REVISTA Saber DIGITAL
ISSN: 1982-8373

Artigo original
DOI 10.24859/SaberDigital.2024v17n1.1497

The power of networked knowledge: Transforming public health in Colombia's fight against malaria

O poder do conhecimento em rede: Transformando a saúde pública na luta da Colômbia contra a malária

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Como citar este artigo:

OLIVEIRA, M.J; RODRIGUEZ, J.C.P.; CAÑÓN, I.M.C..; SOTO, M.J.V.; The power of networked knowledge: Transforming public health in Colombia's fight against malária. **Revista Saber Digital,** v. 17, n.1, e20241705, jan./abril., 2024.

Data de Submissão: 27/12/2023
Data de aprovação: 28/02/2024
Data de publicação: 01/03/2024

ABSTRACT

Objective - This study presents an overview of the development of the network for knowledge management, research, and innovation in malaria (malaria network). With a focus on the organizational factors that influenced its formation, the study aims to shed light on the broader factors that contribute to effective disease prevention and control efforts by examining the contextual elements that shaped the network. **Materials and methods -** The study employed a mixed-inductive approach, with a qualitative core and a quantitative complement. Intentional sampling was used in semistructured group interviews and focal discussion groups during cocreation workshops. Data were collected through surveys and literature review. **Results -** The study found that knowledge of and experience in organizational strategy for knowledge networks is limited, highlighting significant academic gaps in this area. The malaria network addresses this challenge by prioritizing innovation and quality control as key variables in its processes, enabling the network to store, disseminate, share and convert data into useful knowledge for its members and decision-makers. **Conclusions -** To ensure the sustainability of the Malaria Network, this study identifies the need to generate evidence on organizational strategies for knowledge networks. Furthermore, it discusses the importance of maintaining support for the process through various government, academic, and social entities.

Key words: Information Dissemination; Knowledge Management; Malaria; Organizational Innovation; Research; Social Network Analysis.

RESUMO

Objetivo - Este estudo apresenta uma visão geral do desenvolvimento da rede de gestão do conhecimento, pesquisa e inovação em malária (rede malária). Com foco nos fatores organizacionais que influenciaram sua formação, o estudo visa lançar luz sobre os fatores mais amplos que contribuem para esforços eficazes de prevenção e controle de doenças, examinando os elementos contextuais que moldaram a rede. **Materiais e métodos -** O estudo empregou uma abordagem mista-indutiva, com um núcleo qualitativo e um complemento quantitativo. Foi utilizado amostragem intencional em entrevistas em grupo semiestruturadas e grupos de discussão focal durante oficinas de cocriação. Os dados foram coletados por meio de pesquisas e revisão bibliográfica. **Resultados -** O estudo constatou que o conhecimento e a experiência em estratégia organizacional

para redes de conhecimento são limitados, destacando lacunas acadêmicas significativas nessa área. A rede malária enfrenta esse desafio ao priorizar a inovação e o controle de qualidade como variáveis chave em seus processos, permitindo que a rede armazene, dissemine, compartilhe e converta dados em conhecimento útil para seus membros e tomadores de decisão. **Conclusões -** Para garantir a sustentabilidade da Rede Malária, este estudo identifica a necessidade de gerar evidências sobre estratégias organizacionais para redes de conhecimento. Além disso, discute a importância de manter o apoio ao processo por meio de vários órgãos governamentais, acadêmicos e sociais.

Palavras-chave: Disseminação de Informação; Gestão do Conhecimento; Malária; Inovação Organizacional; Pesquisa; Análise de Redes Sociais.

INTRODUCTION

Malaria is one of the most significant parasitic infections worldwide and poses a huge public health challenge, especially in low- and middle-income countries (Olivera *et al*., 2022; WORLD HEALTH ORGANIZATION, 2015). In 2022, the World Health Organization reported a staggering 249 million cases of malaria and 608,000 related deaths globally (WORLD HEALTH ORGANIZATION, 2022). In Colombia, malaria remains a pressing public health threat due to its epidemic potential, severe complications, and high mortality rates as reported by various studies (Olivera; Padilla -Rodríguez; Cárdenas-Cañón, 2023; Padilla-Rodríguez *et al*., 2021; Rodríguez *et al*., 2021). According to the information reported in the epidemiological surveillance system, there were 71,573 reported cases of malaria in Colombia in 2022, with *Plasmodium vivax* infection accounting for 60.7% (43,427) of cases, followed by *P. falciparum* (38.3%) and mixed malaria (1%) (INSTITUTO NACIONAL DE SALUD, 2022).

As a strategy to address endemic problems of interest in public health, such as malaria, great efforts have been made to expand the resources allocated to scientific, technological and innovation activities. In this scenario, the creation of knowledge management networks has been promoted by carrying out cooperative actions and enhancing the capacities of actors (MINISTERIO DE SALUD Y PROTECCIÓN SOCIAL, 2020; ORGANIZACIÓN DE LAS NACIONES

UNIDAS PARA LA EDUCACIÓN LA CIENCIA Y LA CULTURA [UNESCO], 2015).

