



## **PESTEL analysis in the evaluation of the methodology to evaluate the oral health situation**

*Análisis PESTEL en la evaluación de la metodología para analizar la situación de salud bucal*

Judit Martínez Abreu <sup>1\*</sup>, <https://orcid.org/0000-0003-3184-7872>

Dunia Caballero López <sup>2</sup>, <https://orcid.org/0009-0003-2925-7440>

Abel Iván Semper González <sup>3</sup>, <https://orcid.org/0000-0001-5818-0145>

Amanda Guerra Toledo <sup>2</sup>, <https://orcid.org/0009-0003-2333-787X>

Yokohama Muñoz Mayor <sup>2</sup>, <https://orcid.org/0009-0005-1158-1028>

Patricia Santana Estévez <sup>2</sup>, <https://orcid.org/0000-0003-2063-1806>

<sup>1</sup> Matanzas University of Medical Sciences. Dr. Juan Guiteras Gener Faculty of Medical Sciences of Matanzas. Matanzas, Cuba.

<sup>2</sup> Teaching Dental Clinic "III Congress of the PCC". Matanzas, Cuba.

<sup>3</sup> General Directorate of Health Matanzas. Matanzas, Cuba.

\* **Corresponding author:** [jmabreu.mtz@infomed.sld.cu](mailto:jmabreu.mtz@infomed.sld.cu)

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## ABSTRACT

**Introduction:** the methodology with a focus on social determinants and intersectorality requires evaluation, to which PESTEL analysis could contribute.

**Objective:** identify the factors of PESTEL analysis as a tool to evaluate a methodology for analyzing the oral health situation.

**Method:** a qualitative research study was conducted from 2022 to 2024 in Matanzas province, Cuba. Nine experts with medium and high expertise quotients participated. Five managers, 25 dentists, and 23 community representatives were randomly selected. They gave their informed consent to participate. The Delphi Method was applied, along with a survey sent by email and WhatsApp, validated by experts. Ethical principles were followed.

**Results:** the degree of relevance was very high, at 93,5 % the pestel analysis identified the following barriers: lack of funding for oral health projects (85,3 %), energy situation, low perception of the population and community participation (100 %); insufficient usability of digital technologies (98,1 %); drinking water quality (87 %), limited availability of healthy foods (79 %), and legislation and protection of patient rights (70 %).

**Conclusions:** the PESTEL analysis revealed that the factors affecting the implementation of the methodology are: lack of funding for oral health projects, the energy situation in Cuba, the population's low risk perception regarding oral health, low community participation, poor usability of digital tools, insufficient water quality, limited availability of healthy foods, legislation, and protection of population rights.

**Keywords:** PESTEL Analysis; Oral Health Situation Analysis; Methodology; Social Determination of Health; Intersectorality

## RESUMEN

**Introducción:** La metodología con enfoque de determinantes sociales e intersectorialidad requiere ser evaluada, a lo cual pudiera contribuir el análisis PESTEL.

**Objetivo:** identificar los factores del análisis PESTEL como herramienta para evaluar una metodología para el análisis de la situación de salud bucal.

**Método:** se realizó una investigación cualitativa, del 2022 al 2024, provincia Matanzas, Cuba. Participaron nueve expertos con coeficiente de experticia medio y alto. Se seleccionaron al azar, cinco directivos, 25 estomatólogos y 23 representantes de la comunidad. Dieron su consentimiento informado para participar. Se aplicó el Método Delphi y una encuesta enviada por correo electrónico y vía Whatsapp, validada por expertos. Se cumplieron los principios éticos.

**Resultados:** predominó el grado de pertinencia Muy Alta en el 93,5 %. El análisis PESTEL identificó como barreras: falta de financiación de los proyectos de salud bucal (85,3 %), situación energética, baja percepción de la población y participación comunitaria (100 %); insuficiente usabilidad de tecnologías digitales (98,1 %); calidad del agua potable (87 %), escasa disponibilidad de alimentos saludables (79%) y la legislación y protección de los derechos de los pacientes (70 %).

**Conclusiones:** el análisis PESTEL reveló que los factores que afectan la aplicación de la metodología son: falta de financiación de proyectos de salud bucal, la situación energética en Cuba, la baja percepción de riesgo de la población sobre salud bucal, baja participación comunitaria, poca usabilidad de las herramientas digitales, insuficiente calidad del agua, escasa disponibilidad de alimentos saludables, la legislación y la protección de los derechos de la población.

