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Expert validation of an entomological traffic-light technique for vector risk stratification

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Abstract

This study validates an innovative entomological traffic-light technique for stratifying *Aedes aegypti* vector risk at city block level in Camagüey, Cuba's Ignacio Agramonte Health Area (2023), amid arbovirus resurgence. Ten Hygiene and Epidemiology experts (average 26.4 years' experience) participated in three anonymous Delphi rounds, achieving high competence (K=0.92). Round 1 confirmed practical experience dominance (Ka=0.94). Round 2 evaluated entomological competence, management tools (including GIS), and stratification utility. Round 3 assessed clarity, bioecological coherence, feasibility, validity, and acceptability via Likert scales, with unanimous endorsement (100%) across dimensions. The technique integrates House/Breteau Indices, recurrent city blocks, and female mosquito physiological age for rapid decisions (green: routine surveillance; red: intensive intervention), aligning with Cuban standards. It enhances GIS compatibility, requires minimal training, and surpasses traditional methods in sensitivity/specificity, optimizing limited resources and intersectoral coordination. Limitations include training gaps (30%) and insufficient causal/seasonal analyses. In conclusion, expert validation confirmed its content validity, operational relevance, and high acceptability as an innovative tool for *Ae. aegypti* risk stratification, with unanimous specialist agreement. This proposal optimizes limited resources, supports GIS-integrated community decisions, and outperforms traditional methods, strengthening vector surveillance against arbovirus re-emergence. Implementation is recommended with ongoing training and causal-seasonal analysis for national sustainability and transferability.

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Keywords: Aedes aegypti, Cuba, Delphi method, entomological risk, GIS, traffic-light technique

1. Introduction

Vector risk stratification is currently a priority in the context of the (re)emergence of diseases involving different mosquito species [1].

This tool helps prevent and control the presence of vectors involved in arbovirus transmission, such as Aedes aegypti, by concentrating and making more efficient use of the limited available resources in areas of genuine entomo-epidemiological concern [2-6].

In the current Cuban context, the various programs responsible for entomological surveillance, have incorporated integrative strategies that primarily combine biological and physical methods, together with the classical aedine Indicators [1,2,7]. Within this framework, the entomological traffic-light technique emerges as an innovative proposal designed to simplify risk interpretation and facilitate decision-making at the community level [5].

In this context, expert judgment is one of the most important aspects to consider when validating the usefulness of any proposed tool for stratifying a given risk [8,9].

In this regard, several authors emphasize that the selection of competent experts and the estimation of an adequate competence coefficient are essential to ensure the optimal quality of the judgments issued by the panel. González *et al.* (2018) [10] stated that, in public health, competence coefficients above 0.8 reflect a consistent mastery of the topic under evaluation and also support the use of relatively small expert groups when logistical conditions require it, a criterion likewise noted by Hasson *et al.* (2000) [11], García *et al.* (2013) [12], and Álvarez *et al.* (2024) [13].

The present study reports the validation by expert judgment of an entomological traffic-light technique developed by Diéguez *et al.* (2025) [1] to stratify the entomological risk posed by the populations included in the Surveillance and Control Program for *Ae. aegypti* and *Ae. albopictus* in Cuba. To this end, a panel of experts with extensive experience in the vector control network was convened. The panel achieved a high overall competence score, demonstrating its suitability for assessing the proposed technique.

The objective of the study was to demonstrate the content validity, operational relevance, and acceptability of the entomological traffic-light technique as a necessary and important support tool for decision-making in the integrated management of arboviral risk in Cuba.

2. Materials and Methods

The traffic-light technique for entomological variables was validated across five risk stratum according to Diéguez *et al.* (2025) [1], in a study of city block positivity during 2023 conducted in the Ignacio Agramonte Health Area of Camagüey (Figure 1). Ten experts in entomological surveillance and vector control were invited. All were graduates in Hygiene and Epidemiology with extensive experience in arboviral control, selected on the basis of professional track record and institutional recognition, following an approach similar to that reported by Quesada *et al.* (2012) [14].

