

The Financial Balance of Pension Funds in Algeria: The Impact of Population Aging as a Pressuring Factor

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Abstract: Our research paper aims to examine the impact of population aging on the financial balance of pension funds in Algeria, analyzing how these demographic changes affect the sustainability of retirement systems under current economic and social conditions. It also seeks to propose strategies to address these challenges and achieve long-term financial sustainability. Algeria's pension funds face increasing pressures due to rapid demographic shifts, especially population aging, which threatens their financial stability. Algeria has experienced a noticeable decline in birth rates along with rising life expectancy, leading to a growing number of elderly individuals compared to younger, working-age citizens. This imbalance directly affects the financial balance of pension funds, as expenditures increase with a higher number of pension beneficiaries, while revenues decline due to a reduced number of active workers and contributors.

Keywords: Population aging, financial balance, pension funds, financial sustainability, retirement system

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Introduction :

The financial balance of pension funds is a vital issue that touches on multiple aspects of societal well-being, as the sustainability of these funds reflects the capacity to provide financial protection for the elderly and to ensure a dignified standard of living for them after years of work and contribution. In Algeria, the pension system faces mounting challenges due to rapid demographic shifts, particularly population aging, which is one of the primary pressures impacting these funds.

Statistics indicate that Algeria has experienced significant changes in its population structure, with life expectancy rising substantially as birth rates have declined. This trend has led to an increase in the elderly population compared to the younger, working-age groups, creating a gap that requires immediate attention. This disparity between the number of pension beneficiaries and the active contributors to pension funds negatively impacts the financial balance of these funds, as expenses increase significantly while revenues decline.

This phenomenon requires a deep understanding of the economic and social factors associated with it, in addition to the need for effective policies and reforms that contribute to enhancing the financial sustainability of pension funds. Therefore, this study is particularly important as it addresses the various dimensions of the impact of population aging on the financial balance of pension funds in Algeria by analyzing the challenges these funds face and proposing suitable strategies to address them.

The core issue in this context lies in the growing gap between the number of pension beneficiaries and the active contributors to pension funds. Expenditures are steadily rising while revenues are shrinking, creating a disparity that threatens the financial stability of these funds, making them more vulnerable to liquidity issues and the inability to meet obligations. How does population aging affect the financial balance of pension funds in Algeria, and what strategies can be adopted to ensure the sustainability of these funds amid the increasing proportion of seniors and the declining number of young contributors?

The significance of our study emerges across several key aspects, as the sustainability of pension funds is a fundamental pillar in protecting the rights of retirees who have dedicated many years to work, ensuring them a decent income post-retirement. This financial balance also contributes to social stability, as disruptions in pensions can deeply impact many families, increasing poverty risks and potentially threatening social harmony. Furthermore, understanding the impact of population aging helps decision-makers adopt economic and financial policies that align with demographic shifts, thereby enhancing the state's capacity for financial sustainability. This study also provides a valuable contribution to the academic discourse on the demographic and financial challenges facing Algeria, offering strategic insights into viable solutions. As such, this research serves as an essential foundation for a deep, comprehensive understanding of the challenges associated with population aging and its impact on the financial balance of pension funds, making it a highly relevant topic within Algeria's social and economic context.

In studying this topic, we adopted a research methodology that combines both descriptive and analytical approaches. The descriptive method aims to present the current state of pension funds in Algeria and the demographic changes impacting them by providing a comprehensive overview of data and statistics related to aging rates and the ratio of active contributors to beneficiaries. This approach also helps in gaining a clear understanding of the current financial status of pension funds

and the growing pressures resulting from population aging. On the other hand, the analytical method focuses on examining data to understand the relationship between demographic changes and their impact on the financial balance of pension funds. This includes analyzing statistics related to revenues and expenditures and linking them to birth rates, average lifespan, and the proportion of elderly individuals.

To address this issue, the study is structured around the following themes:

1. The Algerian pension system and measures to enhance national solidarity.
2. Population aging in Algeria.
3. The impact of population aging on pension funds.

First: The Algerian Pension System and Measures to Strengthen National Solidarity

Prior to 1983, the pension system in Algeria operated under various occupational schemes that covered workers from multiple sectors (such as employees, farmers, miners, military personnel, state workers, self-employed individuals, veterans, and others).

The enactment of Law No. 83-12 on July 2, 1983, unified these distinct social security systems. Today, Algeria has a unified, mandatory, and general pension system for workers, based on a pay-as-you-go structure, managed by the National Pension Fund (CNR). Meanwhile, self-employed individuals are covered under a separate fund, the National Social Security Fund for Non-Salaried Workers (CASNOS).

The fundamental principle of this system is to ensure a compensatory income proportional to their salaries for individuals who stop working. This is evident in a contribution basis without a cap, including almost all wage components, and in an entitlement calculation base that corresponds with the contribution base.

The 1983 law introduced multiple reforms aimed at unifying the social insurance system and guaranteeing rights for all workers without discrimination. Decree No. 85-223, issued on August 20, 1985, established two funds: the National Fund for Social Insurance, Work Accidents, and Occupational Diseases (CNASAT) and the National Pension Fund (CNR). In 1992, according to Decree No. 92-07, the social security system was restructured with the creation of three funds covering all categories: the National Social Insurance Fund for Salaried Workers (CNAS), the National Social Insurance Fund for Non-Salaried Workers (CASNOS), and the National Pension Fund (CNR).

The pension system faced significant challenges during the 1990s due to economic, social, and political crises in Algeria, coupled with the implementation of economic reforms supported by international financial institutions. This situation led to negative consequences, including the closure of public enterprises, worker layoffs, and an increase in early retirements. As a result, a financial imbalance emerged, driven by the growing number of retirees and the decline in active contributors.

The pension system in Algeria has undergone several legal adjustments aimed at adapting to economic and social changes and improving its financial sustainability. These adjustments include the following:

1. **Decree No. 10-94 (1994):** This ordinance established the early retirement fund with the goal of alleviating unemployment and creating new job opportunities.

2. **Decree No. 97/13 (1997):** This ordinance introduced partial retirement, allowing individuals to receive a full pension before the age of 60 and enabling workers with 32 years of contributions to retire after the age of 50.

3. **Law No. 99-03 (1999):** The amendments under this law included the state's coverage of the costs associated with recognizing the participation periods during the War of Liberation and granting fighters full pension rights. The law also revised the pension calculation method based on the average salary of the last years of service, set a pension cap at 80%, unified the stabilization rate, and increased contribution rates.

4. **Law No. 15-16 (2016):** This law focused on maintaining the retirement age at a minimum of 60 years for men and 55 years for women, with the possibility of continuing work for an additional five years. It also abolished partial retirement without age requirements and called for finding new sources of funding for the National Pension Fund.

