



Achievements and Advances of the Diploma, Master's and Doctorate Program in Biomedical Research of the Faculty of Medical Sciences, First Cohort period 2017-2019.

Ph.D Manuel Enrique Pedroza Pacheco

Professor. Coordinator PROMIB, First Cohort.

UNAN-Managua

hppedroza@gmail.com

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ABSTRACT

This article is presented to pose the achievements and progress of the Diploma, Master's, and Doctorate Program in Biomedical Research of the Faculty of Medical Sciences, First Cohort, period 2017-2019. They are highlighted as relevant findings: 1) The transversal axis of scientific research at the postgraduate level of the Faculty of Medical Sciences has been successfully implemented, which is expressed in the completion of the Diploma, Master's and Doctorate Programs in Biomedical Research; 2) The institutional agreement between the Faculty of Medical Sciences of UNAN-Managua-MINSA has been strengthened, with the completion of the Online Postgraduate Courses, directed at the resident doctors of the MINSA hospitals; 3) Developed the Moodle Platform to support both programs PROMIB and PRODIB, becoming the technical support for the development of the processes of Postgraduate Virtual Education of the Faculty of Medical Sciences of UNAN-Managua; 4) The scientific productivity of the Faculty of Medical Sciences of UNAN-Managua

has increased, through 16 scientific articles and 43 trials that have been produced in PROMIB; 5) The curricular innovation of the FCCM of UNAN-Managua has been demonstrated, to improve the professional competencies and the entrepreneurial capacity in the academic training of the new medical specialists of Nicaragua.

1. INTRODUCTION

As defined by De Souza (1999): “We are living in a time of change that is changing the era in which we live... change of era, institutional change, change of paradigms... Humanity is witnessing the dawn of a new era”. In today’s world, there are continuous and accelerated changes in the “Society of Knowledge, Computerization and Learning”, centered on seven megatrends: *Biotechnology, Biomedicine, Biostatistics, Bioinformatics, Biorobotics and GIS, Climate Change and Change of Paradigms*, which define a new institutional context of paradigm breaking, of new and dynamic learning at global, regional, national and local levels (Pedroza, 2015).

In this global context, there is a set of processes of educational, technological, socio-economic, etc., transformation, all of which are aimed at the continuous improvement of the quality of university education in Nicaragua. Since November 2011, the new transformations in the field of scientific research that are being experienced in our “alma mater” UNAN-Managua are based on the UNAN-Managua R+D+i model. Given this new conceptual model with a holistic, systemic and anthropocentric vision, the different research processes are integrated into a single system, as a set of processes of research, innovation, entrepreneurship, extension, and society, aimed at contributing to the sustainable human development of Nicaraguan society (Pedroza, 2015).

In this new strengthened institutional context of the UNAN-Managua, the Diploma, Master’s (PROMIB), and Doctorate (PRODIB) Programs in “Biomedical Research” of the Faculty of Medical Sciences (FCCM) of the UNAN-Managua, First Cohort, 2017-2020, were initiated. These programs have their origin in the strategy defined by the Direction of Research DIRINVES of UNAN-Managua, to strengthen the Faculty of Medical Sciences (FCCM) in the area of scientific research, innovation and entrepreneurship. Since 2013, this strategy had already been defined in seven major objectives:

1. To contribute to the scientific development of the doctors of the FCCM and Nicaragua, through the Doctorate Program in Biomedical Research of the FCCM (PRODIB).
2. Contribute to the development of the postgraduate education of the FCCM, through the Master’s Program in Biomedical Research of the FCCM of UNAN-Managua (PROMIB).

3. To support the curricular innovation of the FCCM of UNAN-Managua, to improve the professional competences and the enterprising capacity of the future doctors of Nicaragua.
4. Create and develop the Biostatistics Unit of the FCCM of UNAN-Managua, to contribute to improving the quality, relevance, and impact of the research results of the graduates on the different medical residents.
5. To increase the scientific productivity of the FCCM of UNAN-Managua, through scientific publications (scientific articles, scientific essays, scientific articles from own perspective, case studies, etc.).
6. Contribute to the development of scientific research in Biotechnology and Molecular Biology of the FCCM of UNAN-Managua.
7. To contribute to improving the scientific training of the resident doctors of the 23 medical specialties of the FCCM UNAN-Managua-MINSA, through on-line postgraduate courses (POSGIB), in Scientific Research Methodology, Biostatistics, and Scientific-Technical Writing. *This objective was incorporated after the failed coup d'état attempt in April 2018.*