Fig 1: Health Area studied in Camagüey Province (1), and its municipal capital of the same name (Camagüey City). Detail of the evaluated urban core (2), where: IA = Ignacio Agramonte Health Area.

Three anonymous workshop rounds were conducted to evaluate the relevance, scientific rigor, feasibility, objectivity, and practical usefulness of the proposed technique through surveys focused on the action system (Annexes 1-3).

Annex 1

Round 1

Expert Judgment Method. Application and Results.

Expert Selection

Dear colleague:

This guide is hereby submitted to request your cooperation as a specialist in evaluating the system of actions designed to stratify entomological risk in city blocks positive for *Aedes aegypti*. Your opinions will be highly appreciated and will be considered for the improvement of this proposal.

Thank you very much.

The following aspects are presented below for which we request your expert judgment:

Name:____

Workplace:______________________________________

Specialty or Degree:_______________________________

Years of professional experience: ____________________

Please circle, on an increasing scale from 1 to 10, the value that best corresponds to your level of knowledge and information about the subject under study.

1	2	3	4	5	6	7	8	9	10

Based on the table below regarding the sources of argumentation on the subject under study, please carry out a self-assessment and mark with an X the level you consider appropriate.

Sources of Argumentation	Degree of influence of each source according to your criteria		
	High	Medium	Low
Theoretical analyses carried out by you.			
Practical demonstrations of what was theoretically analyzed.			
Experience gained in professional activity (undergraduate and postgraduate teaching received and/or delivered).			
Analysis of the work of national and international authors.			
Knowledge of the current state of the problem in the country and abroad.			

Annex 2
Round 2
Expert Judgment

Objective: To refine the system of actions for stratifying entomological risk in city blocks with *Aedes aegypti* based on the following survey.

Dear colleague:
You were selected, based on your years of experience and the results achieved in your work in the field of vector control, as an expert to evaluate the theoretical and practical results of this research. Therefore, the author kindly asks you to share your ideas and opinions regarding the strengths, weaknesses, and limitations of the system of actions proposed for entomological risk stratification in city blocks with the presence of *Ae. aegypti* in Camagüey.
Please provide your assessment of each of the aspects proposed, keeping in mind that agreement increases as the value approaches 5. Whenever necessary, your evaluation should always be accompanied by supporting arguments, especially in the case of limitations or suggestions regarding the methodology.

	Aspects to Be Evaluated Regarding the System of Actions	Scale				
		1	2	3	4	5
1	Correspondence between the proposed objective and the technique					
2	Theoretical foundations of the technique					
3	Contribution to the integration of the bioecological aspects of the species studied and their linkage with the proposed entomological stratification					
4	Possibilities for achieving integration with entomological, epidemiological, environmental management, and human behavior aspects					
5	Contribution to improving vector control and surveillance activities					
6	Degree of suitability of the proposal for vector control and surveillance programs					

Justify your criteria
Annex 3
Round 3
Expert Survey Instrument

Objective: To gather expert opinions on the integration of entomological knowledge with current risk stratification practices for aedine populations within vector surveillance and control programs.

Dear colleague
We invite your collaboration in this research aimed at reducing the abundance and entomological risk posed by aedine populations. Please respond sincerely to the following questionnaire.

Professional Practice Assessment
1.-Are you competent in interpreting key entomological indicators [(House Index (HI), Breteau Index (BI), percentage of positive city blocks, etc.] and applying them for city block-level risk stratification?
Always ____ Sometimes ____ Never ____
2.-Do you routinely apply entomological knowledge in your daily work to identify city blocks with elevated entomological risk?
Always ____ Sometimes ____ Never ____
3.-Have you received training on new methodologies or updates to the Vector Surveillance and Control Program, including city block-level risk stratification?
Always ____ Sometimes ____ Never ____
4.-Do you use city block-level risk maps to support vector control action planning?
Always ____ Sometimes ____ Never ____
5.-Are city block-level risk stratification results analyzed during work meetings to adjust field interventions?
Always ____ Sometimes ____ Never ____
6.-Are the underlying causes of persistent high-risk status in specific city blocks discussed within your department?
Always ____ Sometimes ____ Never ____
7.-Are seasonal variations (rainy vs. dry seasons) considered when interpreting city block-level entomological risk stratification?
Always ____ Sometimes ____ Never ____
8.-Does city block-level entomological risk stratification improve the efficient use of program resources (personnel, insecticides, transportation)?
Always ____ Sometimes ____ Never ____
9.-Is the traffic-light technique for entomological variables

