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ORIGINAL

Science, Innovation and Development for a Healthy Smile

Ciencia, Innovación y Desarrollo por una Sonrisa Saludable

Rosa María Montano-Silva[1], Yoneisy Abraham-Millán[1], Aliana Peña-Méndez[1], Thalía Fernández-Breffe[2], Iraida Céspedes-Proenza[1], Jennifer de la Caridad Romero-Amaro[1]

[1]Facultad de Ciencias Médicas Isla de la Juventud. Isla de la Juventud, Cuba.
[2]Policlínico Docente Universitario Dr. Juan Manuel Páez Inchausti. Isla de la Juventud, Cuba.

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Corresponding author: Rosa María Montano-Silva

ABSTRACT

Science, innovation, technology, and development will enable the well-being and quality of life that the population must achieve, taking into account the role played by Promotion and Prevention. The objective of the research was to evaluate the results of the research, development, and innovation project "For a Healthy Smile." Qualitative research was conducted from 2023 to 2025. Information was obtained from the project's semiannual report template and the evaluation of schedule compliance. The variables used during the research process were: social, scientific, and technological impact. The main results achieved were: positive changes in the knowledge of undergraduate and graduate students in the Dentistry program, as well as preschool students, schoolchildren, educators, and legal representatives. Hygiene and health activities with a participatory approach were implemented in different communities across the region. A training plan for student scientific work, a postgraduate improvement strategy, a strategy for fifth-year-old infants, a strategy for preschool infants, and an educational program for preschool infants were implemented. Participation in scientific events and publications in scientific journals by 100 % of members. Websites on: potentially malignant lesions and cancer, oral health, healthy nutrition, primary dentition, and mouth breathing. The social, scientific, and technological results demonstrate significant value for the development of science, technology, and society in the region. The results of the "For a Healthy Smile" project can be evaluated as satisfactory.

Keywords: Science; Innovation; Development; Impact.

RESUMEN

La ciencia, innovación, tecnología y el desarrollo permitirán el bienestar y calidad de vida que debe alcanzar la población, teniendo en cuenta el papel que desempeñan la Promoción y Prevención. El objetivo de la investigación fue evaluar los resultados del proyecto de investigación, desarrollo e innovación "Por una sonrisa saludable". Se realizó una investigación cualitativa en el periodo comprendido entre 2023-2025. La información se obtuvo del modelo de informe semestral del proyecto y la evaluación del cumplimiento del cronograma. Las variables que se utilizaron durante el proceso de investigación fueron: impacto social, científico y tecnológico. Los principales resultados alcanzados fueron: modificación positiva del conocimiento de estudiantes de pregrado y posgrado de la carrera estomatología, así como de estudiantes preescolares, escolares, educadoras y responsables legales; ejecución de actividades higiénico-sanitarias con enfoque participativo en diferentes comunidades del territorio; plan de formación de trabajo científico estudiantil; estrategia de superación de posgrado; estrategia para infantes de quinto año de vida; estrategia para infantes de preescolar, programa educativo para infantes de preescolar; participación en eventos científicos

y publicaciones en revistas científicas del 100 % de los miembros; páginas web sobre: lesiones potencialmente malignas y cáncer bucal, salud bucodental, nutrición saludable, dentición temporal, y respiración bucal. Los resultados sociales, científicos y tecnológicos manifiestan un significativo valor para el desarrollo de la actividad de la ciencia, la tecnología y la sociedad en el territorio; pudiendo evaluar de satisfactorios los resultados del proyecto "Por una sonrisa saludable".

Palabras clave: Ciencia; Innovación; Desarrollo; Impacto.

INTRODUCTION

Oral diseases are highly prevalent. Worldwide, 3,5 billion people suffer from them, and they are closely related to non-communicable diseases, thus placing a considerable burden on health, society, and the economy.[(1)] Although improvements have been seen in some countries, the burden of poor oral health remains, especially among the most vulnerable members of society.

Worldwide, 2,3 billion people have untreated dental caries in permanent teeth, 530 million children have untreated dental caries in primary teeth, 796 million people suffer from periodontal disease,[(2)] and oral cancers are among the most prevalent cancers worldwide, causing 180 000 deaths per year. In some countries, it is the leading cause of cancer-related mortality.[(3)]

The economic burden of poor oral health and the direct and indirect costs of oral diseases amount to £545 billion worldwide,[(4)] making it one of the most costly areas of health care. In addition to pain, discomfort, and loss of well-being and quality of life, oral health problems cause school and work absenteeism,[(5)] which in turn leads to learning deficits and productivity losses.

Poor oral health negatively affects the quality of life and healthy aging, both physically and mentally, and is highly associated with cardiovascular disease, diabetes, cancer, pneumonia, and premature births;[(6)] it reflects significant inequalities between countries and affects vulnerable people and other risk groups in particular.