Both programs, PROMIB and PRODIB, represent an institutional change and a paradigm shift in scientific research at UNAN-Managua. This paradigmatic change, contributed from the R+D+i Model, promotes a transforming university, capable of transforming itself and contributing to the transformation of society, developing other ways of doing science to create new knowledge, as highlighted in Pedroza (2016): “This is the route called research-innovation-entrepreneurship-extension and society (CTIES), which is based on studying real-world problems, in the search for their real, concrete solutions, with validity and reliability, through scientific research”.

Both the PROMIB and PRODIB programs have been developed as part of an organizational innovation of the FCCM UNAN-Managua, to improve the quality of higher education *through the continuous improvement of Teaching and Postgraduate Research in the health sector*. Both programs are innovative since *they integrate from different postgraduate programs, the talents in scientific research that UNAN-Managua currently has, with experts from different clinical and surgical areas of the health sector, implementing an interdisciplinary approach to scientific research, promoting organizational and institutional innovation, implementing the Scientific Committees (CTIES_Salud), the Bioethics Committees and the updated Lines of Research in the Health Sector, developing educational research online and with a mixed approach, etc.*

The Master's Program PROMIB and Doctorate PRODIB of the FCCM of UNAN-Managua is an organizational and inter-institutional innovation carried out by the partnership between UNAN-Managua and MINSA and that favors the integration and development of postgraduate education and scientific research. This organizational innovation is applied with an Anthropocentric, Holistic and Systemic vision, for the approach and solution of problems based on reality, in the search for solutions that contribute to the sustainable human development of the Nicaraguan family (Pedroza, 2018).

It is expected that both PROMIB and PRODIB will facilitate the development in new medical professionals of new competencies, capacities, skills, and professional abilities, necessary to design biomedical research by observational (*analytical*) to experimental (*clinical trials*) methods, to reach levels of knowledge both descriptive, as well as correlational, analytical/causality and even predictive/ prognostic, to plan and apply the field phase, to apply the analysis and biostatistical interpretation of data, to know and apply the fundamental rules of scientific writing. These new skills are aimed at guaranteeing the quality and relevance of master and doctoral theses. *In this way, the scientific production and productivity of the Faculty of Medical Sciences UNAN-Managua and the Nicaraguan health sector will be increased.*

The present article is developed with the general objective of publicizing the achievements and progress of the Diploma, Master and Doctoral Program in "Biomedical Research" (PROMIB and PRODIB), 2017-2019, to highlight the achievements of both programs as an institutional contribution of the FCCM, to the strengthening of the doctoral programs of UNAN-Managua.

2. DEVELOPMENT

2.1. Background to the Diploma, Master's and Ph.D. Programmes in Biomedical Research (PROMIB and PRODIB) of the FCCM UNAN-Managua

In the period 2011-2016, a wide and deep process of Institutional and Organizational Innovation of Research was developed at UNAN-Managua (Pedroza 2018), which led among other actions of relevant importance, the following:

1. From DIRINVES and with the support of Dr. Freddy Meynard, Dean of the Faculty of Medical Sciences of UNAN-Managua, the creation, and promotion of free Postgraduate Courses in "Biomedical Research" was promoted since 2010, aimed at R3 medical residents from different medical specialties. An average of 20 physicians per year graduated from these postgraduate courses, completing a total of 125 resident physicians who graduated from six postgraduate courses held in Managua in the period 2011-2016, plus 15 general physicians graduated.

