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A pyramid is usually thought of as a solid structure which sits firmly on the long, broad base that supports all of its levels, which diminish in size as they rise. Traditionally, that was the right figure of speech for a graphic representation of the proportional distribution of a population's different age groups. But it is already beginning to be less adequate, because in Colombia and most of the nations of the world today, fewer persons are being born than before and those who are alive live longer, which challenges – if not checkmates – the way in which different societies have

built their pyramid of economic and social development. The famous population pyramid is becoming less and less of a pyramid.

According to the preliminary figures of the National Administrative Department of Statistics (DANE), based on the 2018 Colombian Census, for every 100 persons under the age of 15, there are 60 who are older than 59, and for every 100 individuals of a potentially productive age, there are 21 of a potentially dependent one. In addition, 40.4% of the elderly population is more than 74 years of age. Taking into account that the current average life span in the country is 74.4 years, and the age of retirement is 62 for men and 57 for women, the disequilibrium produced by the need to uphold the whole system of social security is alarming.

There are many variables and factors which determine and influence this meticulous scaffolding and in order to scrutinize, understand and interrelate them with scientific rigor, the Rosario Institute for the Study of Aging and Longevity (IREEL) has established an institutional proposal which will serve as “a space for the convergence of different disciplines which combine possibilities for the study and positioning of aging from

# AND WE ARE GROWING OLD ...

In 1964, 4.9% of the Colombian population was older than 60 years; today, according to the preliminary data of the 2018 Census of the National Administrative Department of Statistics (DANE), the figure is 13.9%. This happened more quickly in Colombia than in other parts of the world, like Europe, and it poses great medical, economic, cultural and legal challenges, both to the State and society, with the aim of ensuring that a natural process like aging is experienced as fruitfully as possible. The newly founded Instituto Rosario para el Estudio del Envejecimiento y la Longevidad (The Rosario Institute for the Study of Aging and Longevity) is tackling these challenges.

different standpoints, and also act as a voice for elderly persons within the framework of defending their rights,” explains its director, the doctor Catalina Latorre, researcher at the Universidad del Rosario’s School of Medicine and Health Sciences.

This initiative did not arise out of a void. On the contrary, it has nourished itself on many research projects which have been carried in the Universidad del Rosario for quite a long time and are parceled out among several faculties. The fundamental aim is to strengthen them, generate synergies, create new opportunities for analysis in academic venues and develop innovative proposals for improving the quality of life of the elderly, whether through private entrepreneurship or as an input for the creation of public policies.

It is little wonder that the Rosario has a group of more than 30 experienced researchers, who, in different disciplines, have made

contributions to our understanding and study of aging and longevity. The Institute has secured the support and opportunity for joint work with institutions like Boston University (sponsor the *New England Centenarian Study*), the Hospital Universitario Mayor - Méderi and the Fundación Cardioinfantil (Foundation for the care of childrens’ hearts), among others.

In fact, the rehabilitation programs that form part of the School of Medicine and Health Sciences, which provides training in speech and hearing therapy, physiotherapy and occupational therapy, are the intra-university ones which have the longest experience in dealing with the problems of aging, particularly the handling of disabilities and keeping the elderly active and well. In May, 2019, these programs celebrated their 50th anniversary at a ceremony held at the Symposium on Aging and Longevity.

## **Aging: The most important social change of the 21st century**

One of the guest speakers at the Symposium was the neuroscientist Diego Pinal, whose studies have focused on understanding how cerebral functions like working memory and short

term memory are affected by age and modifiable life-style factors, variables which give rise to cognitive processes that either lead to a successful aging or provoke neurodegenerative disorders.

This specialist has a first-hand knowledge of the reality of the situation both in Spain – his homeland – and Portugal – where he currently works – countries with a large percentage of the elderly. According to the predictions of the United Nations, by 2050 Spain will be the country with second highest percentage of the elderly and Portugal, the third (Japan will be the first).

The UN's *World Population Prospects*, published and revised in 2017, estimates that the number of persons older than 60 will double by 2050 and triple by 2100, rising from 962 million in 2017 (13% of the world population) to 2.1 billion in 2050 and 3.1 billion in 2100.

For that supreme multilateral body, “the aging of the population is about to turn into one of the most important social changes of the 21st century, with consequences for almost all sectors of society, among them, the labor and financial market and the demand for goods and services (housing, transport, social protection) as well as the structure of families and inter-generational links.”

In this context, the IREEL plans to follow broad lines of research, a spectrum which studies basic, applied and even social sciences. We present a description and summary of the problems which some of them will deal with, as follows:

### Health prospects

Why do we grow old? What is the reason why some persons age better than others? How do you guarantee that the persons who reach the age of 60 years and live beyond that will be functional and more than active, productive? How must health agencies transform themselves in order to provide services of integral care to that segment of the population? What must health professionals do to respond to the needs of elderly persons?

These are some of the questions which the different research projects in the field of health are trying to answer and they have already detected evidences of the epidemiological changes which entail aging, since the scenarios of the reasons why people become ill have changed.

