

# School Health Program: intervention project against dengue in Matinhos, State of Paraná, Brazil

## *Programa Saúde na Escola: projeto de intervenção contra a dengue em Matinhos-PR*

Eduarda Cristina Poletto Gonçalves<sup>1</sup>, Debora Cynamon Kligerman<sup>1</sup>, Simone Cynamon Cohen<sup>1</sup>, Neilor Vanderlei Kleinubing<sup>2</sup>

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**ABSTRACT** The School Health Program (PSE) aims to promote health actions in schools through pedagogical tools developed between health and education. A study was carried out in the city of Matinhos, State of Paraná, Brazil, by the PSE within the scope of the Luiz Carlos dos Santos municipal school including 60 students from the 5th grades, from March to August 2019. Characteristics of participatory action-research and problematization methodology were used, being a type of social and qualitative study. For data collection, the method of Charles de Maguerez Arch was used. As research result, a pedagogical tool was developed at school and in the community, the intervention project ‘School, health, environment, and community mobilized against the *Aedes aegypti*’. The study proved that the application of existing public policies such as the PSE, through intersectoriality, environmental health education, and mechanical vector control actions, without applicability of poison, are appropriate actions for the disease prevention, such as the elimination of vector breeding sites; thus, making effective the use of environmental health education in schools as a health promotion strategy.

**KEYWORDS** School health services. Public policy. Dengue. Public health.

**RESUMO** O Programa Saúde na Escola (PSE) objetiva promover ações de saúde nas escolas por meio de ferramentas pedagógicas desenvolvidas entre a saúde e a educação. Foi realizado um estudo na cidade de Matinhos-PR pelo PSE, na abrangência da escola municipal Luiz Carlos dos Santos, incluindo 60 estudantes dos 5.ºs anos, no período de março a agosto de 2019. Utilizaram-se características da pesquisa-ação participativa e metodologia da problematização, sendo um tipo de estudo social e qualitativo. Para o levantamento dos dados, utilizou-se o método do Arco de Charles de Maguerez. Como resultado da pesquisa, desenvolveu-se, na escola e na comunidade, uma ferramenta pedagógica, o projeto de intervenção ‘Escola, saúde, ambiente e comunidade mobilizados contra o *Aedes aegypti*’. O estudo comprovou que a aplicação de políticas públicas já existentes como o PSE, por intermédio da intersectorialidade, a educação em saúde ambiental e ações de controle vetorial mecânico, sem aplicabilidade de veneno, são medidas apropriadas para prevenção de doenças, como a eliminação de criadouros de vetores; efetivando, assim, o uso da educação em saúde ambiental nas escolas como uma estratégia de promoção da saúde.

**PALAVRAS-CHAVE** Serviços de saúde escolar. Política pública. Dengue. Saúde pública.

<sup>1</sup>Fundação Oswaldo Cruz (Fiocruz) – Rio de Janeiro (RJ), Brasil.  
eduardacpoletto@gmail.com

<sup>2</sup>Universidade Federal do Paraná (UFPR) – Matinhos (PR), Brasil.



## Introduction

Health, from a broad perspective, was incorporated into education through the National Curriculum Parameters (PCN) in 1997, by considering health as a cross-cutting theme to the subjects and actions in the school context, with emphasis on comprehensive care through health promotion, prevention of diseases and illnesses, and attention and care to the health of children and adolescents<sup>1</sup>.

The link between health and education as a public policy in Brazil intensified with the creation of the School Health Program (PSE) by Presidential Decree No. 6,286 of December 5, 2007. Its main objective was to promote health actions in schools through educational strategies and comprehensive health education, considered essential to produce autonomy, self-care, and participation of students according to their age<sup>2</sup>.

Access to health care is considered one of the weaknesses of the Brazilian National Health System (SUS). In this sense, infant mortality can be avoided with investments in the Family Health Strategy (ESF), focused on primary health care. Furthermore, health promotion and disease prevention efforts reduce social inequities in health, favor disease reduction, and improve people's quality of life<sup>3</sup>.