**Palabras clave:** Análisis PESTEL; Análisis De Situación De Salud Bucal; Metodología; Determinación Social De La Salud; Intersectorialidad

## INTRODUCTION

The Health Situation Analysis, Oral Component (ASIS-CB) requires updating to adapt to the current context in Cuba, moving beyond the traditional focus on disease and therapy, based on the principles established in the Family Doctor and Nurse <sup>(1)</sup> and Comprehensive Dental Care for the Population (PNAEI) programs. <sup>(2)</sup> It is proposed to integrate the social determination of health model as a useful tool <sup>(3)</sup> into a methodology essential for rigorous research. This methodology is composed of a theoretical-cognitive framework and a methodological-instrumental framework, which interact in a dialectical process and allow for a more complete and effective assessment of oral health. <sup>(4)</sup>

The WHO and PAHO use effective methodologies, such as the rapid health promotion assessment (RAHA), to provide key information to those responsible for health and resource allocation. <sup>(5)</sup> On the other hand, there is the participatory action research (PAR) methodology, <sup>(6)</sup> which focuses on the empowerment of participants and their ability to take action to address the problems they face. In addition, there is the evaluative methodology of popular education, <sup>(7)</sup> which starts with the people, through dialogue and participatory processes. The aforementioned methodologies can complement ASIS-CB and improve the quality and acceptance of solutions to problems in dental services.

Several resources have been used to evaluate the methodologies: expert criteria, user surveys, assessment of their relevance, and evaluation of their usability when they contain a strong component of computerization and digital transformation. <sup>(8)</sup> PESTEL analysis (political, economic, social, technological, environmental, and legal factors that influence compliance with the methodology) has also been used, essentially linked to business processes. <sup>(9)</sup>

Among the objectives and priorities of the Cuban health system is the need to evaluate the methodologies used to strengthen primary health care. Therefore, the objective of the study was to identify PESTEL analysis factors as a tool to evaluate a methodology for analyzing the oral health situation.

## **MATERIALS AND METHODS**

A qualitative research study was conducted from 2022 to 2024 in the Versalles health area, Matanzas municipality, Matanzas province, Cuba. Nine experts selected based on medium and high expertise coefficients participated, and the Delphi method was applied. Subsequently, for the PESTEL (Political, Economic, Social, Technological, Ecological, and Legal) analysis, a sample of 62 participants was randomly selected, consisting of five managers, 25 dentists, 23 community representatives, and the nine Delphi panel experts. All participants in this phase voluntarily provided their informed consent.

To assess the relevance of the methodology and identify the factors that constitute barriers to its practical implementation through PESTEL analysis, each of the participants in this stage of the research was sent a virtual instrument validated by experts.

The degree of relevance was considered to be the fulfillment of the methodology's purpose, as perceived by experts and managers from a technical and professional perspective. To determine this value and subsequently make a conceptual judgment, the following formula was used:

for each question item, a possible response scale was presented. For each scale, it is inferred that there is an ideal score, which is given by the number of experts and the maximum score that can be assigned to each item. Therefore, if the sample is nine, and the scale is 1 to 5 (Very High, High, Medium, Low, and Very Low Relevance), the ideal score will be  $9 \times 5 = 45$  points. The score assigned to each query item is considered, which must be divided by the ideal score (maximum that can be obtained) multiplied by 100. In this way, a value is obtained, which determines the degree of relevance.

The degree expressed as a percentage was scaled: Very High (VH) from 80,1 % to 100,0 %; High (H) from 60,1 % to 80,0 %; Medium (M) from 40,1 % to 60,0 %; Low (L) from 20,1% to 40,0 %; and Very Low (VL) from 0% to 20 %.

Each degree of relevance was assigned a set of descriptors that qualitatively detail their respective conceptual descriptions.

