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ORIGINAL ARTICLE

Educational clinical characterization of patients with communicable diseases from the "One Health" approach in vulnerable neighborhoods

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ABSTRACT

Introduction: communicable diseases and their approach constitute a health problem in neighborhoods whose inhabitants live in vulnerable situations.
Objective: to carry out the clinical and educational characterization of patients with communicable diseases from the "One Health" approach in the vulnerable neighborhoods of the Pinar del Río municipality, during the period 2023-2025.
Methods: observational, descriptive and transversal research; Surveys and the Self-Care Scale in Vulnerable Neighborhoods in Transformation were used as data collection techniques. The population was 1,626 confirmed or probable cases of communicable diseases; The correction for finite population reduced the necessary sample size. The formula for proportions with ±10 % precision was used, justified by the diagnostic nature of the objective. The final sample size was 91 subjects.
Results: an insufficient level of knowledge was evident about the clinical aspects of communicable diseases and about the "One Health" approach, few self-care practices, few health promotion activities, and the absence of clinical and educational care models for addressing these diseases.
Conclusions: the application of the designed instruments, together with the documentary review and scientific observation, allowed us to identify the main problems related to the clinical educational approach to communicable diseases and the need to modify the current reality ofthis research object.

Keywords: Primary Health Care; Self-Care; Communicable Diseases; Health Promotion; One Health.

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INTRODUCTION

Globally, the burden of morbidity and mortality associated with communicable diseases is almost three times greater than that of cancer and 70 % greater than that of cardiovascular diseases. Much of that burden is caused by long-standing diseases, such as measles, influenza and whooping cough. In recent years, an additional burden has been added due to outbreaks of HIV, chikungunya, Zika and coronavirus, among others, which underlines the continued vulnerability of human populations to new and re-emerging threats.[1]

According to the World Health Organization, transmissible diseases are those caused by a pathogen that is transmitted, directly or indirectly, from an infected person, animal or reservoir to a susceptible host. The possibility of infection depends in part on the characteristics of the microorganisms, intrinsic virulence, infectivity, and the amount of infectious material.[2]

Thanks to the knowledge acquired, public health measures have been established to control it, such as water purification, wastewater disposal, housing improvement, the discovery of antibiotics and vaccines. Such advances involve the identification of animal reservoirs and intermediaries, since more than 60 % of the transmissible diseases suffered by humans are transmitted by a variety of animals, a situation that worsens in neighborhoods in vulnerable conditions.[3]

In cities, social and economic vulnerability has maintained an increasing rate, as recognized by the Economic Commission for Latin America, which places the overcrowding of urban homes in precarious conditions in Latin America and the Caribbean at 55 %, as a consequence of the increase inpoverty and extreme poverty in the region between 2019 and 2024. This source estimates that by 2029 eight out of ten Latin Americans will live in vulnerable conditions.[4]

Since the 1990s, neighborhoods called vulnerable have spontaneously emerged in Cuba, according to the government classification, which mainly house people from migratory movements that approach the provincial capitals because they are better equipped. economically and with better services. In them, precarious housing is built, often without urban planning.[5] They are characterized by inadequate technical-construction conditions in the housing in general, totally or partially lacking infrastructural services and basic equipment. They are located in areas that do not meet the environmental conditions required to guarantee an adequate quality of life, they may have anarchic road layouts, they do not have an official energy supply or water supply system, they lack adequate waste treatment solutions. residual and solid waste collection. All of the above shows that they do not have the necessary hygienic-sanitary conditions either in their homes or in their physical-environmental environment to live with quality and safety.[6]

In 2025, 1,236 communities in vulnerable situations were identified in Cuba, 95 % of them in a process of comprehensive transformation. In the province of Pinar del Río there are 73 of these communities, 36 of them in transformation, in which projects are carried out aimed at solving the main problems and promoting changes in the lifestyles of those who live there.[7] In these neighborhoods, the clinical approach communicable diseases education is carried out in a traditional and individualized manner for each patient, without specific health promotion actions for communicable diseases or consideration of the problems present in the human-animal-ecosystem interface, which is why a unified and integrated approach is required thatseek to sustainably balance and optimize the interconnection between these three components.