The National Policy for Environmental Education established by Law No. 9,795, of April 27, 1999, established environmental education at all levels of education, which may occur through the production and dissemination of educational material and support for local and regional initiatives and experiences. Environmental education is a thematic field that is transversal to education, therefore, teachers can adopt a complementary training in this field to broaden their areas of activity<sup>4</sup>.

Mohr and Schall<sup>5(200)</sup> point out that, since 1971, through Law number 5,692/1971, the knowledge and practice of basic health and hygiene has been stimulated in schools,

[...] primarily through actions and not through explanations [...], the training of teachers in the fields of environmental education and health education is very deficient.

As Lima<sup>6</sup> states, schools are not only teaching spaces.

The National Policy for Primary Health Care (PNAB) stresses that health education is among the responsibilities of the health teams. Health education practices offer the opportunity to bring the school closer to the community and to health services so as to promote comprehensive care for children and adolescents in the school context, leaving the school walls and experiencing their territories<sup>3</sup>.

The article examined a study developed in the city of Matinhos, State of Paraná, about an intervention project of dengue in schools. This study considered the real work of professionals from the Municipal Health Secretary, health surveillance, as well as the researcher's experience in the health service, in the PSE municipal management, being the result a master's research entitled: 'Educational practices in health and environmental sciences: interface between primary care and school for health promotion in Matinhos-PR'<sup>3</sup>.

This article aims to demonstrate the applicability of a pedagogical tool for local intervention, established intersectorially between health and education teams in order to strengthen the teaching of environmental sciences and health promotion in the school context, intending to promote a local social transformation<sup>3</sup>.

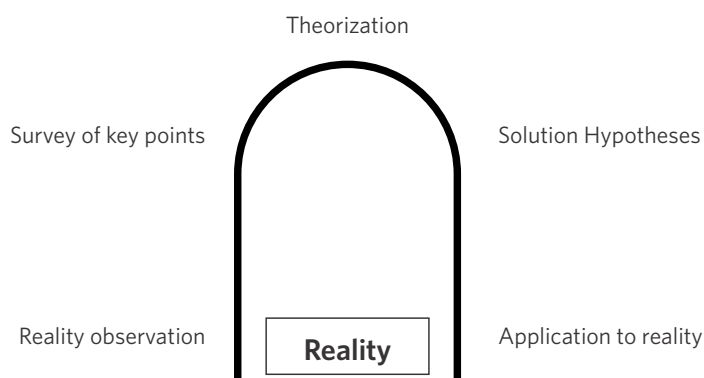
To do so, the interface between health and education was analyzed in the school context under study in order to develop health promotion actions; the school territorialization was evaluated, considering the social and environmental determinants, and how educational health practices are developed in the school through Primary Health Care (PHC) in the applicability of the PSE<sup>3</sup>.

Therefore, this article begins by presenting the methodology used in the study, demonstrates its application in the Charles Maguerez Arc method, and describes each step in the investigation of the consequences of the PSE implementation. This is an intervention project in a school in Paraná, in which the community's real problems, and the incidence of dengue, are taken into consideration. Finally, we highlight the results and discussions of the case study, through action research.

## Material e methods

The research was exploratory as it investigated the causes of the dengue incidence in school, and descriptive<sup>7</sup> because it detailed each step of the method used to investigate the implementation of the intervention project superimposed on a public policy, the PSE. The research is a social study, qualitative, based on action research<sup>8</sup>. It employs the problematization methodology and uses the Charles Maguerez Arc method to collect data and obtain results<sup>9</sup>.

Figure 1. Charles Maguerez's Arc Method<sup>9</sup>



Source: Bordenave e Pereira<sup>9</sup>.

The first stage is called 'reality observation' and seeks an overview of the problem. In the second stage, the 'survey of key points' is carried out, being the occasion in which the researchers, according to their knowledge, present the reasons for the observed problem. In the third stage, the 'theorization' takes place, being the moment of theoretical discussion, either of scientific studies and/or legislation. In the fourth stage, 'solution hypotheses', being the time to formulate actions, activities, and projects to solve or try to solve the problem raised. The last stage consists in

the 'application to reality', being the step of effectively putting into practice the 'solution hypotheses'. Finally, after applying the method<sup>9</sup>, we seek to identify whether significant changes have occurred in the territory (reality).