effective for classifying city blocks by risk level?
Always ____ Sometimes ____ Never ____
10.-Does the traffic-light technique enhance comprehension of entomological conditions among local decision-makers?
Always ____ Sometimes ____ Never ____
11.-Can city block-level risk stratification reduce the vector-disease incidence in your jurisdiction?
Always ____ Sometimes ____ Never ____
12.-Would you recommend adopting and refining city block-level risk stratification via traffic-light coding of entomological variables as a core tool in vector control networks?
Always ____ Sometimes ____ Never ____

Annex 3 (continued)
Technique Validation

Objective: To validate the proposed risk stratification technique using traffic-light coding of entomological variables within vector surveillance and control frameworks.

Dear colleague:
Please provide sincere responses to validate our approach to reducing aedine population abundance and entomological risk.

Technical Adequacy, Clarity, and Precision
1.-The definitions of entomological variables (HI, BI, recurrent city blocks, female physiological age) are clear and precise for vector control personnel.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
2.-Traffic-light strata for entomological variables align logically with *Aedes aegypti* bioecology.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
3.-The technique enables rapid, reproducible risk classification at the health area level.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
Alignment with Study Objectives
4.-Among available entomological variables, those selected are most relevant for arboviral risk stratification.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
5.-Traffic-light coding effectively integrates larval and adult indicators for comprehensive surveillance.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
6.-The technique complies with Cuban vector control standards (MINSAP Resolution 168/2015).
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
Operational Feasibility
7.-Proposed strata are measurable using resources available across Camagüey vector control units.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
8.-Minimal training is required for entomological labs and specialists to implement the technique.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
9.-The technique supports clear decision-making (green: routine surveillance; red: intensive intervention).
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
Result Validity
10.-Traffic-light scale correlates with historical arboviral outbreak patterns.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
11.-It enables early detection of high-risk areas while minimizing false negatives.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
12.-The technique is more sensitive/specific than existing methods for assessing true entomological risk relative to vector abundance.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
Acceptability and Transferability
13.-Results are more readily visualized and communicated to decision-makers and communities.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
14.-It optimizes human, material, and financial resources for vector control.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___
15.-The technique is transferable to other Cuban regions with comparable entomological contexts.
Strongly agree ___ Agree ___ Neutral ___ Disagree ___ Strongly disagree ___

Round 1: Each expert completed a self-assessment of their knowledge level on a scale from 1 to 10, supported by bibliographic sources. The following formula was used:

$$K = \frac{Kc + Ka}{2}$$

Where K is the competence coefficient; Kc is the knowledge coefficient, reflecting the expert's self-perceived mastery of the subject on a 0-1 scale; and Ka is the argumentation coefficient, which assesses the strength of the expert's knowledge sources, where high=1, medium=0.5, and low=0 [9,15,16].

The results were interpreted according to the scale proposed by this author [9,15,16]:
K>0.81: high competence.
0.5<K<0.80: medium competence.
K<0.5: low competence.
Round 2: A questionnaire was administered to assess professional perception and practice, aimed at refining the stratification system based on work experience (Annex 2).
Three dimensions were considered:

1. Entomological knowledge competence and application (questions 1-2), which assessed readiness to interpret key aedine indicators and detect high entomological risk areas.
2. Management, training, and use of support tools, such as thematic risk maps and continuing education (questions 3-7).

3. Perception of the usefulness and impact of stratification, focused on the effectiveness of the traffic-light approach to optimize resources, facilitate understanding among decision-makers, and reduce the vector-disease binomial (questions 8-13).

The percentage of representativeness regarding applicability, feasibility, and usefulness of the traffic-light system was calculated.