According to the 2015 “SABE” study (undertaken by the Colombian Ministry of Health and Social Protection to assemble and analyze information about the health and well-being of the elderly and serve as the foundation for formulating public policies), 84% of elder-



ly people suffer from comorbidity, that this, more than two health disorders. Arterial hypertension is the main one (60%), followed by arthritis-osteoarthritis (25%). In addition, 41% say that they suffer from symptoms of depression and 17%, from a slight cognitive deterioration.

According to the survey, their biggest fear is losing their autonomy and ability to function (much more than suffering from a pathology like cancer) and thus having to depend on

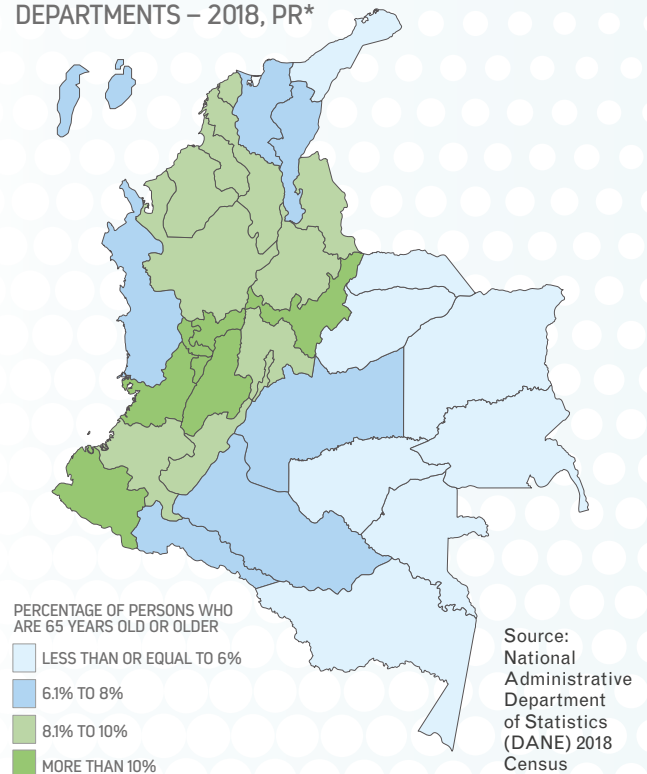


caretakers, who are mostly close relatives who are not trained to care for them nor receive, in turn, the care and support needed to undertake such a demanding job. Thus, caring for the caretakers is also crucial.

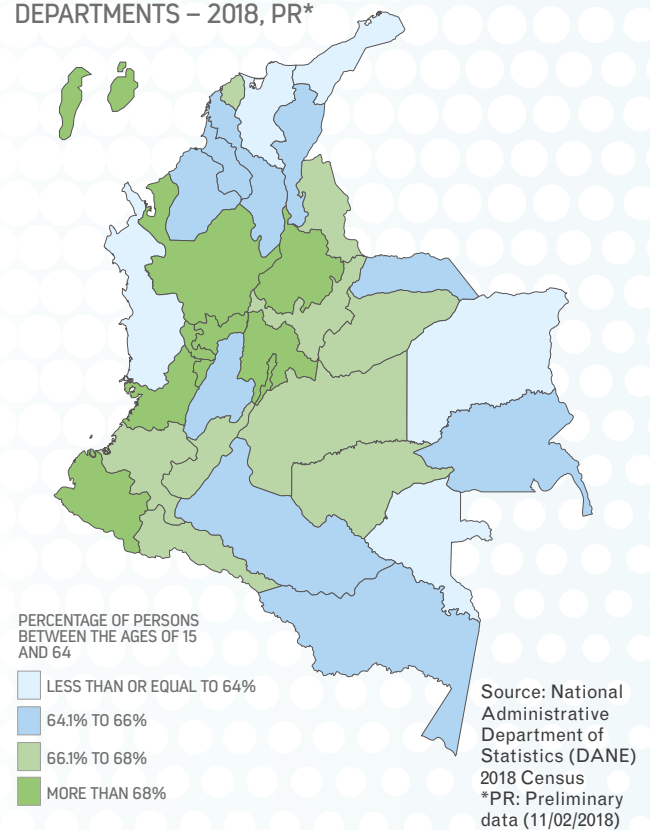
### Socio-cultural prospects

In cultural terms, how is aging perceived and assimilated? What social function do elderly persons perform? How can

PERSONS OLDER THAN 64 YEARS  
DEPARTMENTS – 2018, PR\*



PERSONS BETWEEN THE AGES OF 15 AND 64  
DEPARTMENTS – 2018, PR\*



we reverse the strong social exclusion of old people? How has the view and understanding of aging changed over the years?

The statistics show that aging is more and more a problem of women, that is, for every 73 men who are older than eighty, there are 100 women of the same age or ages.