### Study location

The chosen school, Luiz Carlos dos Santos School, is located in the municipality of Matinhos-Paraná, a coastal city. It has 116,544 km<sup>2</sup> of land area with an estimated population of 34,207 inhabitants, according

to the 2018 census of the Brazilian Institute of Geography and Statistics (IBGE). In 2017, there were 5,229 students enrolled in elementary school, according to the Ministry of Education (MEC) and the National Institute of Educational Studies and Research (INEP). In that same year, the municipality had 20.75 mortality rate in children under five years old (1,000 live births) – Department of Informatics of the Unified Health System (DataSUS) / Department of Health of the State of Paraná (SESA-PR)<sup>10</sup>.

The sewage service is provided by the Paraná Sanitation Company (SANEPAR). In 2018, there were 29,839 economic units, whether house, apartment, store, etc., and the water supply from SANEPAR in that year was of 33,365 economic units<sup>11</sup>.

The local health unit of reference for the school is the Basic Health Unit (UBS) of Mangue Seco – ESF, approximately 1 km away from the school. This UBS has one doctor, one nurse, two nursing technicians, and seven community health agents. The small distance between the school and the UBS shows that distance problems are not an obstacle for the ESF health actions in the school.

According to the municipal zoning, the school is inserted in a Residential Zone (ZR 1) – and one block away from a Permanent Preservation Area (APP)<sup>12</sup>. In this territory there is an Environmental Conservation Zone (ZCA 1), which has non-subdivision housing (invasion). Next to the school is the fishing community of the municipality.

## The research

The methodology used to obtain the results was based on the observation of local problems, considering not the knowledge itself, but the experience of each individual for a collective construction of a solution, or a possible solution, for the observed problem. For Bordenave and Pereira<sup>9(10)</sup>, “A person only knows something well when he/she

transforms it, and converts it into the process”. According to the authors, action research presents itself as a practice that comes up with solutions and, when possible, monitors their corresponding actions.

In 2019, the monitoring system by the use of ovitraps<sup>13</sup> was developed in a partnership between the Municipal Health Secretary of Matinhos, by the SESA-PR health surveillance actions through the 1st regional health department, and the Federal University of Paraná (UFPR), by the biological sciences sector and the department of biology.

This tool identifies eggs for the investigation of *Aedes aegypti* mosquito infestation, following the protocols of the National Dengue Control Program (PNCD). The work consisted in the installation of 86 traps every month during the period of a year in different properties, covering the entire urban area of the city. The traps remained in the field for three days, and then they are sent to the zoology department of the UFPR to check the eggs.

Subsequently, the territories were classified by degree of infestation risk, which is an indicator for decision-making and intervention measures. The school, inserted in Stratum IV, showed positivity of 98 eggs, considered as high risk, alert (red), for proliferation of *Aedes aegypti* mosquitoes in that location.

The school was chosen due to the analysis of the school community’s health situation given the epidemiological scenario that the city was experiencing with a significant increase in the dengue cases, and strengthened by the results of monitoring the ovitrap in the school territory.

The epidemiological scenario characterized the viral disease and reemerging disease in public health, dengue, as the central problem for the development of a pedagogical teaching tool, the teaching by projects, to be applied by the PSE cross-cutting theme – environmental health and public health for that community.

## Study scenario

The study scenario had as target audience teachers, students from the basic municipal education network of the II Elementary education and school community, being the source population: 3 teachers and 3 health professionals, 60 students from the three 5th grades in the scope of the Luiz Carlos dos Santos Municipal School, in the municipality of Matinhos, applied through the PSE.

The students were not focal participants in this research, but the data collected from them was used to investigate the context in which the collaborative interventions were developed. Collective methodological resources were used such as seminars and conversation circle were used with the purpose to know the local problems, to elaborate and develop a collaborative intervention project, and to verify the context of the educational practices in the school. In these events, organizational questions were asked about the health educational practices in schools used by teachers and health professionals, who agreed to participate and signed the Informed Consent Form.