These adjustments were part of efforts to achieve financial balance for pension funds and ensure their sustainability in the face of demographic and economic pressures.

1- Establishment of the National Pension Fund (CNR)

After the unification of the pension system, the National Pension Fund became the sole entity responsible for pension management (Ben Azouz, p. 268). This fund was created due to the merger of eight (08) pension funds, which were established under (Decree No. 70-116 dated August 1, 1970). These funds include:

- **CAAV:** The Algerian Fund for Old Age Insurance, responsible for managing pensions under the general system.

- **CGR:** The General Algerian Fund, responsible for managing pensions for employees.

- **CNMA:** The Agricultural Cooperation Fund, responsible for managing pensions under the agricultural system.

- **CSSM:** The Social Security Fund for the Mining Sector, responsible for managing pensions for miners.

- **CAVNOS:** The Old Age Insurance Fund for the Self-Employed, responsible for managing pensions for non-employed individuals.

- **LEPSGM:** The Social Security Institution for Maritime Workers, responsible for managing pensions for maritime workers.

- **CAPAS:** The Insurance Fund for SONEGAS Workers, responsible for managing pensions for SONEGAS employees.

- **SNTF:** The Insurance Fund for Railway Workers, responsible for managing pensions for railway workers.

The National Pension Fund (CNR) was established under Decree No. 85-223 dated August 20, 1985, which was later repealed and replaced by Decree No. 92-07 dated January 4, 1992. This decree outlines the legal status of social security funds as well as their administrative and financial organization. The National Pension Fund is considered a public institution with a special management structure, subject to the applicable laws in this field. According to Article 2 of Decree No. 92-07, dated January 4, 1992, the fund enjoys legal personality and financial independence.

The tasks of the National Pension Fund are defined by Article 9 of (Decree No. 92-07 dated January 4, 1992) as follows:

- Managing pensions and retirement allowances, as well as pensions and allowances for the beneficiaries.
- Managing pensions and allowances granted under legislation prior to January 1, 1984, until the beneficiaries' rights expire.
- Ensuring the collection, monitoring, and resolution of disputes regarding the collection of contributions designated to fund retirement benefits.
- Implementing the provisions related to pensions as stipulated in international treaties and agreements in the field of social security.
- Ensuring the information of beneficiaries and employers.
- Managing the assistance and relief fund in accordance with Article 52 of Law 83-12, dated July 2, 1983, related to pensions.

2- Rights Granted Under Pension Schemes

The pension system is a fundamental pillar for ensuring financial and social stability for individuals after the end of their professional careers. It provides them with multiple rights aimed at protecting their livelihoods, such as a fixed income upon reaching retirement age or in cases of early retirement, as well as health insurance and pension benefits for beneficiaries in the event of death. This system is part of a comprehensive social framework designed to enhance the social and economic security of individuals and ensure their well-being during old age.

2-1 Direct Pensions

The National Pension Fund (CNR) provides retirement pensions to workers upon reaching the legal retirement age, including early retirement pensions and partial pensions. A worker who has not met the retirement conditions may still be entitled to a retirement grant if they have completed 20 years of service for salaried workers and 7.5 years for non-salaried workers, without increasing the minimum pension amount. The retirement conditions include:

- **Legal Age:** 60 years for men and 55 years for women for salaried workers, and 65 years for men and 60 years for women for non-salaried workers, with exceptions for working women, freedom fighters, and people with disabilities.
- **Duration of Work:** The person must have worked for at least 15 years and have paid social security contributions. Work years are calculated based on the number of working days or

hours, in addition to periods considered as active periods, such as sick leave, benefits related to social insurance, and national service.

2-2 Measures Related to Early Retirement Before 2017

Before 2017, workers were allowed to retire early if they met certain conditions related to years of service, enabling them to exit the workforce without reaching the legal retirement age. This system helped address unemployment following economic crises. However, the effects of this system on the balance of pension funds led to amendments in the laws later on, aiming to reduce reliance on early retirement in order to maintain the sustainability of the pension system.

-2-1 Early or Pre-Retirement

Article 2 of Legislative Decree No. 10-94 stipulates that salaried workers may opt for early retirement starting at the age of 50 for males and 45 for females, provided they have at least 20 years of service and 10 years of full contributions. Additionally, the worker must be on the layoff list for economic reasons. In 1998, the application of early retirement was expanded to include employees in public institutions and administrations under the same conditions. However, the legislator excluded certain categories from this system, such as workers with temporary suspensions or those with fixed-term contracts. The duration of early retirement is reduced based on years of service, with a reduction of up to 10 years for those with 29 or more years of service.

2.2 Early Retirement

Decree No. 97/13, dated May 31, 1997, facilitates the conditions for retirement by allowing a worker to receive a pension once they reach the age of fifty, provided they have contributed to the pension system for at least 20 years. For women, both the retirement age and the required length of service are reduced by 5 years, making the retirement age 45 and the required work duration 15 years. This type of retirement can only be granted upon the worker's request, as a decision made unilaterally by the employer is not sufficient. As for the pension rate, the worker is entitled to 50% of their pension if they have worked for at least 20 years, with the rate increasing to 62.5% if their length of service reaches 25 years (Ben Azzouz, p. 276).

-2-3 Retirement Without Age Condition

Decree No. 97/13, dated May 31, 1997, stipulates that there is no age requirement for workers who have contributed for thirty-two (32) years. Similar to early retirement, a pension is granted solely upon the worker's request, and any retirement decision unilaterally made by the employer is considered invalid and without effect.

Early retirement systems (retirement without age condition and early retirement) were abolished under the reforms introduced in 2017. According to these reforms, an employee with 32 years of full service is allowed to retire upon reaching the age of 60.

Table 01: Key Criteria of the Algerian Pension System

	Public and Private Sector Employees - CNR					Non-Salaried Workers - CASNOS	
	Legal Retirement Pension	Retirement Benefits	Early Retirement Pension	Proportional Retirement	Retirement Without Age	Legal Retirement Pension	Retirement Benefits

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					Condition		
Age Requirement :	Male: 60 years, Female: 55 years	60 years	Male: 50 years, Female: 45 years	Male: 50 years, Female: 45 years	No conditions	Male: 65 years, Female: 60 years	65 years
Contribution Period	15 years	5 years	/	Men: 20 years, Women: 15 years	32 years	15 years	5 years
Other conditions		Purchase of insurance periods	economic layoff, and contribution at a fixed rate.				
Basis for pension calculation (reference salary)	Either based on the average monthly salary over the last five years prior to retirement; or, if more advantageous, based on the average monthly salary calculated over the five years with the highest earnings during the individual's career.					The best 10 years of income, with a maximum limit equivalent to 8 times the guaranteed minimum national wage (SNMG).	
Annual rate	2.5% per year						
Other Calculation Elements			A 1% reduction in the pension for each year of early retirement, as long as the insured has not reached the legal retirement age.				
Minimum Pension	75% of the national minimum wage			/		75% of the national minimum wage	/
The maximum limit	80% of the wage subject to contributions and 15 times the guaranteed national minimum wage (SNMG).					% 80	
Reevaluation of pensions	The index was linked to wages until 1999 and has been determined by the Board of Directors of the National Pension Fund (CNR) since then.					Defined by a ministerial decree.	