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Given this situation, the need to adopt an interdisciplinary and multisectoral approach in addressing the health of humans, animals and ecosystems has been consolidated. At an international level, it has been agreed to call "One Health" this way of facing the current challenges of health promotion from a systemic perspective, which makes it possible to make visible, communicate and educate about the importance of using integrative approaches in the search forsolutions to common problems for humans, animals and ecosystems.[8] At the clinical-educational level, this approach translates into considering the history of animal exposure, the environmental conditions of the home, education on zoonoses and community participation as components of theapproach to each patient.

In the opinion of the authors, in this context it is essential to achieve a positive modification of knowledge, habits, customs and attitudes so that individuals achieve conscious and responsible behavior towards the promotion, conservation and restoration of their health, with astrategy whose methodology allows evaluating the effectiveness, efficiency and impact of educational activities.

To achieve health achievements, education strategies are essential, especially in morbidity and mortality rates due to communicable diseases. It is still necessary to increase educational actions focused on the prevalent risk factors, if we take as a reference that, during the last two decades, the World Health Organization indicates the re-emergence of 200 infectious diseases of zoonotic origin, 43 % ofthem with worldwide distribution.[9] In the literature consulted, no research has been reported that comprehensively analyzes the clinical, educational and environmental components in these contexts from the "One Health" perspective.[10,11]

The novelty of the proposed clinical educational approach lies in its innovative nature since it integrates the human, animal and environmental interface, community participation and sustainability over time through institutional policies and redefines the approach to communicable diseases by integrating clinical, educational, health promotion and epidemiological surveillance aspects. Given this, the objective of this research is to carry out the clinical and educational characterization of patients with communicable diseases from the "One Health" approach in the vulnerable neighborhoods of the province of Pinar del Río, during the period 2023-2025.

METHODS

An observational, descriptive and cross-sectional study was developed, between the years 2023 and 2025, in the vulnerable neighborhoods of the Pinar del Río municipality, province of Pinar del Río. Data were collected retrospectively, extracting cases already registered in the surveillance system.

The Municipal Center of Hygiene and Epidemiology of Pinar del Río provided the official record of confirmed and probable cases of communicable diseases in the five vulnerable neighborhoods of the municipality. The study population consisted of the 1,626 confirmed and probable cases officially registered, distributed by disease and by neighborhood as shown in Table 1.

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Table 1. Distribution of confirmed and probable cases of communicable diseases in vulnerable neighborhoods of the Pinar del Río municipality.

Communicable diseases	Neighborhood (stratum)				Total
	Cuba Nueva (Comandante Pinares)	CP Ceferino Fernández	CP Carlos Manuel (5 de Septiembre)	CP Celso Maragoto (Camino a la Presa)	
Dengue	98	147	109	135	489
Chikungunya	58	79	61	101	299
Leptospirosis	12	31	29	58	130
Brucelosis	5	9	4	8	26
EDA	43	86	69	137	335
Hepatitis	18	37	21	58	134
COVID-19	5	7	9	11	32
Others	28	39	51	63	181
Total	267	435	353	571	1 626

Sample size calculation

The study population (N = 1,626 confirmed or probable cases) allowed the finite population correction to be applied, which reduced the necessary sample size compared to the calculation without correction. The formula for proportions with a precision of ±10 % was used, justified by the diagnostic nature of the objective. The parameters used were: N = 1,626; p = 0,50 (maximum variability, conservative criterion); 95 % confidence level (Z = 1,96); absolute precision d = 0,10 (±10 %).

$n_0 = Z^2 \times p \times (1 - p) / d^2 = 1{,}96^2 \times 0{,}50 \times 0{,}50 / 0{,}10^2 = 96$

$n = n_0 / (1 + n_0/N) = 96 / (1 + 96/1\,626) \approx 91$

The final sample size was n = 91 subjects, with a 95 % CI and a precision of ±10 %. It is recognized that a precision of ±10 % implies wide confidence intervals (approximately 20 % width for a 50 % ratio), which reduces the ability to detect subtle differences in knowledge or practices.

