract or keywords in English or Spanish. To these limitations must be added the fact that the protocol was not registered a-priori.

Despite this limitation, we must take into consideration a systematization of the studies about malaria in Colombia, which concludes that the research projects that have received financial support in our country have focused on molecular biology, vaccine development, antimalarial-drugs resistance profiles, the effects of climate change and, training human resources. Therefore, we may say that qualitative research is still developing [55].

## 5. Conclusions

A wide range of populations and subjects was included; the qualitative evidence derived from them demonstrated that the affected communities share traditional knowledge about the structural determinants, the individual-family effects and the diverse understanding of malaria, its consequences and the need to search for medical attention. This could be attributed to the national efforts made for the education and communication of public health programs since 1957, and the history of malaria in Colombia, that is characterized by colonization processes, the creation of human settlements in zones with presence of the disease vector, and the predominance of extractive economy, all of the factors that increase exposure; and also, sociocultural or structural aspects shared by the study groups that generate similar popular conceptions about malaria.

Motivations for social participation in interventions against the disease should be the center of future qualitative studies in Colombia, in order to promote the engagement of communities in different initiatives for disease control and elimination. This is the least studied or least known, dimension, where the theoretical and methodological resources of qualitative research are essential to define the meanings created by communities regarding different options for intervention and to identify non-scientific knowledge that could be operating as a hindering or reinforcing factor for malaria control strategies in Colombia.

Although a comprehensive protocol was applied, only 10 qualitative studies about malaria in Colombia were found, which demonstrates the marginalized place this type of research has, for many reasons. This is a situation that we must correct if we want to advance firmly in an integrative comprehension of the malaria problem, and then, reach a solution. The present qualitative synthesis, based on a population of 500 subjects, provides a wide conceptual perspective about malaria, but it is insufficient to be representative of the complexity of this disease situation in our national territory. Additionally, 50 % of the studies have been conducted in Amazonas and Antioquia; therefore, it is urgent to promote research in other endemic locations, such as the South of Córdoba department, the Bajo Cauca region of Antioquia and the Pacific Coast.

## Declarations

### Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

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The authors declare no conflict of interest.

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