Source: Prepared by the researchers.

3.2 Survivors' Pension (Inheritance)

The survivors' pension, also known as the transfer pension, is granted upon the death of the pensioner. The beneficiaries of this pension receive a grant and a transfer pension to protect them from economic risks. The beneficiaries of the inheritance pension are:

- **The spouse:** The spouse is entitled to the pension if the marriage is legally recognized, regardless of age (Article 31 of Law No. 83-12).

- **Dependent children:** This includes children under 18 years old, those under 21 years old who continue their studies, and those under 25 years old working under an apprenticeship contract with a salary less than half the national minimum wage, as well as disabled children.

- **Ascendants:** Those who were financially dependent on the deceased or on the deceased's spouse, provided their income does not exceed the minimum pension.

Eligibility for the pension is granted only to children born before the death or within 305 days thereafter (Article 33 of Law No. 83-12).

Table 02: Distribution of Retirement Pension for Beneficiaries

Beneficiaries	Percentage	Total
Only husband	%75	%75
The spouse with dependents only.	50% for the spouse 30% for other beneficiaries	%80
The spouse with multiple other beneficiaries.	50% for the spouse 40% for other beneficiaries, distributed equally among them.	90 %
Absence of the spouse	45% for each child 30% for each dependent (with the total allowances not exceeding 90% of the direct allowance)	90 %

Source: Article 34 of (Law No. 83-12)

Secondly : Population Aging in Algeria

Population aging is considered one of the most pressing issues of the 21st century. Initially a phenomenon confined to the Global North, it has begun to attract attention in the Global South, including countries in the Maghreb such as Algeria, which was once considered a youthful country. Since the 1998 census, Algeria has undergone significant changes in its demographic structure due to declining fertility rates and increasing life expectancy. Projections indicate that the population aged 60 and over will grow at a much faster pace than the overall population in the coming decades.

1- Demographic Transition and the Emergence of Population Aging

Population aging refers to the increase in the proportion of elderly individuals in society and the decline in the proportion of the younger population. It differs from individual "aging," which occurs with the passage of time. This phenomenon is associated with decreased fertility rates and an increase in life expectancy. These changes have been observed in all regions of the world. In the

past, fertility rates were high, with an average of about six children per woman, alongside high birth and death rates, where many children did not survive to adulthood.

However, since the mid-18th century, mortality rates have decreased due to advancements in health and economics, and couples began to reduce the number of births. This demographic transition has led to a new system characterized by low fertility rates, averaging about two children per woman at the beginning of the 21st century, along with low mortality rates, where only one in every 100 newborns dies before reaching the age of 20.

In the previous system, about 44% of the population was under the age of 20, and only 6% was over the age of 60. However, in the new system, this proportion could reach 25% under the age of 20 and 25% over the age of 60 if current trends continue. (PISON, 2009, p. 4)

Population aging will persist if life expectancy continues to rise, leading to an increase in the upper levels of the population pyramid by adding "additional layers." This phenomenon could also be exacerbated if fertility rates fall below the necessary levels to ensure generational replacement, resulting in fewer births and an aging population.

In most Southern countries, sharp declines in fertility rates have reduced the proportion of young people, without a significant increase in the proportion of older people so far. For instance, the age group between 20 and 65 in China increased from 45% in 1970 to about 65% today. However, this situation will only last for a few decades, representing a demographic opportunity that Southern countries must seize to achieve economic development while preparing for future population aging. (PISON, 2009, p. 3)

In the future, active individuals will reach retirement age, leading to a significant increase in the proportion of elderly people. Some countries that have experienced a substantial decline in fertility rates below the replacement level are beginning to recognize the upcoming challenges and are seeking to stimulate these rates. According to data from the United Nations, the decline in fertility rates will lead to a profound shift in the age structure of populations. As a result, all countries that have undergone demographic transitions will face the phenomenon of population aging.

Data indicates that China managed to reduce its infant mortality rate much more quickly than France. It took China only 40 years to reduce the rate from 200‰ to 30‰, while France took over 150 years. Additionally, China halved its fertility rate within 12 years, while France needed a century and a half to achieve the same shift (PISON, 2009).

It is expected that some of these countries will experience even faster transitions than China. In Iran, for instance, the proportion of individuals aged 65 or older is projected to rise from 7% to 14% within 20 years. Similarly, in Vietnam and Syria, the same increase is expected within 17 years.

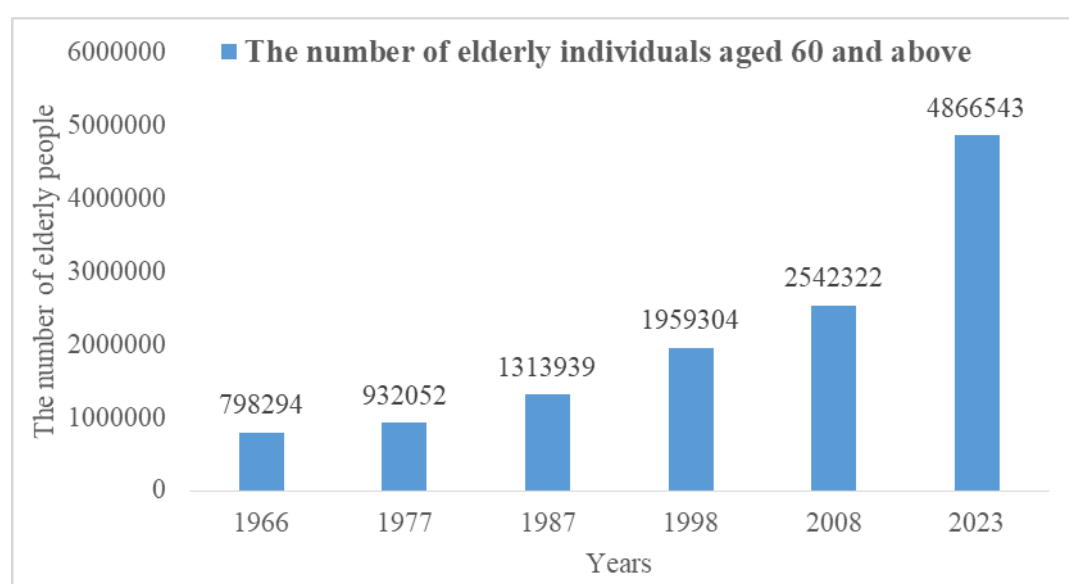
It has been established that demographic transition has significant implications on the age structure of the population, leading to aging, a phenomenon that is global and inevitable, as indicated by studies and analyses we have examined. Algerian researchers have extensively warned about the arrival of this demographic model in the coming decades. Researchers Hamza Cherif Ali and Salhi Mohamed stated that this phenomenon will begin to affect Algeria starting from 2025, as

the generations of the population explosion from the 1970s reach retirement age (HAMZA Cherif & SALHI, 2015).