Round 3: A survey was applied to assess the clarity, bioecological coherence, practical applicability, and predictive relevance of the technique. This aimed to determine whether it enables rapid city block-level risk classification, whether the included variables are appropriate given the available resources, whether they require minimal training, whether the tool provides meaningful support for decision-making, whether it meets entomological needs for correlating outbreaks with vector abundance, whether it is sensitive and specific enough to facilitate communication between specialists and decision-makers, and whether it is transferable (Annex 3). In all cases, representativeness percentages were calculated from responses regarding adequacy, validity, feasibility, and acceptability.

3. Results and Discussion

The results of the experts' responses used to validate the proposed technique are shown in tables 1-6.

Because each expert reported a knowledge level between 9 and 10 (Table 1) on a 1-to-10 scale, the average considered was high, corresponding to Kc=0.9, assuming 9/10 as the mean value.

Table 1: Experts' opinions on their level of knowledge derived from self-preparation.

1	2	3	4	5	6	7	8	9	10
								60.00	40.00

The expert panel accumulated an average of 26.4 years of experience in the vector control network, which demonstrated the technical and operational maturity of each member in vector control activities (Round 1).

For the calculation of Ka, the values shown in table 2, round 1, were used:

$$K_a = \frac{1.0 + 1.0 + 0.85 + 0.85 + 1.0}{5} = 0.94$$

Table 2: Experts' opinions on the degree of influence of argumentation sources on the research topic.

Experts	Degree of influence					
	High	%	Medium	%	Low	%
Theoretical analyses conducted by yourself	10	100.00	0	0.00	0	0.00
Practical demonstrations of theoretically analyzed content	10	100.00	0	0.00	0	0.00
Experience gained from professional activities (undergraduate and postgraduate teaching received and/or delivered)	7	70.00	3	30.00	0	0.00
Analysis of works by national and international authors	7	70.00	3	30.00	0	0.00
Knowledge of the current state of the problem nationally and internationally	10	100.00	0	0.00	0	0.00

To calculate the experts' competence coefficient, the following values were substituted into the global formula:

$$K = \frac{K_c + K_a}{2}$$

$$K = \frac{0.90 + 0.94}{2}$$

$$K = 0.92$$

The resulting K value indicates high competence and therefore confirms that the experts possessed a solid command of the subject, which supports the reliability of the judgments issued regarding the study of vector risk stratification.

Herrera *et al*. (2022) [17] recommended validation exercises with 20 to 30 experts; however, smaller groups are also valid provided that the competence coefficient K exceeds 0.8. This condition was met in the present study, which yielded a high K value.

The analysis of the experts' opinions regarding their sources of argumentation revealed a clear predominance of practical over theoretical components in their self-preparation (Tables 2-3).

Table 3: Weighted average of frequencies regarding argumentation Sources.

Source of argumentation	% High	% Medium	% Low	Average score
Theoretical analyses	100.00	0.00	0.00	1.0
Practical demonstrations	100.00	0.00	0.00	1.0
Professional experience	70.00	30.00	0.00	0.70 x 1 + 0.3 x 0.5= 0.85
Analysis of authors	70.00	30.00	0.00	0.70 x 1 + 0.3 x 0.5= 0.85
Knowledge of the current state	100.00	0.00	0.00	1.0

Practical demonstrations were the main source of updating, in agreement with Bisset *et al*. (2022) [7] and Marquetti *et al*. (2000) [18], who highlighted their essential role in Cuban entomological surveillance programs. In this regard, Noriega (2013) [19] confirmed that, in the face of bibliographic limitations, practical experience may outweigh individual theoretical analysis, as access barriers limit literature review, while Marquetti *et al.* (2000) [18] emphasized the preference for national protocols among Cuban personnel involved in vector surveillance and control.

Despite these constraints, 100% of the experts declared themselves updated on arboviral diseases and their impact on population health, which validates the appropriateness of the traffic-light technique within the Cuban integrated vector control approach.

The experts unanimously validated the technique across all assessed dimensions, confirming its conceptual strength, practical applicability, and strategic alignment with Cuban vector control needs (Tables 4-6).