Knowledge networks are a strategic initiative to deploy knowledge management as the maximum expression of the individual and his or her need to exchange and socialize what he or she creates and learns from social interaction and engaging with institutions influenced by organizational culture, processes, human talent and information and communication technologies (Bedford; Sanchez, 2021).

The Ministry of Health and Social Protection, in its resolution 1035, has established the Ten-Year Public Health Plan 2022-2031, in which the management of knowledge plays a fundamental role in the fight against malaria. The development of processes that ensure the generation and management of knowledge is key for decision-making in areas such as prevention, promotion, and treatment of this disease. It is important to establish articulation at both the sectoral and intersectoral levels for the dissemination, social translation, use, and appropriation of knowledge in public health related to malaria. Furthermore, capacities in the management of knowledge in public health must be strengthened, allowing for better implementation of strategies and policies to combat this disease (MINISTERIO DE SALUD Y PROTECCIÓN SOCIAL., 2022).

The objective of knowledge networks is to promote the production, management, transfer, and socialization of scientific research results. By constructing, developing, and socializing knowledge, knowledge networks aim to strengthen inter-institutional cooperation, facilitate the flow of scientific and academic information, and serve as a platform for disseminating and transmitting knowledge and scientific/technological innovation (Hoppe; Reinelt, 2010).

In 2016, the Malaria Network for Knowledge Management, Research, and Innovation (malaria network) was established in Colombia as a collaborative effort between the Ministry of Health and Social Protection, the National Institute of Health, and the Pan American Health Organization. The network includes departmental, district and municipal territorial entities, health service providers,

research centers, academia, and civil society (Rincon et al., 2018a, 2018b). This specialized knowledge network brings together various elements including technology, regulations, culture, and social factors to enable the integrated management of knowledge on malaria. It encompasses the production, storage, distribution, transfer, and analysis of knowledge generated by research or individual interest groups, all with the goal of promoting the development of capacities for creating, understanding, and innovating in the fight against this vector-borne disease. The purpose of this study is to provide an overview of the development of a malaria network, with a focus on the organizational factors that influenced its formation. By examining the contextual elements that shaped the network, this study aims to shed light on the broader factors that contribute to successful disease prevention and control efforts.

MATERIALS AND METHODS

The proposed methodology is a mixed–inductive approach whose core is qualitative with a quantitative complement. In this way, the qualitative core is dominated by intentional sampling. Semistructured group interviews were carried out with different actors and focal discussion groups in cocreation workshops. The use of the qualitative strategy allowed us to find, theorize, and describe the best possible organizational model for the malaria network.

The quantitative component of our research allowed us to explore additional facets of the organizational design of the research network. We collected ample data through various surveys, which not only validated our qualitative exercises but also supported the subsequent analysis. Our proposed plan comprised the following six phases:

i) Conducting a thorough bibliographic review and developing the theoretical framework of the proposal, which encompassed diverse sources on network organizational designs, administration theories, profile segmentation, and network management.

ii) Training the key stakeholders involved in constructing the proposal. The functional team was equipped to internalize and discuss the findings obtained,

which helped align their understanding of the organizational designs of research networks.

iii) Facilitating collaborative workshops with relevant actors for the construction of the organizational skeleton of the research network and the collection of inputs for the subsequent design of the value offer.

iv) Adopting various capture instruments, both qualitative and quantitative, to support the cocreation workshops and supplement the analyses conducted.

v) Organizing inquiry meetings using an anthropological approach with researchers and territorial entities to gather additional inputs for the network's organizational proposal.

vi) Carrying out a data treatment exercise using different qualitative and quantitative strategies to analyze the comprehensive information and construct the final proposal for the malaria research network.

RESULTS

Classification of actors in the malaria network

The malaria network consists of 90 actors, with 49 (54.4%) being male. Of these actors, 39 (43.3%) belong to entities in the health sector, 32 (35.6%) to educational entities, and 19 (21.1%) to the science and technology sector. With regards to capital composition, 45 (50.0%) of the institutions are public, 26 (28.9%) are mixed, and 19 (21.1%) are private. The actors in the malaria network come from all the country's eco-epidemiological regions, each with its unique cultural settings and distinct disease burdens**.**