2- Numerical Development of the 60 and Above Age Group in Algeria

Various sources of information, such as population censuses, civil statistics, and demographic and health surveys, have enabled the analysis of the historical development of the elderly population in Algeria and the study of its future trends. The percentage of the population aged 60 and above decreased between the 1960s and 1980s due to rapid population growth and a renewal of the younger age groups. However, it began to rise from 5.74% in 1987 to 10.5% according to the latest statistics, indicating a rapid population aging in Algeria that will continue throughout the next century. This phenomenon was clearly observed in the 1998 census, where the base of the age pyramid began to narrow, and its peak expanded, continuing this trend in the following years. (See Figure 01).

Figure 01: Evolution of the Number of Seniors Aged 60 and above in Algeria (1966 – 2023)



Source: (ONS, 1962-2020) (ONS, 2023)

The number of elderly people in Algeria has experienced significant growth, rising from 798,000 in 1966 to approximately 1.96 million in 1998, and then surpassing 2.54 million in 2008, with an average annual growth rate of 2.62% during the period from 1966 to 1998. This growth rate was compared to 2.2% for those under the age of 20 and 2.65% for the total population. During the period from 1987 to 1998, which followed a population boom, the number of elderly people increased at a rate three times faster than that of the youth, with a growth rate of 3.45% compared to 1.04%. From 1998 to 2008, the number of people aged 60 and above increased to over 2.5 million, and by 2023, this number reached approximately 4.87 million, including 2.127 million who were over the age of 70 and 707,000 who were over the age of 80.

Table 03: Evolution of Life Expectancy (e_0) at Specific Ages (60 and 80 Years) by Gender

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Year	Men		Women	
	Age 60	Age 80	Age 60	Age 80
1977	15.43	4.71	16.63	5.09
1987	16.26	/	17.46	/
1998	19.2	5.9	20.2	6.1
2008	21.2	7.4	21.9	7.4
2018	22.7	8.7	23.1	7.9
2019	22.7	8.7	23.1	7.9

Source: (ONS, 1962-2020)

The data indicate a significant increase in life expectancy at ages 60 and 80 for both genders. In 2019, life expectancy at age 60 reached 22.9 years, marking an increase of over 6 years since 1977, while life expectancy at age 80 doubled from 4 to 8 years. Although women enjoy a higher life expectancy than men (23.1 years versus 22.7 at age 60, and 8.7 versus 7.9 at age 80), the gender gap is gradually narrowing.

Life expectancy plays a crucial role in pension systems as it influences how contributions and pensions are distributed. According to Pierre-Yves Chanu, it is impossible to determine a person's lifespan upon entering a pension system—they may live a short or a long life. Consequently, a pension system based on "distribution" offers retirees protection by continuing pension payments regardless of the contributions made during their working life.

The decline in mortality rates among older age groups significantly contributes to the rise in life expectancy. Advances in combating diseases and mortality rates greatly benefit individuals in the latter half of their lives, and over the coming decades, the pace of aging is set to increase inevitably and rapidly.

3- Demographic Aging Indicators in Algeria

3.1 Aging Index

As observed in the table below, the declining relative weight of younger age groups signifies demographic transition. In 1966, those under 15 years of age made up 47.24% of the population, but this figure dropped to 28.05% by the 2008 census. Despite a slight upward trend in 2023, factors such as the delay in the average age of first marriage and a decline in birth rates have contributed to an aging base in the population pyramid.

Table 04: Evolution of the Aging Index and Youth and Elderly Ratios between 1966 and 2023

The indicator (%)	1966	1977	1987	1998	2008	2023
Aging at the Base 15/Total Population	47.25	47.95	44.09	36.20	28.05	30.34
Aging at the Peak Population aged 60+/Total Population	6.61	5.80	5.74	6.64	7.50	10.50
Aging Index 60 years+ / 15 years	13.99	12.10	13.02	18.34	26.71	34.60

Source: Calculations by the authors based on census data

The aging process at the top of the population pyramid has not occurred at the same speed or intensity as at the base. The percentage of elderly people aged 60 and over has increased from 6.6% in 1966 to 10.5% in 2023. In the 1970s and 1980s, Algeria was characterized by high fertility rates and demographic growth. There were nearly 14 elderly individuals for every 100 young people under the age of 15 (between 1966 and 1980). However, changes in behavior and the decline in growth rates have led to shifts in Algeria's population structure over the past two decades, resulting in an increase in the aging index. In 1998, there were about 18 elderly people for every 100 young people, and this index rose to 23 elderly people per 100 young people in the most recent census. By 2023, it reached 34 elderly people.

3-2 Demographic Dependency Ratio

The demographic dependency ratio refers to the relationship between the number of individuals who are presumed to be "dependent" on others in their daily lives, such as the youth and the elderly, and the number of individuals capable of bearing this responsibility. The decrease in the youth proportion of the population has eased the burden on the inactive groups, thus contributing to economic growth. This phenomenon is expected to worsen in the coming years, paving the way for a "demographic golden age"—a benefit that unfortunately will not last long, as these generations are fewer in number. The active population will bear the burden of the aging population as they reach retirement age.

Table 05: Evolution of the Total, Major, and Minor Dependency Ratios from 2008 to 2023

years	2008	2009	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Gross dependency ratio%	55.0	55.2	56.2	58.5	60.1	61.8	63.5	65.2	66.6	67.8	68.5	68.9	69.0
The dependency ratio (minor) %	43.5	43.7	43.5	45.0	46.1	47.4	48.6	49.8	50.7	51.5	51.7	51.7	51.3
The dependency ratio	11.5	11.5	12.7	13.5	14.0	14.4	14.9	15.4	15.9	16.4	16.8	17.2	17.8

Source: (ONS, 2023, p. 22)

The table above highlights significant changes in the demographic composition of Algeria and the effects of demographic transition. From 55.0% in 2008 to 69.0% in 2023, the overall dependence ratio rose, indicating the increasing burden on the working-age population imposed on by the rise in dependents, both from younger age groups and the elderly. This increase represents the demographic shifts facing Algeria, where the society is experiencing a growth in non-economically productive age groups compared to the working-age population.