## Results and discussion

In the first stage of the 'reality observation', it was verified in the territorial assessment and reported by researchers (health), that the dengue issue was a problem requiring emphasis in the health educational practices at school, especially in that territory, since the ovitrap results showed the school as an epidemiological risk environment for dengue.

In the second stage of 'reality observation', the school and the neighborhood were found to have a high level of social vulnerability and violence with the influence of drug trafficking. Thus, in the 'survey of key points', teachers pointed out that intersectorial actions involving sectors, such as health, contributed to the process of applying

pedagogical actions at school, taking the 'burden' of more work from teachers. They wanted these actions more than trainings.

Teachers highlighted feeling overloaded with their duties. Health agents revealed that it is part of their routine work to carry out environmental health education actions; in addition, they were favorable to the application of activities at school and in the community. Education professionals also pointed out that most parents and guardians of students are engaged in school when they 'receive' something; thus, some strategies that could meet the local realities were analyzed, to bring closer the bond between the community, health, and education.

After the 'survey of key points', the 'theorizing' stage was initiated. Researchers had an exchange of knowledge about issues such as health promotion, expanded view of health, and the interference of environmental issues in the health-disease process; The school was singled out as the space in which to develop health educational practices and also suited to integrate the community and develop health education actions considering the territorial issue to promote access to health services such as: vaccination, blood pressure checks, rapid tests for Sexually Transmitted Infections (STIs), guidance on pediculosis, and communication on health and environment.

From this, the researchers planned actions that could contribute to the local transformation involving environmental and vector control issues. As 'solution hypotheses', it was suggested the elaboration of projects considering the development of a pedagogical tool, applied through the PSE guidelines. Moreover, it was proposed the opportunity to carry out a project with students of the 5th grade in an intersectorial way (health, environment, education, and community) followed by an activity with parents and guardians with emphasis on social issues and after an intervention in the community.

The intervention, in the ‘application to reality’ stage, was developed by the project ‘School, health, environment and community mobilized against *Aedes aegypti*’. After this moment, there were changes caused in

the territory by the indicators of ovitrap monitoring, which exposed, in July 2019, the trap number 58, referring to the school, without any infested egg of the *Aedes aegypti* mosquito (figure 2).

Figure 2: Monitoring of trap No. 58, before and after the intervention. Indicator of *Aedes aegypti* mosquito infestation. Circle demonstrates the school location in the territory.



Source: Adapted from Gonçalves, 2019<sup>3</sup>.

According to the ovitrap monitoring parameters from the health secretary office, the research showed that before the intervention there was a high risk for dengue incidence in that territory (area with white thread). After the intervention, the *Aedes aegypti* eggs were eliminated by eliminating the mosquito breeding sites in the community and in the school (circle) mechanically, without the need for intervention with poisons.

In a study on the use of the oviposition trap, Barreto<sup>14</sup> emphasizes that it is an appropriate method for perceiving the presence and variation of *Aedes aegypti* population density; and that the ovitrap is a tool with high sensitivity for monitoring the infestation of the genus *Aedes*, thus being suitable for monitoring data at short intervals, and continuously.

Finally, through a conversation circle among researchers, it was concluded that the objectives to solve the problem (infestation of the

*Aedes aegypti* mosquito – which causes the viral dengue disease) were achieved. It was also presented that the intersectorial actions contribute to the development of health educational practices in schools, and proved to be favorable to the territorial reality. During the educational practices, it was noted that students were interested in the activities and demonstrated, in a playful way, the awareness of fighting arboviruses in a critical way.

Donalísio<sup>15</sup> emphasizes the need to think about new technologies and prevention strategies for dengue, in addition to an articulated effort to integrate actions against the disease. Costa<sup>16</sup> highlights that the work on dengue control must be based on an intersectorial approach including health education actions.

She also considers the territory conditions (housing and sanitation) as important factors for dengue control, and also shows that the monitoring of vectors becomes an

important tool to improve control programs, since vector control is the only method to prevent dengue epidemics<sup>16</sup>.