2. Creation and promotion of Master's and Doctoral Programs in Scientific Research, such as the "Master's in Scientific Research Methods (MEDINV)" of FAREM Carazo, UNAN-Managua. This program was approved by the University Council of UNAN-Managua on December 6, 2013, beginning on March 8, 2014. This program has completed three cohorts to date, starting its Third Cohort on February 5, 2018, in the Faculty of Science and Engineering UNAN-Managua.
3. Creation and promotion of the Doctorate Program "Management and Quality of Scientific Research (DOGCINV)" of FAREM Estelí, UNAN-Managua, First Cohort 2016-2019. This program was approved by the University Council of UNAN-Managua on January 19, 2016, and fortunately, it was possible to inaugurate it on Thursday, July 7, 2016, successfully graduating the first thirteen Ph.D., in December 2019.
4. From DIRINVES Ph.D. Manuel Enrique Pedroza and with the support of Dr. Freddy Meynard, Dean of the Faculty of Medical Sciences of UNAN-Managua, promoted in 2013, the creation of the *Doctorate Program in "Biomedical Research"* **PRODIB** of the Faculty of Medical Sciences of UNAN-Managua, which was approved by the University Council of UNAN-Managua, on December 19, 2015, and opened on October 5, 2017, coordinated by Dr. Marlene Muñoz and Dr. Marianela Corriols.
5. From the FCCM, the *Program of Master and Diploma in "Biomedical Research"* **PROMIB** of the Faculty of Medical Sciences of UNAN-Managua was promoted, *which was inaugurated on October 12, 2017, as a Diploma Program at the request of MINSA*. The first proposal of PROMIB, was presented by Ph.D. Pedroza to Dr. Freddy Meynard, on November 21, 2016, as part of a new Model of Management of Scientific Research in Medical Sciences, figure 1, (Pedroza, 2015). PROMIB was approved on November 15, 2018, by the Faculty Council of Medical Sciences of UNAN-Managua. PROMIB currently operates successfully with 47 base physicians who are clinical-surgical teaching physicians, in MINSA and non-MINSA hospitals.