The child dependency ratio reflects the number of dependents from younger age groups (under working age). Although it rose from 43.5% in 2008 to 51.7% in 2021, it started to show a slight decline to 51.3% in 2023. This slight decrease is due to the decline in fertility rates and the number of births, which alleviates the burden on the working population.

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The dependency ratio, which measures the proportion of dependent elderly individuals (those above the working age), has demonstrated a consistent ongoing trend, increasing from 11.5% in 2008 to 17.8% in 2023. This rise underscores the implications of population aging, as the number of elderly individuals continues to grow relative to younger cohorts. Such demographic shifts present substantial challenges for the future, particularly in ensuring adequate social and economic support for the aging population.

Thirdly: The Impact of Population Aging on Pension Funds

Population aging is one of the most significant challenges facing pension systems in many countries, including Algeria. The rise in life expectancy and the increasing proportion of elderly individuals in society lead to greater pressure on pension funds. As the number of economically active individuals contributing to these funds declines, while the number of retirees benefiting from them increases, financing pensions becomes more difficult.

1- Analysis of the Financial Balance of the Algerian Pension Fund

The Algerian pension system faces significant challenges due to demographic and economic transformations, the most prominent of which are the increasing number of retirees resulting from population aging, and the decline in financial resources due to fluctuations in the economy and oil prices. These factors have led to an increasing gap between the fund's revenues and expenses, threatening its sustainability. Therefore, analyzing the financial balance of the National Pension Fund is essential for understanding the dynamics of revenues and expenditures and assessing the system's ability to continue covering its obligations to current and future retirees.

Table 06: Evolution of the Revenues and Expenditures of the National Pension Fund from 2001 to 2018.

Years	2001 ¹	2002 ¹	2003 ¹	2004 ¹	2005 ¹	2006 ¹	2007 ¹	2008 ¹	2009 ¹
Revenues	135 140	141 300	148 710	183 460	190 110	204 150	244 910	284 400	317 550
Expenditures	127 920	143 070	145 440	172 300	186 930	212 870	250 720	278 260	298 750
Years	2010 ¹	2011 ¹	2012 ¹	2013 ¹	2014 ¹	2015 ¹	2016 ²	2017 ²	2018 ²
Revenues	360 471	445 663	683 060	599 899	671 639	668 580	705 861	699 100	717 800
Expenditures	350 067	406 601	572 520	685 661	795 575	927 540	1 048 990	1 185 400	1 270 300

Source: ¹ (ONS: ALGERIA IN FIGURES, 2017, pp. 20-21) ² (ONS: ALGERIA IN FIGURES, 2021, p. 20) Consulted on 16/09/2024 at 09:40

The revenues of the National Pension Fund in Algeria increased from 135.1 billion dinars in 2001 to 317.6 billion dinars in 2009 due to the rise in wage mass. The revenues saw a significant surge in 2012, reaching 683.1 billion dinars, but they dropped the following year to 599.9 billion dinars due to fluctuations in oil prices. Despite the challenges, revenues stabilized slightly in 2018 at 717.8 billion dinars.

Financial expenditures increased from 127.9 billion dinars in 2001 to 298.7 billion dinars in 2009 due to the rise in the number of retirees and the implementation of early retirement schemes. In 2013, expenditures exceeded revenues, reaching 685.7 billion dinars due to the rising proportion

of elderly people. they continued to rise, reaching 1.27 trillion dinars in 2018, reflecting the increase in beneficiaries and pension costs.

2- Evolution of the National Pension Fund Balance:

The table below demonstrates the evolution of the National Pension Fund balance in Algeria between 2001 and 2018. The fund experienced significant fluctuations during the period from 2001 to 2005, marked by financial surpluses in some years, most notably in 2004, when the surplus reached +11,160 million DZD. In contrast, the fund recorded a deficit in 2002 amounting to -1,770 million DZD. This variation can be explained by the efforts made by Algeria to achieve economic stability following the "Black Decade" (1990-1999), which left deep scars on the national economy. However, the economy experienced a relative recovery, thanks to rising oil prices and increased government revenues, which in turn helped strengthen the financial stability of social systems, including pension funds.

Table 07: Evolution of the National Pension Fund Balance from 2006 to 2018

Years	2001 ¹	2002 ¹	2003 ¹	2004 ¹	2005 ¹	2006 ¹	2007 ¹	2008 ¹	2009 ¹
Balance	+7220	-1770	+3270	+11160	+3180	- 8 720	5 810-	+6140	+18800
Years	2010 ¹	2011 ¹	2012 ¹	2013 ¹	2014 ¹	2015 ¹	2016 ²	2017 ²	2018 ²
Balance	+10404	39 062	+110 540	- 85 762	-123 936	-258 960	-343 129	-486 300	-555 400

Source: ¹ (ONS: ALGERIA IN FIGURES, 2017, pp. 20-21) ² (ONS: ALGERIA IN FIGURES, 2021, p. 20) Consulted on 16/09/2024 at 09:40

The National Pension Fund in Algeria has experienced fluctuations between deficits and surpluses over the years, recording a deficit during certain periods, such as in 2006 (-8,720 million DZD), and surpluses in other years, such as 2008 (+6,140 million DZD). This volatility is partly due to government policies aimed at boosting employment and increasing social spending, in addition to the impact of the global financial crisis in 2008, which led to a drop in oil prices, the primary source of income.

The fund recorded a notable surplus in 2012, amounting to +110,540 million DZD, but this surplus sharply declined, resulting in a deficit of -85,762 million DZD in 2013, which further increased to -123,936 million DZD in 2014. This change is attributed to the collapse of oil prices in 2014, which affected state revenues and its ability to support the fund, as well as the expansion of early retirement schemes and an increase in the number of retirees.