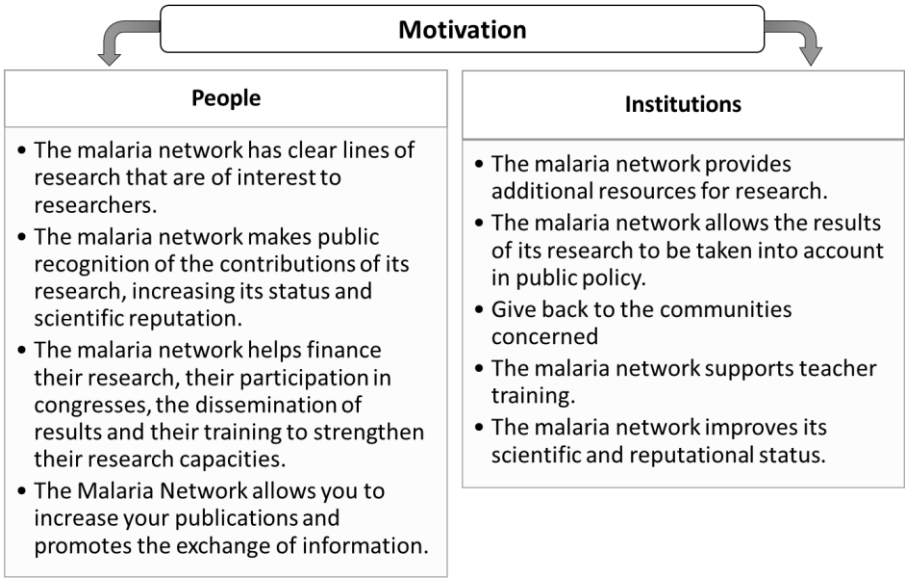
Psychographic profile of malaria researchers

The psychographic profile of malaria researchers provides a fascinating insight into the key drivers and motivations behind those working in the field. Upon analyzing the data, it becomes evident that there are various factors that greatly influence individuals' engagement in malaria research. At an individual level, it is apparent that researchers strive to align themselves with a network that is keenly focused on specific areas of research that are relevant to their own work. It is only by pinpointing and harnessing these specific areas of interest that a

collaborative and fruitful research effort can be established. This suggests that collaboration and information sharing are key drivers for those working within the field, as they seek to connect with others that share their interests and can help advance their own research.

At the institutional level, however, the primary motivation for investing in malaria research is funding. As Figure 1 shows, financial support is key to the success of any research effort, and institutions are strongly motivated to support research that has the potential to make an impact. This underscores the importance of securing funding and resources for malaria research efforts and highlights the need for ongoing advocacy and support from government and private sector institutions.

Figure 1. Psychographic profile of the actors that make up the malaria knowledge, research, and innovation management network.



Source: Author elaboration.

Behavioral profile of malaria researchers

The researchers are enthusiastic and passionate about malaria research, with extensive academic training and recognition, nationally and internationally. In general, they are characterized by a persevering and determined personality, great management skills, diligence in their investigations, and the ability to

innovate due to their individual demands. However, they also lack the initiative needed to promote teamwork because they are individualistic in the sense of managing resources for a single group or institution. With respect to their work, there is retention of knowledge and jealousy concerning information; sometimes, the show highly competitive and territorial positions, which can negatively influence the cooperation and synergies necessary to advance malaria research priorities.

Information technology and communications

Information technology and communications play a key role in facilitating communication and interaction among actors in the malaria network. To facilitate communication and interaction among these actors, the malaria network has a microwebsite that improves strategic decision-making processes through information management. This website provides up-to-date data, best practices, guidelines and other resources which are designed to support the activities of actors in the malaria network. The microwebsite is managed by the National Institute of Health and can be accessed by actors across the malaria network, including researchers, clinicians, public health officials and government agencies. The website enables timely sharing of information, communication of new developments, coordination of activities and tracking of progress. This information infrastructure plays a crucial part in the fight against malaria through improving collaboration, coordination and efficiency among stakeholders.

Direction and management processes of the malaria network

The direction and management processes of the malaria network are critical to the success of its mission. The Ministry of Health and Social Protection plays a key role in governing the network and ensuring adherence to its objectives. Working in coordination with the National Institute of Health, these institutions offer guidance and oversight to the network's leadership and members.

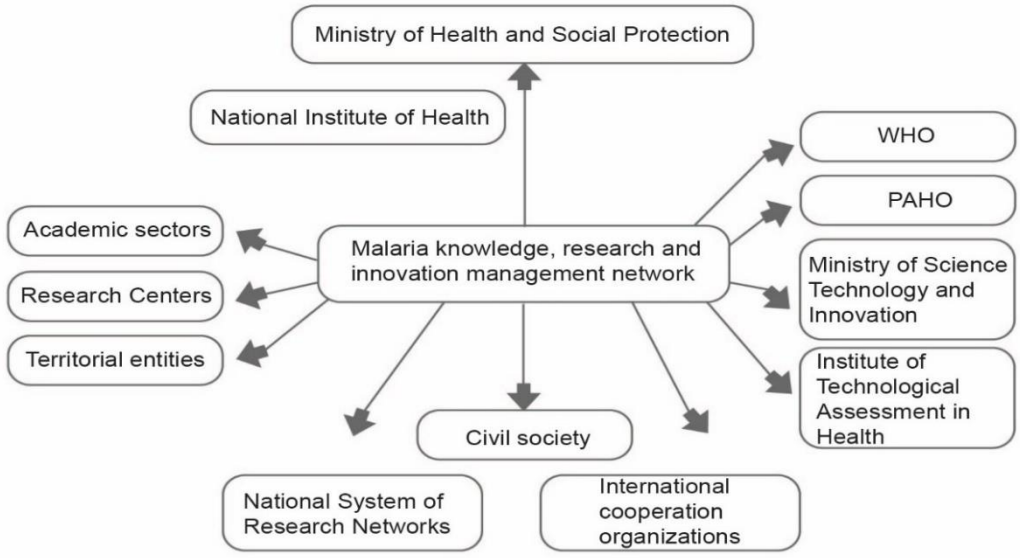
In addition to these governmental bodies, the malaria network benefits from partnerships with some strategic allies. The World Health Organization, the Pan American Health Organization, the Ministry of Science, Technology and

Innovation, and the Institute for Technological Assessment in Health all lend support and expertise to the malaria network's mission.