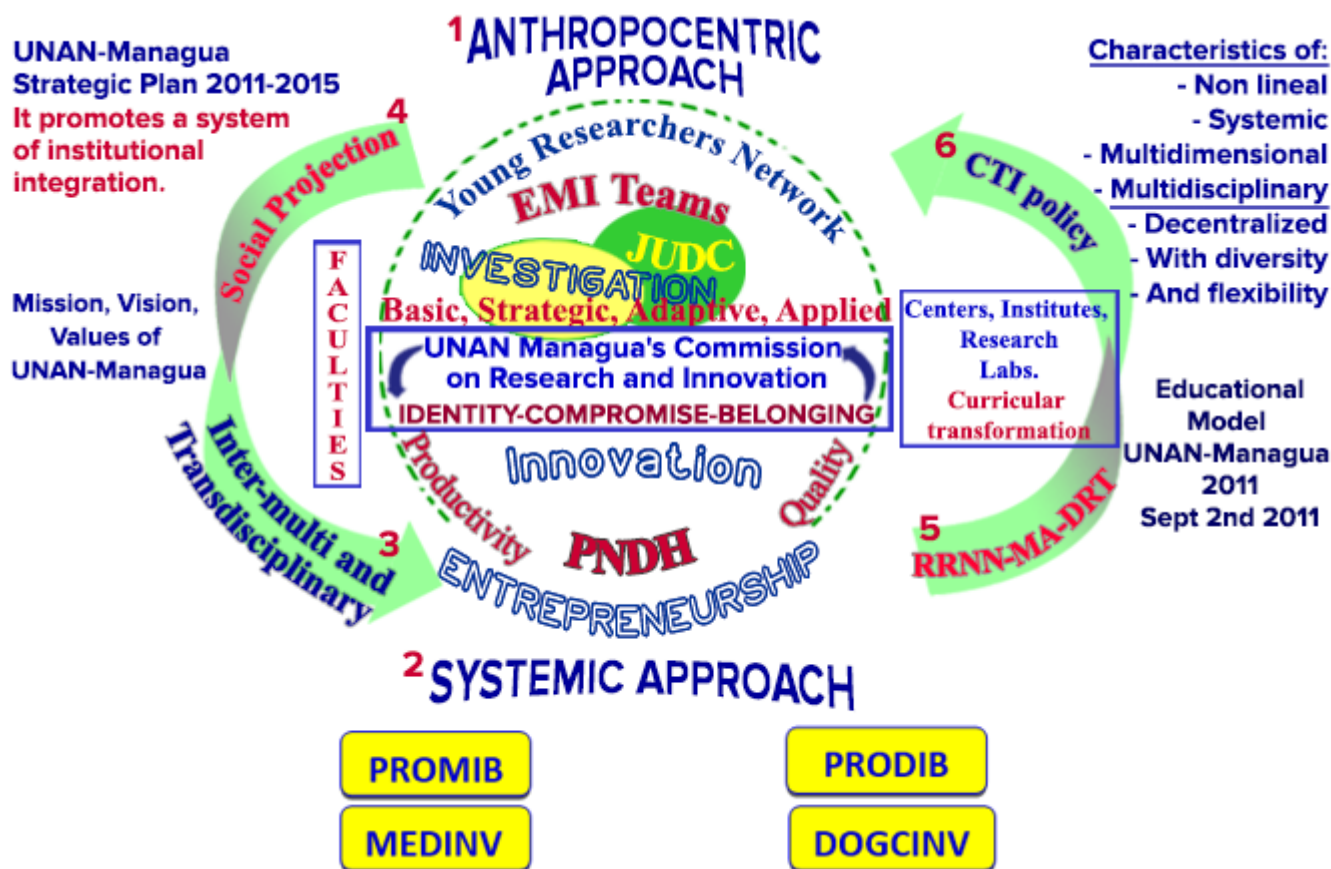


Figure 1. Research, Development, and Innovation (R&D&I) model, target image.

2.2. Philosophical foundation of the Diploma, Master’s and Ph.D. programs in Biomedical Research (PROMIB and PRODIB), of the FCCM UNAN-Managua

The philosophy behind both the PROMIB and PRODIB programs of the Faculty of Medical Sciences of UNAN-Managua is based on (1) the Mission and Vision of UNAN-Managua, (2) in the Principles and Values of UNAN-Managua, expressed in its Strategic Plan 2015-2019, (3) in the Research and Innovation Policies of UNAN-Managua, which implies *Interdisciplinary Management* of the research processes and (4) in the commitment to contribute to the fulfillment of the Strategic Programs of the National Plan for Sustainable Human Development of Nicaraguans, (PNDH, 2013).

Among the policies of the UNAN-Managua, it is proposed in Article 3: “Develop a permanent systemic approach to research with teaching at the undergraduate, graduate and university extension levels” (UNAN-Managua 2013). In the Institutional Strategic Plan, 2015-2019, UNAN-Managua states in the Axis of Modernization that: “Since it is about human and professional training, university management includes values, beliefs, interests, principles, hypotheses, premises, theories, aspirations, commitments, contradictions and therefore

complexity and diversity are inherent to science and technology institutions. UNAN-Managua, at all levels of training, must contribute to sustainable development by training professionals and technicians who have an entrepreneurial, ethical, and critical attitude, both in their professional and personal and social work”.

The University faces the challenge of promoting, building, and developing through research, new competencies both internally and externally, strengthening the strategic alliance with the health sector, identifying new knowledge and technologies that promote the creation of new possibilities of transformation that facilitate scientific-technological development in the health sector. The excellent human capital of the FCCM UNAN-Managua constitutes a great academic potential that should innovate, explore, and propose initiatives of interest to strengthen the University and Nicaraguan society as a whole.

UNAN-Managua (2011), in its Educational Model, highlights the sociological basis: “Nicaragua is a multicultural country rich in natural resources. Despite these factors, it faces a situation of impoverishment and backwardness in terms of the development of science and technology. This lack of conditions for promoting innovation and creation limits the economic growth of the country and the human development of Nicaraguans”.

The scientific foundation of both programs is based on the Research Management Model, R+D+i Model (Pedroza 2015), systemic and anthropocentric approaches to research methods. Epistemological foundation: construction, rescue, and revaluation of knowledge, *which leads to closing the gaps in information, knowledge, and technology, through the adoption and dissemination of new knowledge, by applying new paradigms, approaches, methods, and research techniques in the training of new medical professionals.* This rationale is expected to contribute to improving the quality of training for new medical professionals. Innovation, on the other hand, includes mechanisms for the adoption, absorption, and adaptation of knowledge, transforming it into available technology, moving on to entrepreneurship.

2.3. Basic Physicians Participating in the PROMIB and PRODIB Programs

PROMIB and *PRODIB* participants are clinical-surgical teachers from MINSA and non-MINSA hospitals in Nicaragua. Of 47 *PROMIB* participants, 6.3829% are from **EMI** Lenin Fonseca Hospital and Central Hospital Managua and Militar Hospital, respectively; 8.5106% are from EMI Bertha Calderón Roque Hospital, German-Nicaraguan Hospital and Conchita Palacios Hospital, respectively. 10.6382% are from EMI Fernando Vélez Páiz and Manolo Morales Hospital, respectively; 4.2553% are from EMI Hospital de atención Psicosocial Hospital, Baptist Hospital, Ophthalmology National Centre, Dermatology National Centre, Aldo Chavarría Rehabilitation Centre and Teaching Hospital Oscar Danilo Rosales, respectively. The EMI Carlos Roberto Huembes Hospital accounts for 14.8936% (Figure 2).