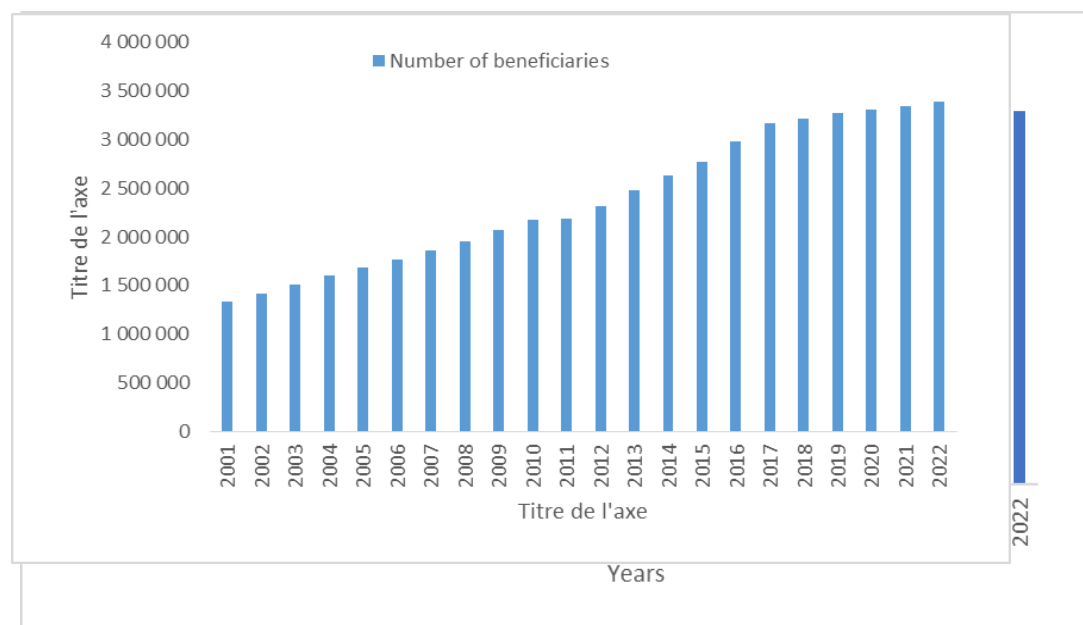
The deficit worsened significantly between 2015 and 2018, growing from -258,960 million DZD in 2015 to -555,400 million DZD in 2018, due to the continued decline in oil prices and the Algerian economy's dependence on oil revenues. Additionally, the population growth, the rising number of retirees, and the aging population contributed to the increasing obligations of the fund, surpassing its revenues.

3- Evolution of the Number of Pension Beneficiaries in the National Pension Fund

The pension system in Algeria has seen a continuous increase in the number of beneficiaries, influenced by economic, social, and political transformations. Between 2001 and 2008, the number of beneficiaries gradually increased from 1,341,161 to 1,948,138, due to improvements in social welfare, the rising number of retirees from public sector employees who were hired in large

numbers after independence, and the economic boom fueled by higher oil prices. Subsequently, the growth in the number of beneficiaries accelerated, reaching 2,773,615 in 2015, driven by the adoption of early retirement policies in some government sectors to address the inflation of public sector jobs and high unemployment rates. Additionally, the demographic growth in the preceding decades added more individuals to the retirement age during this period.

Figure 02: Evolution of the Number of Beneficiaries in the National Pension Fund



Source: National Pension Fund (CNR), accessed on 27/09/2024 at 06:53

The period between 2016 and 2022 was characterized by steady growth, with the number of beneficiaries rising from 2,978,557 in 2016 to 3,393,714 in 2022. However, this increase was slower compared to previous years. This slowdown can be attributed to several factors, most notably the downturn of the Algerian economy due to the drop in oil prices since mid-2014. The government's capacity to keep funding the pension system at the same rate was impacted by this drop. Additionally, in 2017, the government abolished the early retirement policy in an effort to reduce the burden on the pension fund. The COVID-19 pandemic's effects on the world economy did not stop Algeria's pension recipients from growing. While the pandemic may have affected the pace of employment and economic growth, it did not significantly impact the gradual increase in the number of retirees.

4- Elderly Coverage Rate

The senior coverage rate is a crucial metric for assessing the efficacy and inclusivity of social security programs, especially when it comes to offering healthcare and financial assistance to the old. This rate represents the percentage of individuals who are entitled to pension rights or receive social assistance directed toward this group, compared to the total elderly population in society. Coverage for this group is influenced by various factors such as government policies, economic systems, and demographic changes. With the continuous increase in the aging population due to higher life expectancy and lower fertility rates, the need to improve this coverage becomes evident in order to ensure a dignified life for the elderly and enhance the sustainability of pension and social protection systems.

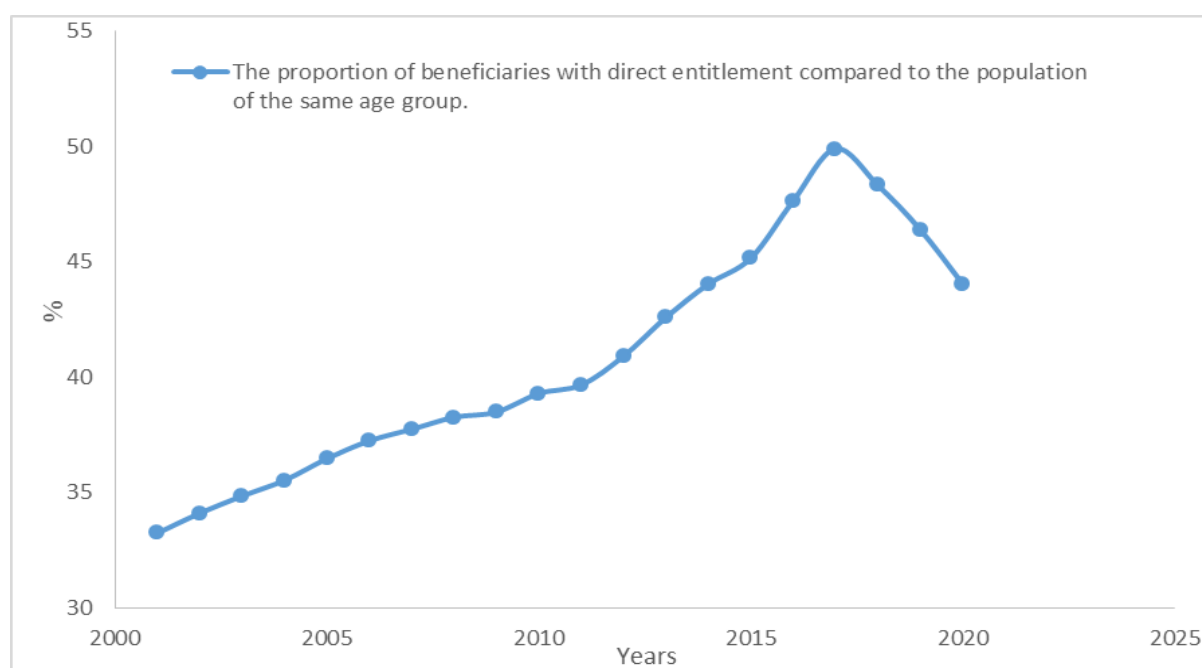
4.1 The Proportion of Direct Beneficiaries (Pension Benefits) Compared to the Population in the Same Age Group

The data shows a steady increase in the proportion of direct beneficiaries compared to the population in the same age group. This percentage rose from 33.24% in 2001 to 49.89% in 2017. This continuous increase reflects the government's efforts to expand social coverage and implement reform programs aimed at enhancing protection for the elderly. This period coincided with an improvement in Algeria's economic conditions, which provided sufficient funding for the pension system, ensuring a larger segment of the population received their pension rights.