Studies on the mapping of *Aedes spp.* mosquitoes and dengue virus detection in urban areas in the municipality of Picos, state of Piauí, revealed the month of April as the month with the highest number of cases in 2017. Besides, the results highlighted that the higher the mosquito infestation, the greater the potential risk of dengue transmission. They also showed that with high temperatures and little rainfall the eggs go into diapause waiting for contact with water for the larvae to hatch. This demonstrates the need for mechanical removal of possible mosquito breeding sites, even without larvae<sup>17</sup>.

Maia and collaborators<sup>17(10)</sup> conclude that:

Entomological and viral circulation monitoring are important tools to indicate areas of higher infestation of vector mosquitoes and prevent future outbreaks, providing subsidies for the planning of actions aimed at the control and prevention of arboviruses by the health secretary and competent bodies of the region.

In addition to monitoring, the effectiveness of health education in schools is only justified if implemented. Figueiredo points out that scientific research should bring the PSE closer to health promotion values and strengthen the need for health practices that encourage children and adolescents to participate in decisions that affect their lives and health. It is also disclosed that the PSE is the appropriate field for innovative and learning experiences in the breadth of intersectorial actions and complex approaches aimed at the collectivity<sup>18</sup>.

Studies on environmental education in schools show significant changes when there are partnerships, intersectorial actions, and community awareness in the school surroundings; however, they reinforce the need for interaction between communities and public authorities. It is also noteworthy that the school needs to bring

the community closer so that together they can work to minimize the environmental problems affecting their territory<sup>19</sup>.

Health education practices, such as educational materials and intervention projects that consider the territory, as well as its dynamics, prove to be effective and replicable. Studies by Poletto and collaborators<sup>20</sup> on the use of pedagogical tools for the development of non-formal education by health surveillance professionals in Matinhos-PR, show that professionals have difficulties in developing health education as a non-formal education due to the lack of local educational materials. This is so because most of them receive federal-level materials, which are not in line with local problems, evidencing the need for their collaborative elaboration.

Communicative actions on health are sources of health promotion and help to improve the quality of lives of individuals as, when identifying their health problems, they seek, together, to improve these conditions. The problematization methodology characterizes this action as “not only focused on ‘knowing’, but also on ‘knowing how to do’, departing from the observation of real needs<sup>20(12)</sup> to develop a solution for the problems in that observed reality. Considering the territory and involving the community in this construction strengthen the knowledge of the population and professionals, as well as stimulate the popularization of science in their environment<sup>20</sup>.

Schools and their programs contribute to the children’s development and have an influence on their health. It is part of the comprehensive health care for children, maintaining the link with the family and health services, with opportunities to focus on health promotion. This includes health-friendly environments, the built environment, complementary feeding, healthy living habits, breastfeeding, vaccination, prevention of diseases and illnesses, providing on-time care and a comprehensive health care for children.

To consider studies of technical and applied knowledge around the built environment, the risk factors, and the impact on human health is defined as healthy housing, a discussion that started before the health promotion movement, in the year 1982, in Buffalo, New York. In 1992, the World Health Organization (WHO) aligned a healthy housing policy as a health promotion tool<sup>21</sup>.

Healthy housing is a field of potential knowledge and practices for application in health promotion strategies, being a tool for an expanded approach to discuss problems related to health and quality of life. It considers school as a temporary housing, being this space a housing context that accompanies the individual in his development and can promote, or not, a favorable environment for health<sup>21,22</sup>.

The WHO's first principle on healthy housing is related to the protection against exposure to etiological agents and vectors of infectious and contagious diseases. It refers to the environment as an adequate space for the number of inhabitants, access to drinking water, sanitary sewage, and solid waste disposal system to reduce disease transmission, especially gastrointestinal diseases and vector-borne diseases such as dengue, chikungunya, and zika, in addition to reducing the proliferation of insects and rodents<sup>22</sup>.

Actions such as those presented in this article are in line with the purpose of the WHO Health Promoting School which seeks to develop health and health education for the school community, to make the school a healthy place through actions and services of health, as well as the elaboration of projects between school and community, establishing policies and practices that respect the well-being of the individuals and their dignity, promoting an environment favorable to health<sup>23</sup>. This research highlights disease prevention in the school community, applied through the promotion of health initiatives such as health education; thus, presenting a healthy school and surrounding environment for students.