- Very High (VH): Clear and consistent relevance. It stands out from the contrasted component. It usually manifests itself with a broad repertoire of aspects superior to the benchmark or adds richness and value to the component's fulfillment.
- High (H): It stands out from the contrasted component. It usually manifests itself with some aspects superior to the benchmark or adds richness and value to the component's fulfillment.
- Medium (M): It meets expectations, but with some inconsistency. It is considered positive but not high.
- Low (LH): Weak relevance; its representation of the contrasted component is ambiguous and indeterminate, and weaknesses are observed.
- Low (VL): It presents clear weaknesses in the contrasted component, which significantly affect the degree of alignment between the proposal shown and the benchmark.

The following steps explain how the PESTEL analysis was conducted:

1. Political factors (P) were identified: those that may affect the implementation of the methodology, such as government policies related to

oral health, available funding for oral health projects, and the participation of relevant political actors.

2. Economic factors (E) were identified: those that may affect the implementation of the methodology, such as the cost of implementing the methodology, the availability of financial resources, and the country's overall economic situation.

3. Social factors (S) were identified: those that may affect the implementation of the methodology. These include: the population's perception of the importance of oral health, cultural or gender barriers to accessing oral health services, and community participation in the process.

4. Technological factors (T) were identified, which may affect the application of the methodology, such as the availability of information and communication technologies for data collection and analysis, and the availability of oral health diagnostic and treatment technologies.

5. Environmental factors (E) were identified, which may affect the application of the methodology, such as the quality of drinking water and the availability of healthy foods, which can directly or indirectly affect oral health.

6. Legal factors (L) were identified, which may affect the application of the methodology. These included legislation related to oral health, the regulation of dental health service providers, and the protection of patient rights.

For the relevance analysis, the collected data were analyzed and summarized in a table using absolute and relative frequencies. This allowed for the interpretation of each item in relation to the methodology and its relevance to essential components of primary health care. For the PESTEL analysis, the results were summarized in text.

The research focused on updating the methodological framework for analyzing the local oral health situation, in the context of reviewing the objectives of the National Health System and improving the National Comprehensive Dental Care Program in Cuba. Ethical principles were followed according to the Declaration of Helsinki, the CIOMS-WHO guidelines for research involving humans, and the Universal Declaration on Bioethics and Human Rights.

## RESULTS

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Table 1 reflects the experts' assessments of the degree of relevance of the methodology, which uses a social determinants and intersectoral approach to analyze oral health situations. The degree of relevance was Very High (93,5 %) and High (6,5 %). It was stated that it is clearly and consistently relevant, standing out from the methodological guidelines established in the PNAEI from a conceptual and procedural perspective. It contributes to the continuous improvement of the quality of dental services, incorporating self-assessment and external evaluation by the health sector and other sectors, thus adding richness and value.

**Table 1.** Assessment of the degree of relevance of the proposed methodology

Expert evaluators	Rank obtained	Degree of relevance
58 (93,5 %)	80,1 %- 100,0 %	Muy Alta (PMA)
4 (6,5 %)	60,1 %-80,0 %	Alta (PA)

Regarding the PESTEL analysis; 85,3 % agreed that the factor that could most affect the application of this methodology is the financing of oral health projects. Regarding the economic aspect, 100 % cited the country's overall situation, with emphasis on the state of the national energy system. Regarding social factors, similar importance was given to the application of the methodology to assess the oral health situation, as well as to the population's perception of the importance of oral health and community participation in the process.

In addition, technological factors were explored, with 98,1 % stating that the application of the methodology could be affected by the insufficient usability of information and communication technologies for data collection and analysis.

Among the environmental factors, the quality of drinking water and the availability of healthy foods were identified as potentially directly or indirectly affecting oral health, with 87 % and 79 %, respectively. The analysis included legal factors considered potentially affecting implementation, including legislation related to oral health and the protection of patient rights, in more than 70 % of the participants.

## DISCUSSION

The PNAEI <sup>(2)</sup> established a methodological guide for the preparation of ASIS-CB reports in 1992, but it has not been updated, despite the country's socioeconomic transformations. The methodology, based on social determinants and intersectoral approaches, is considered an improved and

contextualized proposal, taking into account important elements of updating related to the transformation of the Cuban economic model and the transformations of Cuban public health, as determining aspects that have characterized this period.

The training and development of specialists in Comprehensive General Medicine and Comprehensive General Dentistry is imperative for improving teaching processes in primary care, where health situation analysis emerges as a scientific and methodological tool, allowing us to understand the health problems of populations and design actions to resolve them.