After reaching its peak in 2017 at 49.89%, the percentage gradually declined to 44.04% in 2020. This decline may be partly attributed to the expansion of the informal sector during the 1990s, which resulted from falling oil prices and the implementation of structural adjustment programs that failed to meet increasing social needs. This, in turn, affected the organization of the economy in general and the labor market in particular.

The reasons for the decline in coverage rates are partly linked to the 1970s and 1980s, when the conditions for obtaining retirement rights were tied to prior access to formal employment throughout one's professional life. Historically, this issue can be traced back to the generations born between 1928 and 1934, who lived through periods of war, including the national liberation wars. (MENDELI, 2015, p. 10).

Figure 03: Proportion of beneficiaries of direct entitlement (retirement pension) compared to the population of the same age group.

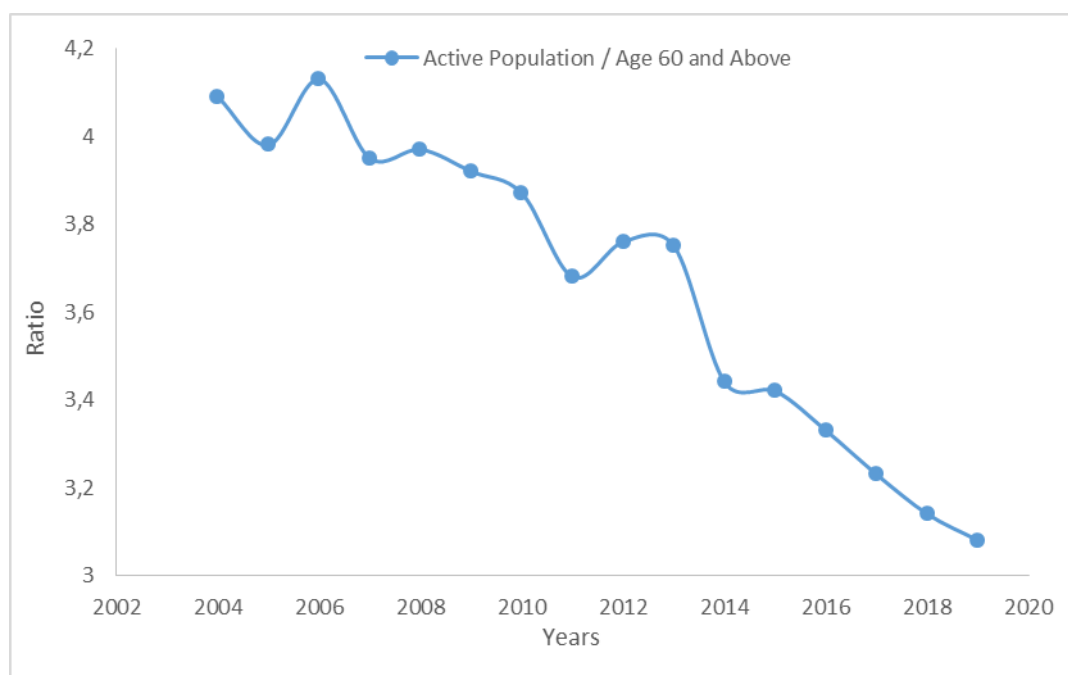


Source: National Pension Fund (CNR), accessed on 27/09/2024 at 06:53, ONS

2- Ratio of Support for Elderly Individuals

In a pension system based on the distribution principle, developments in contribution rates are heavily dependent on the support ratio of the elderly population, which is sometimes referred to as the ratio of active individuals to retirees. This ratio reflects the relationship between the number of individuals capable of working (who contribute to pension funds through their contributions) and the number of individuals of retirement age who rely on these contributions as their source of retirement income. This ratio focuses solely on retirees, making it a more accurate tool for understanding the financial burden posed by the increasing number of elderly individuals compared to the working population.

Figure 04: Evolution of the ratio of active individuals to the population aged 60 and above



Source : 2004-2013 (ONS, 2013, pp. 11-12); 2014-2019 (ONS, 2019, pp. 12-13)

The table shows the ratio of the active population to those aged 60 and over in Algeria over the period from 2004 to 2019. A downward trend in this ratio is noticeable over the years, declining from 4.09 in 2004 to 3.08 in 2019.

This decrease reflects a shrinking base of active population relative to the 60+ age group, indicating an acceleration in population aging. This trend could increase pressure on pension and social security systems and highlights demographic and economic challenges that will require the state to intensify efforts in finding innovative solutions to maintain balance between active and retired generations.

Notably, the most significant decline occurred between 2014 and 2019, with the ratio dropping sharply from 3.44 in 2014 to 3.08 in 2019, underscoring the accelerating pace of demographic changes during this period.

3. Coverage Rate of the Active Workforce in the Labor Market

Calculating this rate is crucial to improving pension coverage rates, as the pension system is funded through contributions collected by the National Social Security Fund, which are paid by active workers across various sectors of the economy, both public and private.

The financial crisis of the fund is attributed to insufficient coverage of employees in the labor market. A significant portion of the active population is not enrolled in the social security system, which will prevent them from receiving pension benefits in the future. Ensuring coverage for this group is essential, as it would increase the number of contributors and reduce the pension fund deficit. Statistics indicate that half of the employed workers are not covered by social insurance, exacerbating this issue.

Table 08: Evolution of Key Labor Market Indicators from 2004 to 2019 (in thousands)

Year	Working Population	Affiliated Population	Non-Affiliated Population	Unemployed Population	Active Population
2004	7 798	3 774	4 024	1 672	9 470
2005	8 044	4 092	3 953	1 448	9 493
2006	8 869	4 159	4 709	1 241	10 110
2007	8 594	4 322	4 272	1 375	9 969
2008	9 145	4 567	4 579	1 170	10 315
2009	9 472	4 694	4 778	1 072	10 544
2010	9 735	4 856	4 879	1 076	10 812
2011	9599	5227	4372	1 062	10 661
2012	10170	5922	4249	1 253	11 423
2013	10788	6211	4577	1 175	11 964
2014	10 239	5 972	4 267	1 214	11 453
2015	10 594	6 515	4 079	1 337	11 932
2016	10 845	6 747	4 098	1 272	12 117
2017	10 858	6 198	4 660	1 440	12 298
2018	11 001	6 406	4 596	1 462	12 463
2019	11 281	6554	4727	1 449	12730

Source : 2004-2013 (ONS, 2013, pp. 11-12) 2014-2019 (ONS, 2019, pp. 12-13)

By analyzing the table, we observe that the number of working individuals in Algeria experienced continuous growth over the studied period, increasing from 7.798 million workers in 2004 to 11.281 million in 2019. This growth reflects not only an expansion in economic activity but also an enhanced labor market capacity to absorb more workers, indicating progress across various sectors within the Algerian economy.