What are the social impacts of this reality? In Colombia, 50% of its inhabitants have a negative view of aging, in contrast with what happens in other latitudes, like Spain and Portugal, “where the new generations of the elderly are much more active and demand more in the way of services and care because they still have a lot to live for. They regard it as a stage full of life and freedom,” remarks Pinal, who believes that this marks a big difference with the past few decades of the post-dictatorship period, when aging was thought of as the closure of the life cycle. Nowadays, the elderly are younger in terms of their capacities and spirit, and that means that they can devote their life force to caring for their grandchildren, which, in the opinion of this psychologist is positive, or engage in many activities in the form of their hobbies or fulfill more profound ambitions (study for a career, get up to date with technology, nourish their spirituality, support community enterprises, etc.).

### Economic prospects

How much can and should the State pay for the needs of elderly persons? What economic and social adjustments should the country make to help to sustain them? How will the rise in chronic illnesses which are under-diagnosed in Colombia (like cardiovascular ones, diabetes or mental disorders) change the State’s spending on health, along with others, like cancer, whose effects are



growing? What is the impact of the lack of a policy to support the caretakers of the elderly? How will such problems deplete the government’s pension bonds in the short and middle term?

One of the major economic problems related to aging is retirement, since at the current time two out of every three persons do not have a pension. The marked informality of the labor market which occurred in recent decades meant that people who are now elderly do not contribute to a pension fund or only did it for a short time, which forces many of them to continue to work in order to survive. According to the “SABE” survey, 60% of those who still work do it because they

## Neuroscience works for a healthy and productive old age

The brains of elderly persons go through important changes which affect their cognitive, physical and emotional capacities. Among the main changes there are: The loss of the integrity of white matter (responsible for interconnecting a person’s neurons), which leads to a reduction of the speed and efficiency of the processing of information; changes in the volume of gray matter (the body of the neurons themselves), particularly in the frontal area, which provokes a malfunctioning of cognitive control, planning and the carrying out of tasks which require the suppression of irrelevant information and other factors which interfere with the objective; and the loss of a functional connectivity between different regions of the brain.

These natural changes vary from individual to individual of course, depending on a combination of factors which occur in the course of life, like diet, physical exertion, educational level, socio-cultural activities and exposure to external natural agents, among others. However, such harmful effects can be lessened or counteracted in different ways, from cognitive training (for example, with exercises of working memory) to a non-invasive cranial stimulation. That is the field which Diego Pinal focuses his efforts on, a psychologist and neuroscience specialist, who, with his working team in the Laboratory of Psychological Neuroscience at the Universidad do Minho, in Braga, Portugal, has carried out a numbers of studied aimed at characterizing the aging process from a neuroscientific standpoint and discovering how to intervene in the disorders of the elderly to avoid or prevent their cognitive deterioration.



The neuroscientist Diego Pinal, whose studies have focused on understanding how cerebral functions like working memory and short term memory are affected by age and modifiable life-style factors.



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have to and 13% to help their families. The country has tried to guarantee a minimum income for them, with the "Colombia Mayor" (Elderly Colombia) program, but it is not enough.

"Among all of the reforms which Colombia made at the beginning of the 1990's, the weak point were pensions," remarks the economist Paul Rodríguez, researcher at the Faculty of Economics of the Universidad del Rosario, who studies the economic impact of aging. The 1991 Constitution laid down the conceptual framework for ensuring that Colombians would enjoy many of their constitutional rights, hence the idea that "the State should pay for almost anything." "This has had many implications, among others, the resort to legal

appeals to secure medical assistance from the State, and it is therefore very difficult to check the increase in spending on health due to the pressures of the system itself," he points out. Although Colombia is not different from other member nations of the Organisation for Economic Co-operation and Development (OECD) in providing universal access to health and ensuring an objectively sound state of health for its citizens, there are big differences between different parts of the country. ■

Non-invasive cranial stimulation is a technique which has been used since the late 1990's and consists of placing at least two electrodes on the surface of the skull which set off a weak and continual current of electricity between one positive and another negative pole in order to stimulate some areas of the brain and inhibit others, depending on the patient's needs. "The technique is 100% safe and has no side effects, except, according to the literature, some cases where the part of the skin where the electrode is placed becomes red and itchy. The aim is to increase or inhibit the excitability of the cortex in order to improve the transmission of neuronal information," Pinal explains. So far, the results of his research projects have not been entirely positive in terms of the importance and permanence of the effects, since they are not statistically significant and are only registered online, that is,

while the stimulation takes place, not afterwards. Nevertheless, last June he and his team redesigned the initial framework of the study done of 54 healthy persons of advanced age and they are now more hopeful about achieving the expected results, backed by one certainty: "A recent review of the literature indicates that 80% of the studies which have used this technique have shown positive results, that is, an improvement in the realization of the cognitive tasks, which was what they aimed at. We are working on optimizing the equipment by changing the voltage and the placement of the electrodes, but I still cannot offer any further data which would tell us whether it works or not and at what ages," the Spanish doctor clarifies.