Of 47 participants in PROMIB, 63.8297% are women and 36.17% men. By medical specialty, 14.89% are from the specialty of pediatrics and gynecology/obstetrics, respectively; 10.63% are from the specialty of general surgery; 8.51% are from the specialty of radiology and public health; 6.38% is from the specialty of internal medicine and orthopedics, respectively; 4.25% is from the specialty of anesthesiology, psychiatry, emergency medicine, ophthalmology, dermatology, and physiatry, respectively; and 2.12% is from the specialty of pathology and general medicine, respectively (Figure 3).

Of the six PRODIB doctoral students as of December 2019, 83.33% are women, two of whom are basic doctors in MINSAs hospitals, and two of whom are teachers at UNAN-Managua.

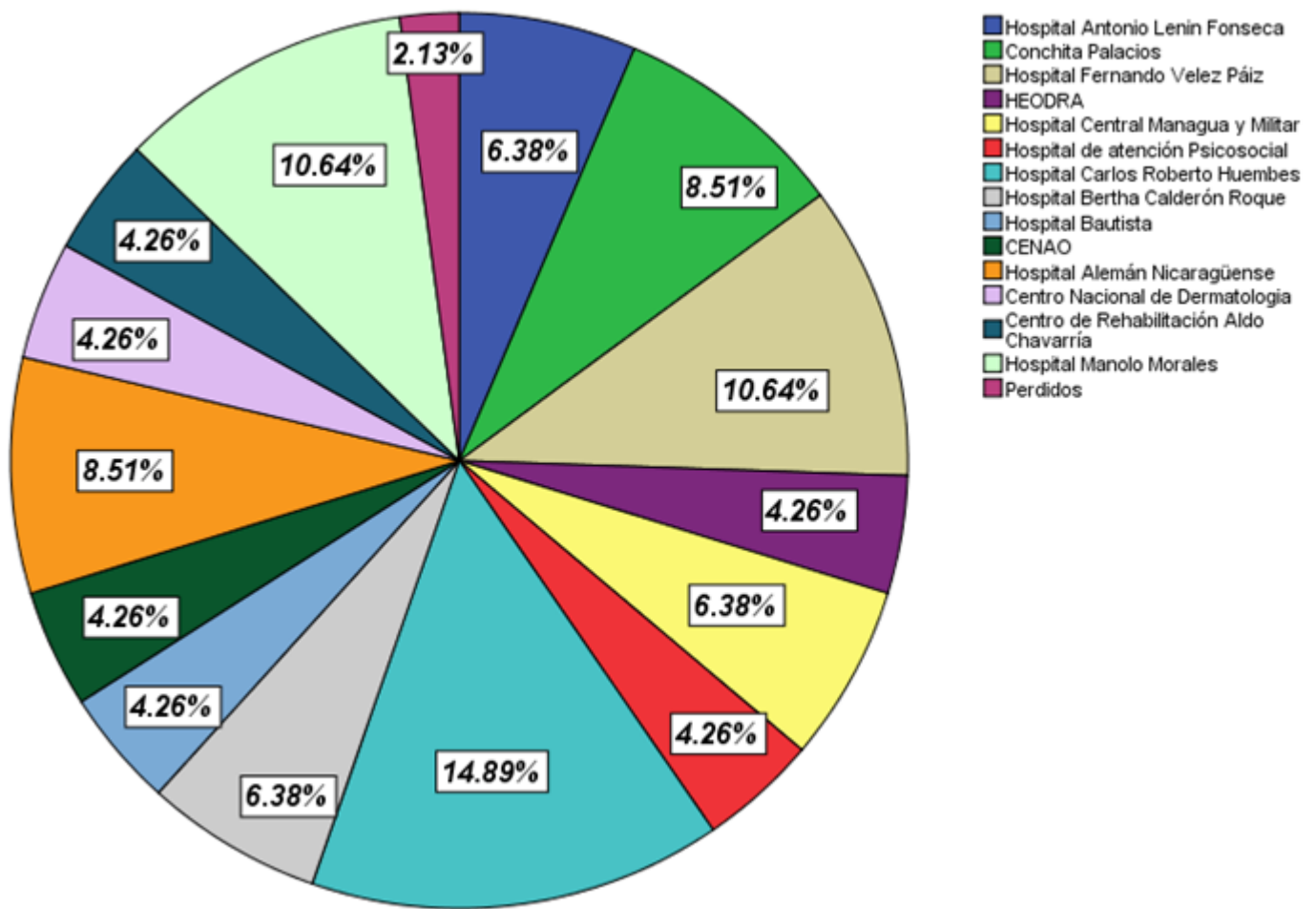


Figure 2. PROMIB participants, organized in EMI Teams.

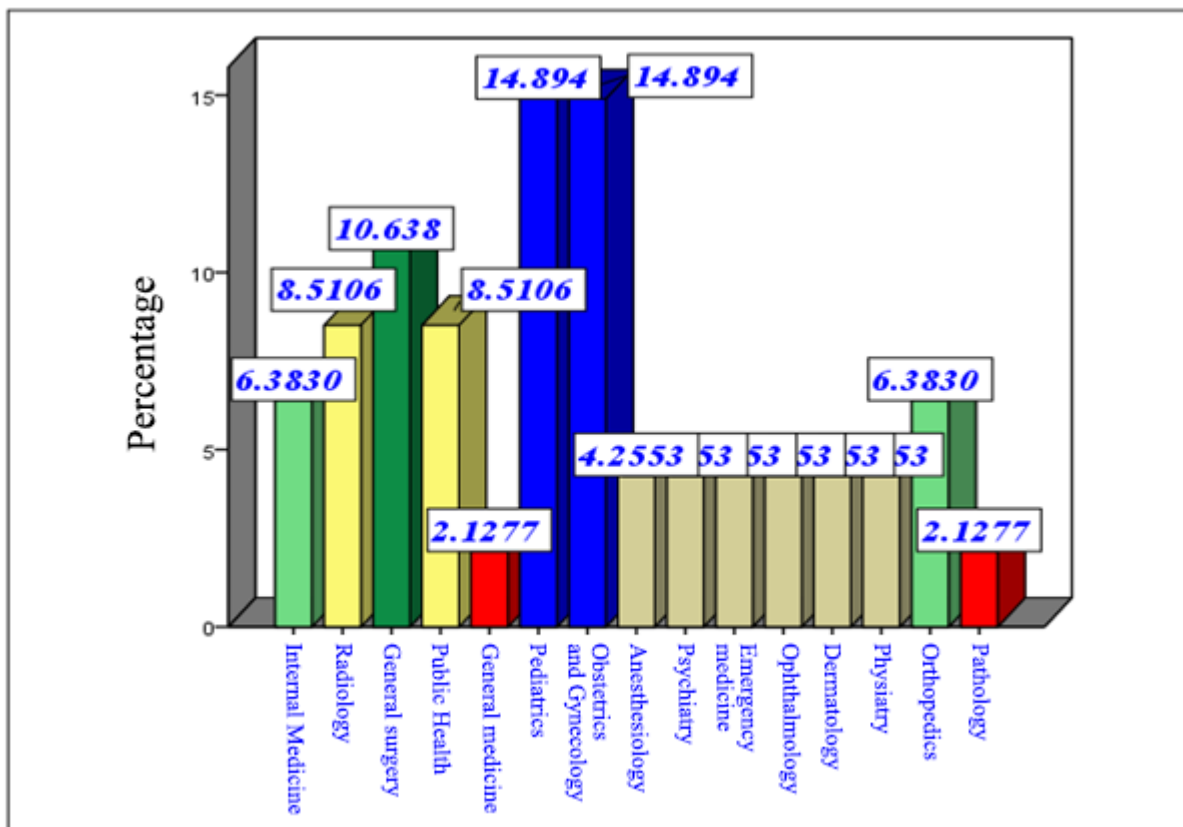


Figure 3. Medical specialties of PROMIB participants

2.4. Academic Advances in the Diploma, PROMIB and PRODIB Programs

During the second half of 2017 to the second half of 2019, the Diploma Program, *PROMIB* and *PRODIG* were completed at FCCM. These programs have completed their academic modules, which are still underway, and are expected to conclude their first cohort in 2020.