This specialized knowledge network is committed to preventing and treating malaria, a disease that affects millions of people around the world. By collaborating with key stakeholders and leveraging resources and knowledge, the malaria network is able to deliver effective solutions that save lives and improve public health outcomes.

To ensure continued success, it is important for the direction and management processes of the malaria network to remain strong and adaptable to the changing landscape of global health. Through ongoing collaboration, strategic planning, and investment in research and innovation, the network can continue to make meaningful contributions in the fight against malaria and other diseases (see **Figure 2).**

Figure 2. Relational forms at the institutional level of the malaria knowledge management, research, and innovation network, with other examples



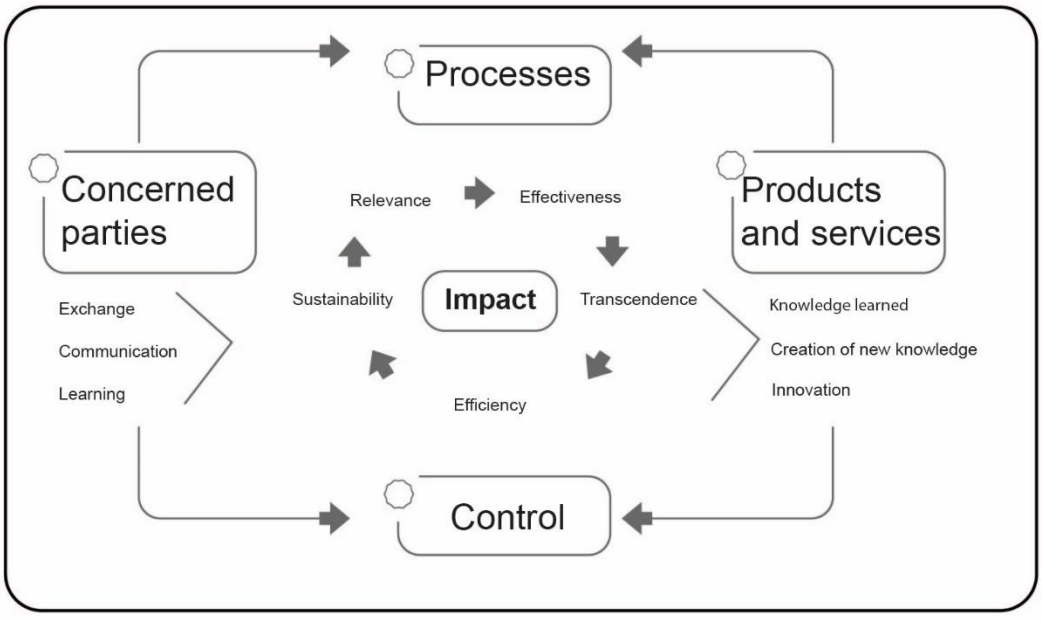
Source: Author elaboration.

The comprehensive model for enhancing quality processes in the malaria network.

The malaria network is dedicated to enhancing the quality of its processes and has developed a comprehensive model aimed at achieving this goal. This model is based on the integration of knowledge management and innovation, both of which are essential elements for creating a culture of continuous improvement. By leveraging its knowledge base and promoting innovation, the malaria network is able to stay at the forefront of technology and make informed decisions that drive positive outcomes.

Figure 3 provides a visual representation of the model, showcasing the intricate relationship between knowledge management and innovation. The model emphasizes the importance of capturing, sharing, and leveraging knowledge across the organization to achieve optimal outcomes. This includes using tools such as best practices, lessons learned, and collaborative problem-solving to drive innovation and improve the quality of processes.

Figure 3. The comprehensive model for enhancing quality processes in the malaria knowledge management, research, and innovation network



Source: Author elaboration.

Through the implementation of this model, the malaria network is able to maintain a high level of quality management across all of its processes. By

fostering a culture of continuous improvement, the organization can stay ahead of the curve and stay relevant in an ever-changing landscape.

The malaria network is based on the technical and behavioral aspects of its elements, allowing the synergy of the resources and skills of all the actors in the system, and is aware of the components and conditioning factors thereof. This makes it possible to clearly identify the impact of the endogenous and exogenous elements that affect the final format of the offer and institutional design of the network.