The success of a population oral health situation analysis can be measured in several ways, depending on the specific objectives of the analysis and the expected outcomes. Some possible measures of success include:

1. Identification of the main oral health problems in the population: The analysis's ability to identify the main oral health problems in the population, such as dental caries, periodontal disease, or oral lesions. This corresponds to the descriptive stage.
2. Identification of the main causes of oral health problems: The analysis's ability to identify the main causes of oral health problems, which are the social determinants of health. This corresponds to the descriptive and analytical stages.
3. Development of effective strategies to address oral health problems: The analysis's ability to develop and implement effective strategies to address the identified oral health problems, such as oral health education campaigns, prevention programs, early diagnosis programs, and appropriate and timely treatments. This corresponds to the analytical stage.
4. Evaluation of the impact of implemented strategies: The analysis's ability to assess the impact of implemented strategies, for example, the reduction in the prevalence of dental caries and periodontal disease, a balanced and non-cariogenic diet and nutrition, exercise and healthy practices to avoid addictions such as tobacco and alcohol, and integrated actions to improve the population's quality of life. This corresponds to the evaluation and control stage.
5. Active community participation: The analysis's ability to actively involve the community in the process of problem identification, the implementation of



solutions, and the evaluation and monitoring of the results achieved, measuring the expected impact. This is transversal to the entire process.

On the other hand, intersectoral oral health can address the lack of access to safe drinking water and contribute to improving this to reduce the risk of oral diseases. With the agriculture and food sector, it can promote the availability of healthy and nutritious foods. Housing conditions can influence oral health through air quality, exposure to pollutants, and lack of access to basic hygiene and sanitation services. Housing and urban planning can improve housing conditions and reduce the risk of oral diseases.

Education and culture also influence health knowledge and oral hygiene practices. Intersectoral collaboration can improve oral health education in schools and promote healthy practices. The workforce can promote policies that improve access to oral health services and reduce barriers to care. Working within the oral health team can address a wide range of social determinants and reduce oral health inequalities. The study identified and established partnerships with different sectors—such as education, culture, sports, agriculture, transportation, water and sanitation, among others—to address oral health in a comprehensive manner.

Communication and information exchange are essential for effective intersectoral coordination. It is important to establish clear and effective communication channels and share relevant and up-to-date information on oral health and the social determinants that affect it among all stakeholders. It is also important to strengthen the intersectoral capacity and resources needed to address the social determinants of oral health, such as human resource training, infrastructure investment, and access to financing. In Cuba's current socioeconomic context, intersectoral financing is essential to optimize the Plan's actions and implementation. Some authors report studies with initiatives that have demonstrated the usefulness of this health technology. <sup>(10-12)</sup>

The success of a methodology for analyzing the oral health situation in the population can be measured by its ability to actively involve other sectors in the process of identifying problems, implementing solutions, and evaluating and monitoring the results achieved, measuring the expected impact. <sup>(13)</sup> It is transversal to the entire process. It may also depend on external factors, such as political and financial support, oral health care infrastructure, and the health system's capacity to implement effective measures. The authors consider these aspects essential based on the literature reviewed.

They agree with Águila Rodríguez et al. <sup>(13)</sup> and Pría Barros <sup>(14)</sup>, who argue that the demands placed on the primary healthcare team in the doctor's office to carry out the activities of control programs on a daily basis diminishes the systematization of skills and knowledge acquired during undergraduate studies and minimizes the usefulness of the ASIS as a tool for solving problems unrelated to these programs, regardless of the epidemiological situation of the area or population being served. This situation is similar to the study of the oral component at the primary care level.

In this research, the following were identified, based on PESTEL: the lack of funding for oral health projects, <sup>(15)</sup> the general economic situation of the country and its energy system, <sup>(16)</sup> the perception of the population and their community participation. <sup>(17)</sup> Ladera Castañeda et al.,<sup>(15)</sup> addresses these aspects in Latin America with a similar perspective.