The risk factors that oral diseases share with other non-communicable diseases, such as tobacco use, harmful alcohol consumption, high intake of free sugars, and poor hygiene, are some of the reasons why oral health promotion, prevention, and treatment strategies need to be integrated into national policies on non-communicable diseases, with coordinated inter-ministerial and intersectoral action, from a perspective that encompasses the entire life cycle, from pregnancy and birth to old age.

Primary health care, schools, and communities must implement strategies that can control the risk of disease, taking into account health determinants, to comprehensively promote health and prevent diseases that could lead to a decline in the population's well-being and quality of life. The above highlights the need for a project incorporating innovation and technology into the community to contribute to knowledge about oral health from educational and social media perspectives and to the comprehensive development and analysis of health with a synergistic approach based on community education and postgraduate training.

The essence is to promote different forms of collaboration: inter-institutional, intersectoral, intra, inter, and transdisciplinary. The project does not aim to provide a comprehensive study on oral health but rather to show that it is part of the population's well-being and quality of life as a strategic policy of states for sustainable development.

The present research was designed to evaluate the results of the research, development, and innovation project 'For a Healthy Smile'.

The results of this research aim to share the contributions to society, technology, and science for sustainable development that have been designed and implemented by the project 'For a Healthy Smil

DEVELOPMENT

Qualitative research was conducted between January 2023 and April 2025 to evaluate the results of the study, development, and innovation project 'For a Healthy Smile.' The following variables were analyzed: social impact, technological impact, and scientific impact.

An analysis was conducted to determine compliance with the activities scheduled for those periods and the Project's Half-Yearly Report models established in the Resolution regulating the System of Science, Technology, and Innovation Programmes and Projects. The research results derived from the project with code PT241IJ400-024 contribute to the 'Quality of Life' Programme.

Theoretical methods (analytical-synthetic, inductive-deductive, historical-logical analysis, and a systems approach), empirical methods (observation, documentary analysis), and mathematical-statistical methods (descriptive) were used.

The results of the research project presented in this study constitute essential points of convergence between oral health and other Sustainable Development Goals, in particular, Goal 1 (End hunger, achieve food security

and improved nutrition, and promote sustainable agriculture), Goal 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) and Goal 12 (Ensure sustainable consumption and production patterns). It is also based on the Political Declaration of the High-level Meeting of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases (2011), which stated that oral diseases pose a significant challenge and that their situation could benefit from measures to address non-communicable diseases as a whole; and the Political Declaration of the High-Level Meeting on Universal Health Coverage (2019), which includes a commitment to intensify efforts to address oral health as part of universal health coverage.

To achieve this, relationships were established with the Directorate-General for Health, the Directorate-General for Education, and other Ministry of Higher Education institutions, radio and television stations. The following were recognized: resolutions WHA60.17 (2007), WHA69.3 (2016), WHA72.2 (2019), as well as decisions WHA72.11 (2019), WHA73.12 (2020) and WHA74.5 (2021); the National Stomatological Care Programme; the National Programme for the Computerisation of Cuban Society; the National Economic and Social Development Plan: Agenda 2030; National Programme for Health and Sexuality Education; National Strategy for Education and Food Sovereignty; Comprehensive Development Programme for the Isle of Youth and the strategic objectives assumed in the project of the Territory's Development and Innovation Unit.

The research was approved by the Technical Advisory Council of the Faculty of Medical Sciences of Isla de la Juventud and the other institutions mentioned above. The principles and regulations established in the Declaration of Helsinki and the Public Health Law of the Republic of Cuba were respected.

The analysis of compliance with the research project schedule revealed the following impacts:

Social

1. Increased the well-being and quality of life of undergraduate and postgraduate students and dentists.
2. Enabled the training of human resources through completing specialized projects.
3. Positive change in the knowledge of students and dentists regarding the primary diseases affecting the stomatognathic system.
4. There was a positive change in knowledge among educators, preschoolers, schoolchildren, and patients in schools and communities where interventions related to the main diseases affecting the stomatognathic system were implemented.
5. Health promotion and hygiene activities with a participatory approach for the implementation of the project in the communities of La Demajagua, Atanagildo-Cajigal, La Fe, La Caoba, Delio Chacón, Nueva Gerona, and in the home for children without family support.