As part of the *Master's Program in "Biomedical Research" PROMIB* of the Faculty of Medical Sciences of UNAN-Managua, the Diploma in "Biomedical Research" began at the request of MINSA in October 2017, concluding this stage of training in February 2019. In July 2019, the institutional graduation ceremony was held for 58 base doctors who completed the *Diploma in "Biomedical Research" First Cohort*. This Diploma completed 26.12 academic credits, which correspond to the following courses: *Scientific Research Methods with a Quantitative Approach*, *Biostatistics*, *Scientific Research Methodology*, *Scientific-Technical Writing*, *Ethics in Biomedical Research*, *Seminar I. Scientific Article and Essays*.

In March 2019, the *Master's Program in "Biomedical Research" PROMIB* of the FCCM of UNAN-Managua was continued. The first cohort, expected to be concluded in 2020, is organized in three modules to complete 77 credits: Module I: The Quantitative and Qualitative Approach to Scientific Research, Module II: Experimental and Non-Experimental Research in Biomedical

Research, Module III: The Holistic, Systemic and Anthropocentric Approach to Biomedical Research. The three modules contain fourteen courses in total (Pedroza, 2019). Currently, in December 2019, only the following courses are missing: Fundamentals of Experimental Research in Biomedicine, Philosophy of Science, Scientific Research and ICTs, Applied Research and Thesis Seminar.

From the first **PRODIB** cohort, the courses of its curricular design have already been completed. PRODIB has a total of 127 credits and 2800 hours (Corriols 2017). Currently, December 2019, PRODIB's doctoral students, UNAN-Managua, are in the *Graduation Phase of their doctoral training*, which establishes the completion of the field phase for the collection of their data, the biostatistical analysis to arrive at the elaboration of their doctoral theses, including the completion of their four scientific articles and the completion of the defense process of their PRODIB doctoral thesis.

2.5. Results and Progress of the Diploma Programs, PROMIB and PRODIB

At the end of the period 2017-2019, hard institutional work has been developed, on the *transversal axis of scientific research at the postgraduate level of the Faculty of Medical Sciences of UNAN-Managua*, which is evidenced by the great motivation of the participants, in the results and successful progress achieved to date, which is presented below:

The cross-cutting theme of scientific research at the postgraduate level of the Faculty of Medical Sciences of UNAN-Managua **has been working well**, this is expressed in the continuous development that has demonstrated the *Diploma, Master and Doctorate Programs in "Biomedical Research"*, aimed at medical specialists in MINSA hospitals and not MINSA, which are national reference hospitals in Nicaragua.

Currently, the First Cohort of the Diploma Program in "Biomedical Research" was completed, graduating 58 basic doctors; the Master's Degree in "Biomedical Research" is continuing, with 47 basic doctors expected to graduate in June 2020 and the *Doctorate Degree in "Biomedical Research"* is continuing, with 6 basic doctors expected to graduate in 2020. This academic contribution is very relevant, as evidenced by the institutional approval of the curricular documents of both PROMIB and PRODIB.

During 2018 and 2019, the institutional agreement MINSA- UNAN-Managua has been successfully implemented, which is the basis for the development of the Online Postgraduate Courses: (1) *Scientific Research Methodology*, (2) *Biostatistics* and (3) *Scientific-Technical Writing*, aimed at resident doctors R1, R2 and R3 respectively, from MINSA and non-MINSA hospitals.

Simultaneously to the implementation of the *transversal axis of scientific research at the postgraduate level of the Faculty of Medical Sciences*, the Moodle Platform was developed to support

PROMIB and PRODIB, as technical support for both programs. All the teaching resources for the different courses, Videoconferences, PowerPoint Lectures, textbooks, recommended PDF readings, etc. are available on this platform (msceducav.unan.edu.ni).

In 2019, the strengthened collaboration with Dr. Jorge Antonio Lazareff from UCLA, Professor of Bioethics and Scientific Paradigms, Advisor to PROMIB and PRODIB, stands out. *The postgraduate Virtual Education process was successfully developed through the Teleconferences and Videoconferences given by Dr. Jorge Antonio Lazareff from UCLA.*

Another aspect that stands out in this period is the increase of the scientific productivity of the Faculty of Medical Sciences of UNAN-Managua, through the realization of 16 scientific articles and 43 essays that have been produced in the PROMIB, which will enrich the scientific publications of the FCCM. Also of great importance is the strengthening of the *innovative curriculum of the FCCM of UNAN-Managua*, to improve the professional skills and entrepreneurial capacity in the training of medical specialists in Nicaragua.