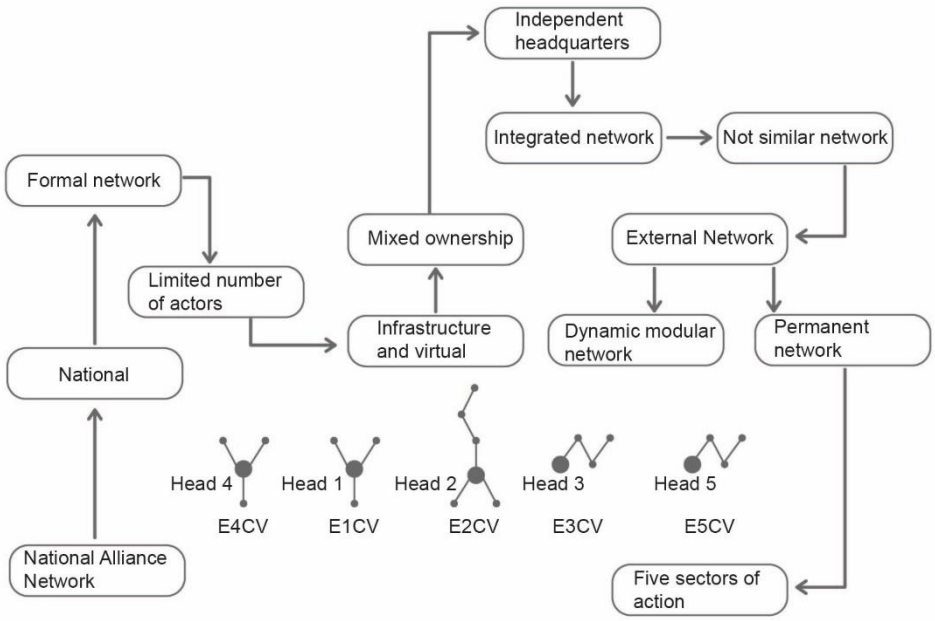
Organizational structure

The organizational structure of the malaria network is both diverse and collaborative, bringing together a variety of actors from different sectors to tackle the complex issue of malaria. As a permanent organization, the network is committed to conducting both basic and applied research to provide sound scientific evidence in support of evidence-based decision-making.

In addition to generating vital knowledge in the fight against malaria, the network is also focused on reducing the social and economic burden of the disease, with a particular emphasis on the most vulnerable populations. To achieve this goal, the network works closely with the Colombian health system, engaging in targeted public policy and planning initiatives to ensure that resources are allocated in the most effective and efficient manner possible.

As depicted in Figure 4, the malaria network is structured to encourage meaningful collaboration and cooperation among its various members. By promoting intersectoral engagement and knowledge dissemination, the network is able to leverage the unique strengths and experiences of each of its actors to achieve a unified goal: the eradication of malaria in Colombia and the reduction of its impact on public health and wellbeing.

Figure 4. Organizational structure of the malaria knowledge, research, and innovation management network



Source: Author elaboration.

Dynamic environment analysis

Dynamic environment analysis is a crucial aspect of understanding the complex systems that operate in our world. One example of this is the malaria network, which has evolved to quickly adapt to changes in the environment. By transforming threats into opportunities and weaknesses into strengths, the malaria network is able to thrive and survive, even in the most challenging conditions.

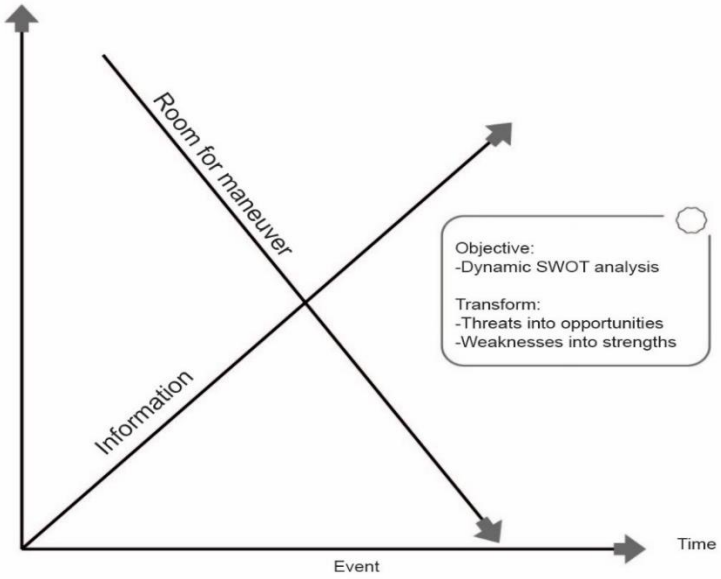
The key to the success of the malaria network is its ability to anticipate changes in the environment. The knowledge network surrounding the malaria network constantly monitors the changing conditions and is able to provide early warnings of potential changes, allowing the network to take action before the threat becomes too great.

This dynamic and adaptive approach is essential in any system where survival depends on the ability to change in response to the environment. It is this

ability to constantly assess and respond to changing conditions that allows complex systems to thrive and survive. By embracing the principles of dynamic environment analysis, we can learn from the successes of the malaria network and apply these lessons to other complex systems in the world around us.