Scientific

1. Design of surveys and interviews.
2. Analysis of the health situation in clinics in the territory and the El Guayabo prison.
3. Design a training plan for the development of student scientific work.
4. Design a strategy for improving continuing education for students in the dentistry program.
5. Design the educational strategy 'The Tooth Fairy' for five-year-old children, their legal guardians, and educators.
6. Educational program 'For a healthy smile' for preschool children, their legal guardians, and educators.
7. Design of six complementary materials for preschool education related to the primary diseases affecting the stomatognathic system.
8. Design of teaching resources.
9. Design of the text 'Biochemistry Applied to Stomatology'.
10. Of 11 undergraduate students participating in the project in 2023, 100 % presented at regional, national, and international scientific events, including the Student Science Conference, Science and Technology Forum, ISLACIENCIA, and SALUDISLA 2023 Scientific Health Convention. At these events, they received awards ranging from honorable mentions to relevant awards.
11. The rest of the project members in 2023 presented at regional, national, and international scientific events, including National Congress of Family Medicine, First International OdontoSantiago Congress 2023, Scientific Conference on Stomatology 2023, Second International ISLACIENCIA Convention 2023, Third Virtual Congress on Basic Biomedical Sciences Cibamanz 2023, EDUMED Scientific Methodological Conference 2023, SALUDISLA Scientific Health Convention 2023.
12. In 2024, four first-year students from the Stomatology program were included as project members. The undergraduate students participated in regional, national, and international events such as the Student Scientific Conference, the Félix Varela Class Festival, the 2nd PRISALUD National Primary

Health Care Event, the 3rd International Congress on Science and Education, the Municipal Scientific Conference on Stomatology and the Palliative Care Workshop. Two students entered the Annual Health Award competition at the regional level in the scientific article category and obtained relevant results.

13. The rest of the project members 2024 participated in regional, national and international scientific events such as the International University Congress 2024, the Second National Primary Health Care Event PRISALUD, the Family Medicine Conference, the Annual Health Award Competition, the Third International Congress on Science and Education, the International Dentistry Meeting, the Paediatrics Congress, the Municipal Scientific Conference on Stomatology, the Palliative Care Workshop and the EDUMED 2024 Scientific and Methodological Conference. In the Annual Health Award Competition, one mention and two relevant awards were obtained in three categories.
14. Until May 2025, undergraduate students have participated in the Student Scientific Conference and the Félix Varela Class Festival.
15. Until May 2025, project members have participated in Pedagogy and University Conferences and the 5th International Health Convention CUBASALUD 2025.
16. Twenty-six articles on the research results related to the project have been published in journals by Health, Science and Technology Publishing Hous, and the proceedings of the events described above.
17. Another relevant aspect is the admission of three doctoral students to doctoral training.

Technological

1. Design informative posters on topics researched and published by project members.
2. Multimedia design on stomatological biosafety.
3. Multimedia design on potentially malignant lesions and oral cancer.
4. Design of a website on potentially malignant lesions and oral cancer.
5. Design a mobile application on potentially malignant lesions and oral cancer.
6. Design a website for preschool children on oral health and healthy nutrition.
7. Website design for pregnant women on oral health and primary dentition.
8. Website design on mouth breathing habits.

Health as a social product requires an organized response, allowing comprehensive actions and interventions to achieve the population's well-being. The current complexity and universal nature of health problems make it challenging to identify and define where they begin and end, both in terms of their origin or cause and how to solve them. They, therefore, require coherent and holistic strategies that bring together the development of various scientific disciplines and actors in society.[7,8]

To decide how to act in a health situation, having knowledge of reported frequency statistics and applying a health strategy is not enough. It is also necessary to analyze the level of understanding that human beings have about the disease and aspects related to their daily hygiene practices and attitudes towards it.[9]

The approach of medical professionals, which is focused on disease, should, therefore, be modified to a prevention-based approach grounded in health, health education, and self-care. We should adopt a salutogenic vision that addresses aspects that generate health with a 'One Health' approach.[10]

Education is a tool that can promote greater awareness and a change in attitude towards well-being and quality of life for sustainable development. The quality of substantive processes at the University depends on the adequate performance of comprehensive, capable, and competent professionals. Hence, their continuous training is a fundamental strategy to ensure their undergraduate and continuing education efficiency.

In the developmental and creative training process, new results, methods, and strategies are not intended to replace traditional ones but rather to integrate them to meet the requirements of evolution and improvement.[9]

It is possible to build a new university that promotes the processes of general appropriation of knowledge that social, comprehensive, and sustainable development demands; therefore, strengthening the unity between teaching, research, and innovation is vitally important.[11,12]

CONCLUSIONS

The social, scientific and technological results demonstrate significant value for the development of science, technology and society in the region, and the 'For a healthy smile' project can be considered satisfactory.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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AUTHOR CONTRIBUTION

Conceptualisation: Rosa María Montano-Silva, Yoneisy Abraham-Millán, Aliana Peña-Méndez.

Research: Rosa María Montano-Silva, Yoneisy Abraham-Millán, Aliana Peña-Méndez, Thalía Fernández-Breffe, Iraida Céspedes-Proenza, Jennifer de la Caridad Romero-Amaro.

Data curation: Thalía Fernández-Breffe, Iraida Céspedes-Proenza, Jennifer de la Caridad Romero-Amaro.

Formal analysis: Rosa María Montano-Silva, Yoneisy Abraham-Millán, Aliana Peña Méndez.

Methodology: Rosa María Montano-Silva, Yoneisy Abraham-Millán.

Writing – original draft: Rosa María Montano-Silva.

Writing – review and editing: Yoneisy Abraham-Millán.