For selection, the nominal list of cases by neighborhood, with clinical history number, was obtained from the Municipal Center for Hygiene and Epidemiology; A correlative numbering was assigned within each stratum (from 1 to N_i, N_i being the total number of cases in the stratum). Random numbers were generated using statistical software (SPSS) and corresponding cases were included. When a case did not meet the inclusion criteria, it was replaced by the next one on the random list (documented replacement).

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Table 2. Proportional distribution of the sample by stratum.

Neighborhood (stratum)	Population	Cases(N)	% of the population	n assigned	Sample fraction	Selection
Cuba Nueva (Comandante Pinares)	7 692	267	16,4	15	5,6	Simple random
CP Ceferino Fernández	11 967	435	26,8	24	5,5	Simple random
CP Carlos Manuel (5 de Septiembre)	9 812	353	21,7	20	5,7	Simple random
CP Celso Maragoto (Camino a la Presa)	19 346	571	35,1	32	5,6	Simple random
Total	48 817	1 626	100	91	5,6	—

Inclusion criteria: patient with confirmed or probable diagnosis of communicable diseases recorded in the study period; usual resident in one of the five vulnerable neighborhoods at the time of diagnosis; over 18 years old; willingness to participate (signed informed consent).

Exclusion criteria: solely clinical diagnosis without registration in the epidemiological surveillance system; transient residents or residents without stable ties to the neighborhood; people with a cognitive or health condition that would prevent participation in the educational component.
Study variables.

The study variables were: age (18 to 30, 31 to 45, 46 to 60, > 60), sex (female, male), educational level (primary, lower secondary, pre-university, university), hygienic-sanitary situation of the environment (good, fair, bad), housing condition (good, fair, bad),animal interface (yes, no), communicable diseases (Dengue, Acute diarrheal disease, Chikungunya, Hepatitis, Leptospirosis, Brucellosis, COVID-19, others), symptoms and signs presented (fever with/without chills, bone pain, diarrhea, headache, joint pain, retro-ocular pain,skin rashes, cough, vomiting, yellowing of the skin or eyes, difficulty breathing, seizures, others), complications (yes, no), hospital admission (yes, no), treatment received (yes, no), level of knowledge about communicable diseases with a "One Health" approach (high, medium, low),preventive self-care practices (never, almost never, sometimes, almost always, always).

Applied techniques and instruments:
• Observation of health risks related to the "One Health" approach in neighborhoods with the aim of obtaining information on health risks related to the "One Health" approach in vulnerable neighborhoods in transformation, including the hygiene situationhealth of the environment, state of the housing and the animal interface.

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• Survey of patients to evaluate the clinical behavior of communicable diseases: included items about the communicable diseases that the patients suffered, symptoms and signs, tests to confirm the disease, previous contact with a sick, dead or unknown animal, previous ingestion ofproducts without cooking or pasteurization, contact with sick people, if you traveled in the days before getting sick, if you received treatment.
Documentary review of family and individual health histories to identify the clinical variables of patients with communicable diseases.
• Survey to evaluate the level of knowledge about communicable diseases from the "One Health" approach: definition of "One Health", prevention of zoonoses, risks of zoonoses, vaccine care, antimicrobial resistance, management of solid and liquid waste.
• Self-Care in Vulnerable Neighborhoods Scale (SVNS-20), intended to measure self-care behaviors, responsibility with hygiene practices, personal protection, management of the environment and the active participation of the patient in their health process. The data were recorded in a form prepared for this purpose. The SVNS-20 is composed of 20 items grouped into four dimensions that reflect the pillars of preventive self-care for communicable diseases.

All instruments are their own, developed by the authors of the research. Each instrument was subjected to a content validation and internal reliability process. Content validity was established through expert judgment, and reliability was determined using Cronbach's alpha coefficient, with values greater than 0,80 in all cases.

Construct validity was verified through exploratory factor analysis and pilot testing. Instruments that did not meet the minimum consistency criteria were reformulated before final application.

Statistical analysis
Descriptive statistics techniques (absolute and relative frequencies, measures of central tendency and dispersion) and inferential statistics were used, with a significance level of $\alpha = 0,05$. The tests used were: Pearson's chi-square (χ^2) and Fisher's exact test (when some expected frequency was less than 5) for the association between categorical variables; Student's t to compare a quantitative variable with a normal distribution between two groups; correlation of Spearman (ρ) for ordinal variables; and binary logistic regression for multivariate analysis. Normality of age was evaluated using the Kolmogorov-Smirnov test ($p = 0,935$).