Figure 5 provides a visual representation of how the malaria network adapts to changing conditions. By understanding this model and the principles that underlie it, we can gain valuable insights into how other systems in the natural world operate.

Figure 5. Dynamic environment analysis



Source: Author elaboration.

Mission

The malaria network is a public and private organization of a permanent nature and made up of intersectoral actors who manage knowledge, create innovation proposals, and generate scientific evidence through basic and applied research to achieve the elimination of this parasitic disease in the national territory.

Vision

By 2030, we aim to be positioned as the reference network that conducts and leads malaria knowledge management, research development, and

intersectoral innovation at the national level across the political, scientific, and social sectors of the country, contributing to the elimination of malaria in Colombia.

Objectives

Principal: Contribute to the elimination of malaria in Colombia through knowledge management, research, and innovation in accordance with the Ten-Year Public Health Plan (PDSP) 2012-2021 and the public health policy in force by 2030.

Specifics:

• Promote the results in different lines of research on the disease according to the country's priorities.

• Coordinate the efforts and actions in research, innovation, and knowledge management of the different actors in the country.

• Generate scientific evidence that facilitates decision-making in public health that leads to the elimination of disease burden in the country.

Purpose

To produce, store, and disseminate scientific-technical, multidisciplinary, and collaborative network knowledge that strengthens cooperation and the use of resources from research and innovation to contribute to the elimination of malaria.

DISCUSSION

The study highlights the importance of organizing and managing research networks in Colombia. Such organizational structures help to optimize the limited human and financial resources available for research, while also mitigating the intense competition that often exists among researchers and institutions. Furthermore, these networks can rationalize resources, reduce the risk of duplicating research, and avoid concentrating efforts in non-priority areas. Ultimately, effective research network management is essential for advancing scientific progress and achieving meaningful outcomes that benefit society as a whole.

Currently, there is a lack of knowledge and experience in relation to the organizational strategy of knowledge networks, and research is just beginning to highlight their importance not only in Colombia, but globally. In particular, there is a limited theoretical framework for management models of knowledge networks, resulting in significant gaps in academic literature (Bedford; Sanchez, 2021; Lawrence; Bishop; Curran, 2019). The malaria network acknowledges this challenge and proposes innovation as an essential strategic variable. To achieve success, the network emphasizes proper quality management to store, distribute, share, and communicate data and information effectively, transforming them into valuable knowledge that can be used by members and decision-makers alike. Researchers support this approach, as they argue that a network's success is dependent on its ability to innovate and evolve over time *(Lam et al*., 2021; Zheng, 2022).

The study emphasizes the importance of understanding the personalities of malaria researchers when building effective research networks, particularly in the context of present-day Colombia, where the research environment often strongly influences researchers' behavior and positions. To operate successfully in this environment, any research network must consider the local context when developing their value proposition (Gagliardi et al., 2014). This approach ensures that the network is designed to effectively support the unique needs of the local research community. This study provides valuable insights into the considerations that must be taken into account when building research networks in this region, and is an excellent resource for those seeking to do so (Bornstein et al., 2017; Bowen; Martens, 2005).

Research networks generate strategic synergies that can enhance the comparative advantages of their actors by promoting interdependence and cooperation towards shared objectives. By organizing their research initiatives with clear criteria, these networks can make efficient use of their human and financial resources (Korte; Chermack, 2007; Yazdizadeh *et al.*, 2014). As a result, networked research can achieve greater impact and generate more valuable

insights than individual research efforts would be able to accomplish on their own (Andermann *et al*., 2016; Bedford; Sanchez, 2021; Dobbins *et al*., 2010).

The malaria network is a collaborative effort between national and territorial actors, whose roles include the development and implementation of public policies, allocation of resources, intervention, research promotion, as well as the building of human capacity in health and related fields. This network holds great promise in achieving its goals, but it requires the steadfast support of all stakeholders to address impediments to training, financing, coordination, and sustainability (Cugmas *et al*., 2021; Natividad; Fiereck; Parker, 2012).

To realize the potential of this important initiative, each actor must play their unique role by contributing their skills and expertise. Through this strategic collaboration, the malaria network can successfully overcome hurdles and achieve its objectives (Fafard; Hoffman, 2020; Marchiori; Franco, 2010).

CONCLUSIONS

The importance of generating further evidence on organizational strategies in knowledge networks cannot be overstated, as this can lead to significant advancements in the field. Additionally, there is a critical need to identify and prioritize malaria research needs in Colombia, as well as translate these needs into effective health policies. To achieve these goals, it is crucial that various government, academic, and social entities come together and provide their support to ensure the success and sustainability of this ongoing process.

To facilitate this collaboration, it is essential to establish common agendas and create spaces for ongoing interaction and communication. These can take the form of either permanent virtual or physical spaces, allowing for regular, productive engagements and discussions. By fostering an environment of open communication and collaboration, we can work towards advancing knowledge and making positive contributions in the field of healthcare research.

COMPETING INTERESTS

None declared.

FUNDING

Instituto Nacional de Salud de Colombia.