3. CONCLUSIONS

1. The Faculty of Medical Sciences of UNAN-Managua *has successfully implemented the cross-cutting theme of scientific research at the postgraduate level, which is expressed in the completion of the Diploma, Master and Doctorate Programmes in "Biomedical Research"*, aimed at specialist doctors in MINSA and non-IMSA hospitals.
2. *The institutional agreement between the Faculty of Medical Sciences of UNAN-Managua-MINSA has been strengthened by the implementation of online postgraduate courses for resident doctors in MINSA and non-UNMED hospitals: (1) Scientific Research Methodology, (2) Biostatistics and (3) Scientific and Technical Writing.*
3. *The Moodle Platform has been developed as technical support for both PROMIB and PRODIB programs, becoming the technical support for the development of the postgraduate Virtual Education processes of the Faculty of Medical Sciences of UNAN-Managua, through Teleconferences and Videoconferences.*
4. There is an increase in the *scientific productivity* of the Faculty of Medical Sciences of UNAN-Managua, through the realization of 16 scientific articles and 43 essays that have been produced in the PROMIB, which come to enrich the scientific publications of the FCCM.
5. *The post-graduate curriculum innovation of the FCCM of UNAN-Managua is evident, with the institutional approval of the curriculum documents, both PROMIB and*

PRODIB to improve the professional competences and the entrepreneurial capacity in the training of the medical specialists of Nicaragua.

6. *Scientific collaboration has been strengthened* with Dr. Jorge Antonio Lazareff from UCLA, Professor in Bioethics and Scientific Paradigms, Advisor to PROMIB, and PRODIB, *successfully developing the process of postgraduate Virtual Education, through Teleconferences and Videoconferences.*

WORKS CITED

- Corriols, M. (2017). Doctorado en Investigaciones Biomédicas (PRODIB), Conferencia inaugural en power point. 21 p.
- PNDH. 2013. Plan Nacional de Desarrollo Humano de los y las nicaragüenses. 2012-2016. 260 p.
- Pedroza M.P. 2015. El Modelo de Gestión de la Investigación, Modelo I+D+i de la UNAN-Managua. Vice Rectoría de Investigación. Dirección de Investigación. 81 p.
- Pedroza, M. E. (2016). Programa de Doctorado "Gestión y Calidad de la Investigación Científica" (DOGCINV). Managua: Universitaria de UNAN-Managua. 61 p.
- Pedroza, M. E. (2018). Innovación Institucional y Organizacional de la Investigación en la UNAN-Managua, en el período 2011-2016. Managua: Universitaria de UNAN-Managua. 81 p.
- Pedroza, M. E. (2019). Diseño Curricular de la Maestría en Investigaciones Biomédicas (PROMIB). Facultad de Ciencias Médicas, Managua UNAN-Managua. 80 p.
- De Souza Silva, J. (1999). "El Cambio de Época, el Modo Emergente de Producción de Conocimiento y los Papeles Cambiantes de la Investigación y Extensión en la academia del Siglo XXI". Panamá: IICA. Retrieved on September 11, 2017, from Grupo Chorlavi: <http://www.grupochorlavi.org/php/doc/documentos/docabr1.html>.
- UNAN-Managua, (2011). Modelo Educativo, Normativa y Metodología para la Planificación Curricular 2011. Aprobado en Consejo Universitario Sesión Ordinaria N°18-2011 del 2 de septiembre 2011. 134 p.
- UNAN-Managua. 2011. Plan Estratégico de UNAN-Managua, 2015-2019. 90 p.
- UNAN-Managua. 2011. Reglamento del Sistema de Estudios de Posgrado y Educación Continua, SEPEC-UNAN-MANAGUA. Vice Rectoría de Investigación, Posgrado y Extensión Universitaria. Dirección de Posgrado. 59p.
- UNAN-Managua. 2013. Políticas de Investigación y Postgrado de UNAN-Managua. Vice Rectoría de Investigación, Posgrado y Extensión Universitaria. Dirección de Investigación. 45 p.