The normality of age was verified using the Shapiro-Wilk test, applied separately in the group with complications ($W=25$; $p=27,5$) and in the group without complications ($W=66$; $p=2,5$), as the comparison of age between both groups is the only one that requires this assumption. Once normality was verified, the comparison was made with Student's t for independent samples, after checking the homogeneity of variances using Levene's test ($F= 0,25$; $p=0,78$).

Ethical aspects
The research was presented and approved by the Scientific Council of the "Dr. Ernesto Che Guevara de la Serna" Faculty of Medical Sciences. The ethical standards recommended for this type of research were taken into account. The informed consent of the patients was considered. The results obtained will be presented in prestigious scientific journals and events.

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RESULTS

The age group of 931 to 45 years predominated (37,4 %), with an average of 43,8±13,6 years. The female sex (57,1 %) and basic secondary education (50,5 %) predominated. Adverse environmental conditions also predominated: 90,1 % had a regular or poor hygiene situation and 96,7 % lived in regular or poor housing. Human-animal-environment contact was present in almost all patients (Table 3).

Table 3. Sociodemographic profile of the sample studied.

Variable		No. (%)
Age*	18 a 30	16 (17,6)
	31 a 45	34 (37,4)
	46 a 60	29 (31,9)
	> 60	12 (13,1)
Sex	Female	52 (57,1)
	Male	39 (42,9)
Schooling	Primary school	9 (9,9)
	Secondary school	46 (50,5)
	Pre-college	27 (29,7)
	Academical	9 (9,9)
Hygienic-sanitary situation	Good	9 (9,9)
	Regular	47 (51,6)
	Bad	35 (38,5)
Housing status	Good	3 (3,3)
	Regular	58 (63,7)
	Bad	30 (33,0)
Animal interface	Yes	85 (93,4)
	No	6 (6,5)

Notes: * Mean ± SD age: 43.8 ± 13.6 years; median: 43 years; range: 18 to 70 years.

Among communicable diseases (Table 4), dengue and acute diarrheal disease were the most common (24,2 % each). The most frequent symptoms were fever with chills (84,6 %), bone pain (54,9 %) and diarrhea (52,7 %). 72,5 % of patients did not present complications and 25,3 % required hospital admission; 75,8 % received medical treatment.

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Table 4. Clinical profile of communicable diseases.

Variable		No. (%)
Type of communicable disease	Dengue	22 (24,2)
	Acute diarrheal illness	22 (24,2)
	Chikungunya	17 (18,6)
	Hepatitis	11 (12,1)
	Others	7 (7,7)
	Leptospirosis	6 (6,6)
	Brucellosis	3 (3,3)
	COVID-19	3 (3,3)
Symptoms and signs	Fever with/without chills	77 (84,6)
	bone pain	50 (54,9)
	Diarrhea	48 (52,7)
	Headache	33 (36,3)
	Joint pain	32 (35,2)
	Retro-ocular pain	27 (29,7)
	Skin rashes	22 (24,2)
	Cough	19 (20,9)
	Vomiting	12 (13,2)
	Yellow discoloration of the skin or eyes	10 (11,0)
	Others	5 (5,5)
	Difficulty breathing	4 (4,4)
	Convulsions	1 (1,1)
Complications	Yes	25 (27,5)
	No	66 (72,5)
Hospital admission	Yes	23 (25,3)
	No	68 (74,7)
Medical treatment received	Yes	69 (75,8)
	No	22 (24,2)

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In Table 5, a low level of knowledge was observed in 42,9 % of the participants; independently, 42,9 % did not systematically carry out self-care practices (never 27,5 % + almost never 15,4 %). Although both values are numerically equal, they correspond to different and complementary indicators: the first characterizes the cognitive deficit and the second the absence of protective behaviors.

Table 5. Level of knowledge about communicable diseases with a "One Health" approach andhealth practices.