AUTHORS' CONTRIBUTIONS

MJO: Conceptualization, literature review, research methodology, survey data collection, statistical data analysis, initial writing, final writing of the article and correction, format according to the Journal's standards, website submission and corresponding author. **JCPR, IMCC and MJVS:** Conceptualization, literature review, research methodology, survey data collection, final writing of the article and correction, format according to the Journal's standards. All authors read and approved the final version of the manuscript.

REFERENCES

ANDERMANN, Anne; PANG, Tikki; NEWTON, John N.; DAVIS, Adrian; PANISSET, Ulysses. Evidence for Health III: Making evidence-informed decisions that integrate values and context. **Health research policy and systems**, England, v. 14, p. 16, 2016. DOI: 10.1186/s12961-016-0085-4.

BEDFORD, D.; SANCHEZ, TW. **Knowledge Networks**. [s.l.] : Emerald Group Pub Ltd, 2021.

BORNSTEIN, Stephen; BAKER, Rochelle; NAVARRO, Pablo; MACKEY, Sarah; SPEED, David; SULLIVAN, Melissa. Putting research in place: an innovative approach to providing contextualized evidence synthesis for decision makers. **Systematic reviews**, England, v. 6, n. 1, p. 218, 2017. DOI: 10.1186/s13643-017-0606-4.

BOWEN, Sarah; MARTENS, Patricia. Demystifying knowledge translation: learning from the community. **Journal of health services research & policy**, England, v. 10, n. 4, p. 203–211, 2005. DOI: 10.1258/135581905774414213.

CUGMAS, Marjan; FERLIGOJ, Anuška; ŠKERLAVAJ, Miha; ŽIBERNA, Aleš. Global structures and local network mechanisms of knowledge-flow networks. **PloS one**, United States, v. 16, n. 2, p. e0246660, 2021. DOI: 10.1371/journal.pone.0246660.

DOBBINS, Maureen; DECORBY, Kara; ROBESON, Paula; HUSSON, Heather; TIRILIS, Daiva; GRECO, Lori. A knowledge management tool for public health: health-evidence.ca. **BMC Public Health**, *[S. l.]*, v. 10, n. 1, p. 496, 2010. DOI: 10.1186/1471-2458-10-496. Disponível em: https://doi.org/10.1186/1471-2458-10-496.

FAFARD, Patrick; HOFFMAN, Steven J. Rethinking knowledge translation for public health policy. **Evidence & Policy**, Bristol, UK, v. 16, n. 1, p. 165–175, 2020. DOI: 10.1332/174426418X15212871808802. Disponível em: https://bristoluniversitypressdigital.com/view/journals/evp/16/1/article-p165.xml.

GAGLIARDI, Anna R.; WEBSTER, Fiona; BROUWERS, Melissa C.; BAXTER, Nancy N.; FINELLI, Antonio; GALLINGER, Steven. How does context influence collaborative decision-making for health services planning, delivery and evaluation? **BMC health services research**, England, v. 14, p. 545, 2014. DOI: 10.1186/s12913-014-0545-x.

HOPPE, Bruce; REINELT, Claire. Social network analysis and the evaluation of leadership networks. **The Leadership Quarterly**, *[S. l.]*, v. 21, n. 4, p. 600–619, 2010. DOI: https://doi.org/10.1016/j.leaqua.2010.06.004. Disponível em: https://www.sciencedirect.com/science/article/pii/S1048984310000901.

INSTITUTO NACIONAL DE SALUD. **Informe de evento malaria, 2022.** Bogotá. Disponível em: https://www.ins.gov.co/buscador-eventos/Informesdeevento/MALARIA PE XII 2021.pdf.

KORTE, Russell F.; CHERMACK, Thomas J. Changing organizational culture with scenario planning. **Futures**, *[S. l.]*, v. 39, n. 6, p. 645–656, 2007. DOI: https://doi.org/10.1016/j.futures.2006.11.001. Disponível em: https://www.sciencedirect.com/science/article/pii/S0016328706001777.

LAM, Long; NGUYEN, Phuong; LE, Nga; TRAN, Khoa. The Relation among Organizational Culture, Knowledge Management, and Innovation Capability: Its Implication for Open Innovation. **Journal of Open Innovation: Technology, Market, and Complexity**, *[S. l.]*, v. 7, n. 1, p. 66, 2021. DOI: https://doi.org/10.3390/joitmc7010066. Disponível em: https://www.sciencedirect.com/science/article/pii/S2199853122008356.

LAWRENCE, Logan M.; BISHOP, Andrea; CURRAN, Janet. Integrated Knowledge Translation with Public Health Policy Makers: A Scoping Review. **Healthcare policy = Politiques de sante**, Canada, v. 14, n. 3, p. 55–77, 2019. DOI: 10.12927/hcpol.2019.25792.