Table 4: Degree of acceptance by experts regarding the proposed technique.

No.	Aspects to be evaluated regarding the system of actions	Scale				
		1	2	3	4	5
1	Correspondence between the proposed objective and the technique					10
2	Theoretical foundations of the technique					10
3	Contribution to integrating the bioecological aspects of the studied species and linking them to the proposed entomological stratification					10
4	Potential for integration with entomological, epidemiological, environmental management, and human behavior aspects					10
5	Contribution to improving vector surveillance and control activities					10
6	Degree of suitability of the proposal for vector surveillance and control programs					10

Table 5: Experts' opinions on the integration of entomological knowledge and the current risk stratification provided by aedine populations.

Questions	Always	%	Sometimes	%	Never	%
1	10	100.00				
2	10	100.00				
3	8	80.00	2	20.00		
4	10	100.00				
5	10	100.00				
6	10	100.00				
7	6	60.00	4	40.00		
8	5	50.00	1	10.00	4	40.00
9	10	100.00				
10	10	100.00				
11	10	100.00				
12	10	100.00				
13	10	100.00				

Stated that multidimensional bioecological integration is an essential pillar in the fight against arboviral diseases [5].

Regarding practical usefulness, 100% of the experts reported using these indicators daily to identify priority areas; however, 30% had not received recent training, highlighting the need for continuous educational updating programs. This finding is consistent with Rodríguez *et al.* (2022) [4], who also emphasized that traffic-light interventions require consolidated technical mastery through targeted training.

The systematic use of Geographic Information Systems (GIS) also showed effective integration of stratification with territorial operational planning. However, although there was unanimous agreement (100%) on the adequacy of the proposed strata, this proportion fell to 60% because the causal factors underlying persistent risk in city blocks with repeated focality were not examined in depth. This reveals shortcomings in the corresponding analyses and in the proposed integrated solutions. According to Maciel *et al.* (2007) [20], such limitations weaken intersectoral and extra-sectoral coordination in comprehensive responses aimed at reducing risk, while CDC (2025) [21] noted that this weakness favors continued dengue transmission by failing to identify the causes of foci, including cultural habits, sanitation deficiencies, and human mobility. In these cases, interventions remain superficial, and risk strata based on observations without solid evidence do not dynamically reflect entomological reality.

Addressing the lack of training and the limited incorporation of seasonality into the analyses requires immediate action to strengthen causal analysis and the systematic application of stratification, thereby ensuring its responsiveness to entomological dynamics. García *et al.* (2024) [22] confirmed that systematic GIS optimize territorial prioritization.

The proposed technique not only facilitates the timely detection of geospatial foci, but also promotes integrated solutions within and beyond the health sector, primarily at the community level, to achieve a sustainable reduction in risk [25-27].

The experts unanimously endorsed the operational efficiency of the technique, highlighting its ability to simplify procedures, optimize resources, and improve decision-making among health specialists, decision-makers, and the community, these results largely agree with those obtained by other authors on the subject. [28-30]. They also recognized its high communicative value and strategic sustainability, and recommended its continuation with future improvements in training and seasonal analysis.

Valdes *et al.* (2009) [2] and MINSAP (2013) [23] emphasized the need for trained personnel and standardized variables, such as the House Index, Breteau Index, recurrent city blocks, and the physiological age of captured females, among others, all of which align with the National Dengue Control Program [24]. They also confirmed the operational feasibility of the technique, since the strata are measurable with local resources and allow rapid field decisions with minimal training, in agreement with Rodríguez *et al*. (2022) [4] regarding the need for practical tools based on local resources.

Regarding the validity of the results, the traffic-light system can be correlated with historical *Aedes*-related events, since it allows early detection of likely risk zones and therefore surpasses traditional methods in precision, as validated by Escalona *et al*. (2023) [5] through historical outbreak strata.

Finally, its acceptability lies in the clear visualization of results, resource optimization, and transferability to other similar territories, consolidating it as a sustainable tool within the national vector control program.