Variable		No. (%)
Level of knowledge about communicable diseases ("One Health" approach)	High	16 (17,6)
	Mediym	36 (39,6)
	Low	39 (42,9)
Preventive self-care practices	Never	25 (27,5)
	Hardly ever	14 (15,4)
	Sometimes	21 (23,1)
	Almost always	14 (15,4)
	Always	17 (18,7)

None of the sociodemographic or environmental variables evaluated (sex, education, hygienic-sanitary situation, housing status, animal interface) achieved a statistically significant association with complications or hospital admission (Table 6). The association between education and complications (χ^2 = 6,339; p = 0,096) was non-significant. There was a positive, moderate-high and significant correlation between the level of knowledge about communicable diseases from the "One Health" approach and self-care practices (ρ = 0,670; p < 0,001).

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Table 6. Statistical association tests.

Association	Statistical test	p value	Interpretation
Hygienic situation → complications	$\chi^2 = 4,025$	0,134	Not meaningful
Hygienic situation → admission	$\chi^2 = 2,830$	0,243	Not meaningful
Animal interface → arbovirus	Fisher	0,167	Not meaningful (OR = 0,18 [IC 95 %: 0,02-1,71])
Sex (F) → complications	$\chi^2 = 0,018$	0,892	Not meaningful (OR = 0,94 [IC 95 %: 0,37-2,37])
Sex (F) → income	$\chi^2 = 0,021$	0,886	Not meaningful (OR = 1,07 [IC 95 %: 0,40-2,85])
Schooling → complications	$\chi^2 = 6,339$	0,096	Not meaningful
Schooling → income	$\chi^2 = 4,652$	0,199	Not meaningful
Housing status → income	$\chi^2 = 2,936$	0,230	Not meaningful
Low knowledge → complications	$\chi^2 = 0,115$	0,735	Not meaningful (OR = 0,85 [IC 95 %: 0,33-2,17])
Low knowledge → income	$\chi^2 = 0,576$	0,448	Not meaningful (OR = 0,68 [IC 95 %: 0,25-1,84])
Age → complications	t = 0,663	0,509	Not meaningful
Knowledge ↔ self-care (Spearman)	$\rho = 0,670$	< 0,001	Significant Moderate-high positive correlation

Notes: OR (odds ratio); CI (95 % confidence interval).

Multivariate analysis of hospital admission

The original version presented a binary logistic regression model with seven predictors (age, sex, hygienic situation, housing status, complications, knowledge and animal interface) for hospital admission. With 23 events and 7 predictors (≈ 3,3 events per variable, compared to the recommended 10 to 15) the model is overfitted: McFadden's pseudo-$R^2 = 0,662$ is artificially high. It also included "complications"—direct clinical cause of admission—which produced quasi-complete separation and an OR without plausibility (577,5; 95 % CI: 31,63-10 542,7), and the "animal interface" variable, whose low variability (94,4 %) prevents estimating its effect (OR = 0,82; 95 % CI: 0,01-73,46). It is recommended to respecify the model with a maximum of two clinically based predictors, exclude "complications" and "animal interface", declare the variable entry method and report the Hosmer-Lemeshow test and the AUC-ROC; In the event of separation, consider Firth's penalized regression. The corrected model is not recomputable without the primary database.

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DISCUSSION

Regarding the impact of the population in contexts of vulnerability, the sociodemographic profile coincides with vulnerability, with Latin American records. Data from the National Institute of Statistics and Censuses of Argentina reflect that the population between 15 and 29 years old is among the most affected by this phenomenon (60,7 %), with a level of indigence of 21,2 % for that age group and an unemployment rate that doubles the national rate.[12]

In relation to the educational level, the predominance of basic secondary schooling (50,5 %) could make it difficult to understand the recommendations on addressing communicable diseases and preventive self-care practices. This result coincides with a study on disadvantaged neighborhoods in Córdoba, Spain, which reports a high level of illiteracy, with a large part of its inhabitants without having completed primary education and a minority reaching higher education.[13] out the primary database.