MARCHIORI, Danilo; FRANCO, Mário. Knowledge transfer in the context of inter-organizational networks: Foundations and intellectual structures. **Journal of Innovation & Knowledge**, *[S. l.]*, v. 21, n. 4, p. 600–619, 2010. DOI: 10.1016/j.jik.2019.02.001. Disponível em: https://www.elsevier.es/en-revista-journal-innovation-knowledge-376-articulo-knowledge-transfer-in-context-inter-organizational-S2444569X19300216.

MINISTERIO DE SALUD Y PROTECCIÓN SOCIAL. Resolución 1035 de 2022 "Por el cual se adopta el Plan Decenal de Salud Pública 2022-2031 con sus capítulos diferenciales: indígena para los pueblos y comunidades indígenas de Colombia, población víctima de conflicto armado, el Pueblo Rrom y la población Colombia, 2022. p. 1–273. Disponível em: https://www.minsalud.gov.co/Normatividad_Nuevo/Resolución No. 1035 de 2022.pdf.

MINISTERIO DE SALUD Y PROTECCIÓN SOCIAL. **Plan estrategico nacional de malaria en Colombia, 2019–2022.** Bogotá, Colombia. Disponível

em: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VS/PP/PAI/plan-estrategico-malaria.pdf.

NATIVIDAD, Maria Dulce F.; FIERECK, Kirk J.; PARKER, Richard. Knowledge networks for global public health. **Global public health**, England, v. 7 Suppl 1, p. S73-81, 2012. DOI: 10.1080/17441692.2012.693517.

OLIVERA, Mario J.; PADILLA RODRÍGUEZ, Julio Cesar; CÁRDENAS CAÑÓN, Iván Mauricio. A propensity score matching analysis using statistical methods for estimating the impact of intervention: The cost of malaria and its impact on the health system. **Healthcare Analytics**, *[S. l.]*, v. 4, p. 100246, 2023. DOI: https://doi.org/10.1016/j.health.2023.100246. Disponível em: https://www.sciencedirect.com/science/article/pii/S2772442523001132.

OLIVERA, MJ; PEÑA, C.; YASNOT, María F.; PADILLA, J. Socioeconomic determinants for malaria transmission risk in Colombia: An ecological study. **Microbes Infect Chemother**, *[S. l.]*, v. 2, n. e1339, p. 1–7, 2022. DOI: https://doi.org/10.54034/mic.e1339.

ORGANIZACIÓN DE LAS NACIONES UNIDAS PARA LA EDUCACIÓN LA CIENCIA Y LA CULTURA [UNESCO]. Informe de la Unesco sobre la ciencia. *[S. l.]*, p. 42, 2015.

PADILLA-RODRÍGUEZ, Julio Cesar; OLIVERA, Mario J.; AHUMADA-FRANCO, Martha Liliana; PAREDES-MEDINA, Andrea Elizabeth. Malaria risk stratification in Colombia 2010 to 2019. **PloS one**, *[S. l.]*, v. 16, n. 3, p. e0247811, 2021. DOI: 10.1371/journal.pone.0247811.

RINCON, C.; OLIVERA, Mario Javier; PARRA-HENAO, Gabriel; PADILLA, J.; GUEVARA, B. **Lineamiento Político de investigación , innovación científica y tecnológica y gestión del conocimiento que contribuye a la eliminación de la Malaria 2018 .** Bogotá. Disponível em: https://www.ins.gov.co/Direcciones/Investigacion/recoplascol.

RINCON, C.; OLIVERA, Mario Javier; SIACHOQUE, H.; MELO, E.; RODRÍGUEZ, J. **Medidas de intervención para la constitución de la Red de Gestión del Conocimiento, Investigación e Innovación en Malaria.Instituto Nacional de Salud**. Bogotá. Disponível em: https://www.ins.gov.co/Direcciones/Investigacion/recoplascol.

RODRÍGUEZ, Shirley Natali Iza; RODRÍGUEZ, José Alejandro Iza; RODRÍGUEZ, Julio Cesar Padilla; OLIVERA, Mario Javier. Malaria mortality in Colombia from 2009 to 2018: a descriptive study. **Revista da Sociedade Brasileira de Medicina Tropical**, *[S. l.]*, v. 54, p. e04412020, 2021. DOI: 10.1590/0037-8682-0441-2020.

WORLD HEALTH ORGANIZATION. **Global Technical Strategy for Malaria 2016–2030**. Geneva, Switzerland. Disponível em: https://www.who.int/malaria/publications/atoz/9789241564991/en/.

WORLD HEALTH ORGANIZATION. **World malaria report 2022**. [s.l: s.n.]. Disponível em: https://www.who.int/publications/i/item/9789240064898.

YAZDIZADEH, Bahareh; MAJDZADEH, Reza; ALAMI, Ali; AMROLALAEI, Sima. How can we establish more successful knowledge networks in developing countries? Lessons learnt from knowledge networks in Iran. **Health research policy and systems**, England, v. 12, p. 63, 2014. DOI: 10.1186/1478-4505-12-63.

ZHENG, Jifeng. Innovation concentration in knowledge network. **PloS one**, United States, v. 17, n. 4, p. e0266530, 2022. DOI: 10.1371/journal.pone.0266530.