Health actions at school level are necessary to promote health to students and the community through whether through health promotion actions, creation of environments favorable to health, disease prevention or/and access to health services. According to a 2015 report by the Pan American Health Organization (PAHO) on environmental impacts on children's health, by group of diseases, 5.9 million children under five years of age died, being vector-borne diseases, such as malaria, one of the leading causes of death of children worldwide<sup>24</sup>.

The PAHO report also points out that "the reduction of environmental risks can prevent a quarter of childhood deaths and diseases"<sup>24(22)</sup> with intersectoral preventive interventions focused on primary prevention by reducing environmental risks improve the children's health. It also generates health care savings – for every US\$1 invested in basic sanitation, between US\$2 and US\$4 were saved in healthcare costs and productivity losses. In addition to being very beneficial to health, interventions to reduce environmental risks contribute to the goals of sustainable development, climate, environment, and overall development<sup>24</sup>.

The school has legal competence to act on cross-cutting issues through partnerships with sectors such as health. This requires understanding on how teachers and health professionals can integrate themselves for the development of health educational practices in schools, health education to promote health by involving the social determinants<sup>3</sup>.

Working with projects and considering the methodology of problematization for diagnosing a territorial problem and knowing local needs leads to: intersectoral planning, affectivity, cooperation with the work done by others, active and socialized teaching, and produce teaching and learning purpose. Being able to develop health educational practices and teach them in the school leads students and the community to social transformations that will improve their quality of life.



This evaluation of local belonging and the effectiveness of the intervention project was evident in the reduction and elimination of *Aedes aegypti* eggs in the territory worked on, thus demonstrating that vector control actions have favorable results in mechanical removal activities without the use of chemicals, so harmful to health and the environment. Intersectorial actions and, especially, environmental health education is a tool to eliminate mosquitoes breeding sites, resulting in the prevention of vector-borne diseases such as dengue, which cause epidemics and deaths

Thus, it is considered that intersectorial actions when applied to existing public policies, such as the PSE, are favorable to the development of health promotion strategies and to the teaching of environmental sciences, strengthening the relationship between health and environment. The result is the transformation of a territory, and the school is the appropriate place to implement these actions.

Thus, the research described in this article demonstrated the effectiveness in applying the PSE in the connection between health, environment and education, encouraging the community to make significant changes in their surroundings. As a result, health actions were carried out through the collective health vision, through the biopsychosocial approach in order to improve the quality of life in the school and in the community by evaluating its risk factors (dengue); in addition to creating a healthier environment in the school.

## Final considerations

Schools are the appropriate places to carry out health promotion activities and initiatives, once the enrolled students identify their real problems and have contact with cross-cutting issues connected to various sectors such as health embedded in existing public policies, such as the PSE. Moreover, schools must be a favorable environment for the improvement of health, so as to promote better health and

quality of life for the school communities.

The health educational practices in schools should occur through intersectorial actions in APS, with health surveillance being a powerful mechanism for health promotion actions and the enforcement of public policies. It also prevailed that it is necessary to step beyond the UBS and school walls and go to the community – the PSE is suitable for this purpose.

The pedagogical tool developed in this research for teaching environmental sciences was the project ‘School, health, environment, and community mobilized against *Aedes aegypti*’, which can be replicated in any national territory. This methodology brings students closer to their local reality and promotes knowledge exchange and critical thinking through a visit to the recycling association, developing a sense of belonging by implementing actions in the community, highlighting the need for the population to participate in preventive environmental actions, such as the elimination of mosquito breeding sites.

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## Collaborators

Gonçalves ECP (0000-0002-5413-9492)\* contributed to the conception of the article, data analysis and interpretation, writing of the paper, review and approval of the final version of the article. Kligerman DC (0000-0002-7455-7931)\* and Cohen SC (0000-0001-6228-6583)\* contributed to the design of the paper, review and approval of the final version of the paper. Kleinubing NV (0000-0003-3611-4985)\* contributed to article design, data analysis and interpretation, review and approval of the final version of the article. ■

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\*Orcid (Open Researcher and Contributor ID).

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