In other regions, the adverse environmental conditions agree with what was observed in vulnerable neighborhoods and regions. In India, research on hygienic conditions showed that more than 90 % of households did not have access to running water and that, although access to improved latrines was almost universal, 80 % used shared facilities; In addition, frequent consumption of Street foods, a factor in communicable diseases of enteric origin.[14]

Cárdenas et al.,[15] in a non-urbanized and vulnerable community, showed overcrowding in most of the homes and concluded that this is a population resulting from the construction of homes without authorization, without habitability conditions or legalization, with emigrations andfrequent immigrations that are difficult to quantify.

As empirical confirmation of the "One Health" risk, human-animal-environment contact was present in almost all patients, which constitutes empirical confirmation of the "One Health" risk in these neighborhoods. Human and animal health are today situated in a complex scenario, associated with global change, in which the establishment of collaboration mechanisms between public health, animal health, agricultural production and the environment constitutes a priority.[16] Due to their limited availability,variability (present in the vast majority of cases), the animal interface cannot be evaluated as a risk factor in this study; Its high prevalence is interpreted, rather, as a structural determinant of the context, consistent with the "One Health" approach.

In the same environment, arboviruses, diarrheal diseases, hepatitis, leptospirosis and brucellosis coexisted, which the same environment justifies the integrated approach of the model. The increase in these communicable diseases in vulnerable neighborhoods is due to environmental, ecological and socioeconomic factors, and is common in settlements that do not have sufficient public health services.[17]

In Colombia, during 2022 and 2023, more than 4,7 million cases of acute diarrheal disease in inhabitants of vulnerable neighborhoods were registered in the National Public Health Surveillance System, with incidence rates of 122,5 and 113,5 cases per 1,000 inhabitants, respectively.[18]

Low level of knowledge and poor or irregular self-care practices predominated, reinforcing the need for an educational clinical model. A previous study carried out in a vulnerable neighborhood of Pinar del Río showed that, before applying a community intervention strategy, lack of knowledge prevailed in critical areas such as antimicrobial resistance (91,9 %) and food safety (71,1 %), with improvementssignificant after the intervention.[19]

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Recognized as a vital capacity for health protection, self-care allows individuals and communities to take an active role in their well-being, with particular relevance where access to formal medical care is limited.[20] Primary health care professionals they play an essential role in promoting therapeutic education and empowerment; Strategies such as expert patient training and peer training programs reinforce self-care capacity through the exchange of knowledge and experiences.[21]

Given that the study grouped diseases with heterogeneous transmission mechanisms (arboviruses, enteric diseases and zoonoses such as leptospirosis and brucellosis), the determinants of knowledge, self-care or hospitalization could vary depending on the type of disease; byFor example, practices to prevent dengue fever differ from those for diarrheal disease.

Limitations of the study
Due to its cross-sectional design, the study does not allow establishing causal relationships or temporal sequences between the variables. The chosen precision of ±10 % results in wide confidence intervals and reduces the ability to detect subtle differences in knowledge and practices. The moderate sample size (n = 91) limits the power of the association tests and, above all, of the multivariate analysis, with only about three events per predictor variable. Another limitation is the aggregate analysis of diseases with different transmission mechanisms, which can mask specific patterns by etiological group.

Practical implications and future perspectives
These findings support the relevance of designing and evaluating a clinical and educational care model, with a "One Health" approach, aimed at strengthening knowledge and self-care practices in these neighborhoods, and integrating into the consultation the history of animal exposure and thehome environmental conditions. As future lines, the following are proposed: recalculate the sample size with greater precision and statistical power; validate the instruments used; analyze disaggregated by type of disease; and directly measure the practices of professionals to characterize the care approach, ininstead of inferring it from the population.

CONCLUSION

With the application of the instruments designed for the diagnosis of the current state of the clinical educational approach to communicable diseases from the "One Health" approach in the vulnerable neighborhoods of Pinar del Río, together with the documentary review and scientific observation, it allowedidentify the main problems related to said approach and the need to modify the current reality of the research object.

Conflict of interest
The authors declare that there are no conflicts of interest.

Authors' contribution
GAHH: conceptualization, data curation, formal analysis, research, methodology, project administration.
MCCM: supervision, validation, visualization, writing the original draft and writing final review and editing.
GLHM: writing the original draft and writing, final review and editing.

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The authors declare that no artificial intelligence tools were used.

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