In an analysis based on the fact that, of 100 % of primary fuels consumed annually in Cuba, 59 % is used for electricity generation, and that the Electricity Union (EU) set a baseline for 2030 targeting 24 % of total electricity generation from renewable energy sources, which would provide 14,2 % of national energy needs, it is estimated that the potential for savings in end-use energy is much greater if a 10 % increase in the direct use of renewable energy sources by consumers and a 27 % savings in current energy consumption across all sectors of the economy is proposed. This is sufficient to reduce Cuba's energy needs by 51 % and thus avoid fuel imports. This is based on the existence of technologies that guarantee savings of over 52 % or more and that allow for 100 % self-sufficiency from renewable sources. <sup>(17)</sup>

This energy approach should be applied to dental services, which favors the application of the methodology and the sustainability of its results.

During the research, the need to create a computer tool to streamline the data storage process and monitor the health situation based on the true needs of the population was identified. The computerization of society is of great importance, as it makes productive and creative processes more efficient. <sup>(18)</sup>

With e-learning <sup>(19)</sup>, knowledge acquisition is achieved through teaching at all educational levels, training in the use of digital tools, and e-health allows for the creation of a reliable, timely, and high-quality health care and information system to promote ongoing training, education, and research in medicine.

Also important are the concepts of Cybersecurity <sup>(20)</sup>, which guarantees the security of information and networks, and Cyberscience, which demonstrates

the production of information, knowledge, training, cooperation, and exchange between scientific institutions and universities. <sup>(21)</sup>

Education has made significant progress with the arrival of technology, especially with the competitive implementation of virtual environments, thanks to the progressive evolution of Artificial Intelligence (AI), which opens up a world of possibilities. Artificial Intelligence and education are considered a perfect match for the proper management of educational quality, in line with the demands of the 21st century. <sup>(22)</sup>

Advances in AI, simulation, educational robotics, and machine learning will radically transform the practice and teaching of medicine, a criterion shared by the authors. They also consider that the introduction of AI in Cuban medical universities constitutes a current challenge for them in this new era of knowledge that demands human-technology synergy.

A study <sup>(23)</sup> recognizes that with the increasing computerization of medical records and telemedicine, cyberattacks can have devastating consequences. The leakage of sensitive data or the hijacking of systems can compromise patient privacy and jeopardize medical care. To counter this threat, robust cybersecurity measures are required as a protective measure. In the authors' opinion, the computerization applied to ASIS-CB will contribute to increasing the potential for impact in all the areas mentioned above.

The PESTEL analysis recognized the quality of drinking water and the availability of healthy foods as barriers to the methodology, a finding echoed by some authors consulted. <sup>(23,24)</sup> Legislation and a lack of data protection were also identified. A study <sup>(24)</sup> on women's rights finds that, from a social determination perspective, the right to oral health of postpartum women and their newborns is threatened by limiting processes at the general level (economic, political, and gender) that subsume other processes at the particular level (labor, consumption, and sociocultural dynamics), and these, in turn, subsume other processes at the individual level (oral conditions of women and their children under one year of age).

These disadvantageous processes diminish the effectiveness of a few processes that behave as if they favor such a right.

In a project presented to evaluate the administrative management of a company, it is considered that once the critical points are determined by employing PESTEL and other methodologies, a proposal is issued for the repowering of the institutional service using improvement strategies through

the use of tools that allow the strengthening of the institution's internal processes in the long term, seeking to optimize the perception of the service and, in turn, the institutional image by providing a quality experience to the end user. <sup>(25)</sup>

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## CONCLUSIONS

It is concluded that the PESTEL analysis revealed that the implementation of the methodology could be primarily affected by the lack of funding for oral health projects, the country's overall economic situation and energy system, the population's perceptions and community participation, the limited usability of digital tools for data collection and analysis, the quality of drinking water and the availability of healthy foods, and legislation on issues related to oral health and the protection of population rights.

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## **STATEMENT OF AUTHORSHIP**



**JMA:** Conceptualization, data curation, formal analysis, research, methodology, project administration, supervision, validation, visualization, writing - original draft and writing - review and editing.

**DCL:** Conceptualization, data curation, formal analysis, supervision, validation, visualization, writing - original draft and writing - review and editing.

**AISG:** Conceptualization, data curation, formal analysis, supervision, validation, visualization, writing - original draft and writing - review and editing.

**AGT:** conceptualization, data curation, writing - original draft.

**YMM:** supervision, validation, visualization, writing - original draft and writing - review and editing.

**PSE:** Conceptualization, data curation, formal analysis, writing - original draft and writing - review and editing.

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The authors declare that there are no conflicts of interest.

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