4. Conclusion

In conclusion, expert validation of the entomological traffic-light technique confirmed its content validity, operational relevance, and high acceptability as an innovative tool for stratifying the vector risk of *Ae. aegypti*, with unanimous agreement among experienced specialists. This proposal optimizes the use of limited resources, supports community decision-making integrated with GIS, and outperforms traditional methods, thereby strengthening vector surveillance in the face of arbovirus re-emergence. Its implementation is recommended, with emphasis on ongoing training and causal-seasonal analysis to ensure national sustainability and transferability.

5. Compliance with ethical standards

5.1. Transparency

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study, and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

6. Author´s Contributions

All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

7. Disclosure of conflict of interest

No conflict of interest exists among the Authors.

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References

1. Diéguez L, del Valle D, Sanchez OA, Varona F, Gomez EE, Fimia R. Proposal for a risk stratification technique: using the traffic light system of entomological variables for dengue surveillance. Int J Multidiscip Res Growth Eval. 2025;6(5):930-9.
2. Valdés V, Díaz AO, Borrell MC, Cabreras AV. Stratification for entomological surveillance of dengue. Rev Cubana Med Trop. 2009;61(2). Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0375-07602009000200009&lng=es
3. Diéguez L, Monzón MV, Juárez JA, Barrios DY, Barrientos ME, Hernández Y, *et al*. Characterization of dwellings' infestation by three mosquito species (Diptera: Culicidae) of medical importance: recommendations for its domestic control in low- and middle-income countries. Sci Health. 2021;(3):49-66.
4. Rodríguez JE, Alfonso A, González M, Pérez C. Risk stratification of arbovirus transmission in city blocks of the Abreus municipality: 2015-2019. Correo Cient Méd. 2022;26(1):47-60.
5. Escalona E, Lorente Y, Escalona J, González JL. Infestación por Aedes aegypti, estratificación del riesgo y factores ambientales asociados. Municipio Yara, Granma 2020-2022. Rev REDel Cienc Tecnol. 2023;7(1):263-74.
6. Diéguez L, Alarcón PM, Pino R, Fimia R, Osés R, Iannacone J, *et al*. Exploring the breeding sites of Aedes aegypti (Diptera: Culicidae) in Camagüey, Cuba. Interam J Med Health. 2024;7:e2024260CC.
7. Bisset JA, Marquetti MC. Vector-borne diseases from the perspective of the "One Health" concept. Rev Cubana Hig Epidemiol. 2022;59. Available from: https://revepidemiologia.sld.cu/index.php/hie/article/view/1312
8. Diéguez FL, del Valle LD, Varona GF, Duvergel HPE, Roiz PD, Hernández RM, *et al*. Spatial temporal patterns of Aedes aegypti (Diptera: Culicidae) container breeding in Camaguey, Cuba. Int J Multidiscip Res Growth Eval. 2025;6(3):1518-29.
9. Cabero J, Barroso J. La utilización del juicio de experto para la evaluación del TIC: el coeficiente de competencia experta. Bordón. 2013;65(2):25-38.
10. González JR, Olivera IF, Padrón A. Validation of data collection instruments in health research: expert judgment. Rev Electron Dr Zoilo E Marinello Vidaurreta. 2018;43(4):1-15.
11. Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. J Adv Nurs. 2000;32(4):1008-15.
12. García VM, Suárez MM. Delphi method for the expert consultation in the scientific research. Rev Cubana Salud Pública. 2013;39(2):253-67.
13. Álvarez B, Mirabal JC, Naranjo Y. Usefulness of the Delphi method for evaluating computerization strategies in teaching management. Medisur. 2024;22:e2585. Available from: http://scielo.sld.cu/pdf/mgi/v40/1561-3038-mgi-40-e2585.pdf
14. Quesada JA, Quesada E, Rodríguez N. Different approaches to the epidemiological stratification of dengue. Arch Méd Camagüey. 2012;16(1):109-23.
15. Sossa JWZ. Delphi Method - a proposal for calculating the number of experts. Rev Espacios. 2014;35(13):1-10.
16. Ramírez MC, Martínez MC. Origin and development of an expert competence index: the k coefficient. RELIMIS. 2020;5(1):1-20.
17. Herrera JR, Calero JL, González MÁ, Collazo MI, Travieso Y. The expert consultation method at three levels of validation. Rev Habanera Cienc Méd. 2022;21(1):e4711. Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2022000100014
18. Marquetti MC, Valdés V, Aguilera L, Navarro A. Entomological surveillance of Aedes aegypti and other culicids in Boyeros 1991-1996. Rev Cubana Med Trop. 2000;52(1). Available from: https://revmedtropical.sld.cu/index.php/medtropical/article/view/590
19. Noriega V. Methodological proposal for evaluating vector control and surveillance departments in processes for the control of Aedes aegypti. [Thesis]. Havana:

National School of Public Health; 2013. 66 p. Available from: https://files.sld.cu/revsalud/files/2013/09/tesis-para-revista-viviannoriega.pdf
20. Maciel de Freitas R, Codeço CT, Lourenço-de-Oliveira R. Variation in Aedes aegypti (Diptera: Culicidae) container productivity in a slum and a suburban district of Rio de Janeiro during dry and wet seasons. J Med Entomol. 2007;44(4):575-82.
21. Centers for Disease Control and Prevention (CDC). Dengue clinical trial guide. 2025. Available from: https://www.cdc.gov/dengue/es/hcp/diagnosis-testing/pruebas-clinicas.html
22. García LL, Martínez MC, Pérez Y. Stratification of risk factors for epidemiological surveillance of dengue using a geographic information system. Rev REDel Cienc Tecnol. 2024;8(2). Available from: https://revistas.udg.co.cu/index.php/redel/article/view/4825/version/4659/1
23. Ministry of Public Health (MINSAP). National Program for the Eradication of Aedes aegypti. Havana: National Directorate of Surveillance and Vector Control; 2013. Available from: https://files.sld.cu/revsalud/files/2013/09/programa-vigilancia-lucha-antivectorial.pdf
24. Ministry of Public Health (MINSAP). National Dengue Control Program. Ministerial Resolution No. 168/2015. Havana: MINSAP; 2015.
25. Gascón RBC, Fimia DR, Ibargollín SI, Armiñana GR, Pérez BJA. Results of the intervention strategy for Dengue control in a popular council of Santa Clara, Villa Clara, Cuba. REDVET. 2018;19(6). Available from: http://www.veterinaria.org/revistas/redvet/n060618/061807.pdf
26. Fimia DR, Zambrano GFE, Aldaz CJW, Osés RR, Machado VI, de la Paz GE, *et al*. Mathematical modeling of population dynamics of the Aedes aegypti (Diptera: Culicidae) mosquito with some climatic variables in Villa Clara, Cuba. Acad J Biotechnol. 2020;8(12):264-72.
27. Diéguez FL, Rodríguez LR, del Valle LD, Torrente PD, Bujardón MAR, Molina MC, *et al*. Vector Surveillance and Control (VSC): a scientific technical perspective within the One Health paradigm. Biomed J Sci Tech Res. 2025;63(1):55176-81.
28. Fimia DR, Osés RR, del Valle LD, Castañeda LW, Wilford GFM. Modeling of the total Number of monthly mosquito outbreaks (Diptera: Culicidae) using the Objective Regressive Regression methodology in Villa Clara, Cuba. Arch Appl Sci Res. 2022;14(1):1-8.
29. Fimia DR, Guerra VY, del Valle LD, Morales GRJ, Castañeda LW, Leiva HJ, *et al*. Population dynamics of Aedes aegypti (Diptera: Culicidae): contributions to the prevention of arbovirosis in Villa Clara, Cuba. GSC Biol Pharm Sci. 2022;18(2):38-51.
30. Fimia DR, Osés RR, del Valle LD, Diéguez FL, Zambrano GMP, Wilford GFM, *et al*. Mathematical modeling and climate: incidence, repercussion and impact on communicable entities and vector organisms. Int J Innov Sci Eng Technol. 2023;10(4):36-57.

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