Additionally, the number of affiliated individuals, or those registered in the social security or pension system, has also increased significantly, rising from 3.774 million in 2004 to 6.554 million in 2019. This substantial increase reflects improvements in policies related to the registration of workers within the social system, which contributes to enhanced financial and social inclusion. This development plays a crucial role in bolstering social security for workers, ensuring their access to rights such as retirement benefits and health insurance.

Regarding the non-affiliated population, the initially high numbers presented a significant concern, reaching 4.024 million in 2004. Although this category increased in certain years between 2006 and 2009, the overall trend shows a gradual decline, falling to 4.727 million in 2019. This decrease reflects the authorities' efforts to integrate more workers into the formal economy, signaling positive progress in public policies aimed at improving labor market regulation and worker registration.

Unemployment also witnessed a notable reduction, with the number of unemployed individuals decreasing from 1.672 million in 2004 to 1.449 million in 2019. Despite this improvement, unemployment remains a substantial economic and social challenge, as certain years, such as 2017 and 2018, experienced slight increases in the number of unemployed individuals. This fluctuation reflects the vulnerability of some economic sectors and their impact on sustainable job creation.

Conversely, the active population steadily grew from 9.470 million in 2004 to 12.730 million in 2019, indicating an increasing entry of individuals into the labor market. This growth reflects improvements in qualification rates, increased economic awareness among individuals, and a desire to engage in economic and professional activities.

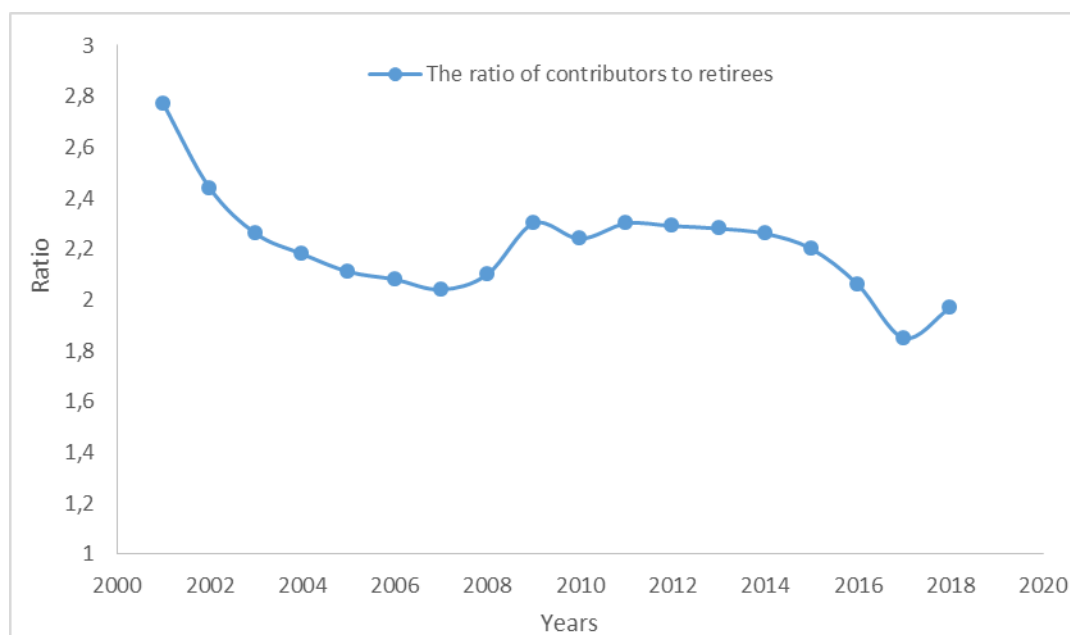
Overall, Algeria's labor market saw a notable improvement between 2004 and 2019, with higher employment rates and an increase in registered workers in social security systems. However, challenges related to unemployment and a high number of non-affiliated individuals persist, highlighting the need to continue economic reforms. This includes focusing on creating new job opportunities, enhancing social inclusion, and improving the business environment to support sustainable economic growth.

4- Contributor-to-Retiree Ratio

Specialized reports indicate that the contributor-to-retiree ratio is a critical indicator of the sustainability of a pension system, reflecting the system's ability to distribute risks across generations. In 1979, the ratio was 18 contributors for every retiree, reflecting a strong labor market and a thriving economy. However, this ratio began to decline, reaching 8 contributors per retiree in 1989 and then dropping further to 2.5 in 1995. This decline was influenced by economic crises that led to the loss of hundreds of thousands of jobs, a slowdown in job creation, and challenges in collecting contributions from financially struggling companies, particularly those in the public sector.

Demographic changes have increased the number of retirees while slowing workforce growth, putting additional pressure on the pension system. The influence of government employment regulations and the global economic slowdown further exacerbated these difficulties. By 2014, the ratio had fallen to 2.26 contributors per retiree, marking a continued downward trend since 1995, with a brief rise to 3 contributors in 2000 due to higher oil prices. With the ratio remaining below the minimum acceptable threshold to sustain the pension system (6 contributors per retiree), it is expected to continue declining as the population ages and life expectancy rises.

Figure 05: Evolution of the number of retirees in the National Pension Fund compared to the number of contributors from 2001 to 2018.



Source: (ONS: ALGERIA IN FIGURES, 2017, pp. 22-23) (ONS: ALGERIA IN FIGURES, 2021, p. 20)

The data in the above figure reflects a continuous increase in the number of retirees, rising from approximately 1.34 million in 2001 to over 3.2 million in 2018. Despite the increase in the number of contributors, from 3.7 million in 2001 to about 6.34 million in 2018, the coverage ratio of contributors to retirees has significantly declined.

In 2001, there were 2.77 contributors for each retiree, but this ratio dropped to 1.97 in 2018. This decline in the coverage ratio is due to several factors, including the continued rise in the number of retirees as a result of population aging, increased life expectancy, and early retirement policies observed in Algeria following economic crises. On the other hand, the increase in the number of contributors did not match the pace of growth in the number of retirees, leading to significant financial pressure on the National Pension Fund. These figures highlight the challenge faced by Algeria in maintaining the sustainability of its pension funds amid demographic shifts, as the narrowing gap between contributors and retirees threatens to exacerbate the financial deficit of the fund.

Conclusion :

In conclusion, the issue of the financial balance of pension funds in Algeria is a fundamental matter for ensuring social security and financial stability for the retired population, who rely on this system to cope with the burdens of life after their working years. This topic reflects the profound challenges faced by Algeria due to demographic changes, particularly with the ongoing population aging, which is accompanied by a decline in the population growth rate and a slowdown in the active young workforce. This demographic shift has led to a reduction in the base of active contributors and an increase in the number of retirees, placing significant pressure on pension funds and escalating the challenges of their financial sustainability. The study has highlighted how closely

population aging is linked to the growing financial deficit in pension funds, which cannot be overlooked as it reflects structural problems requiring urgent and continuous intervention.

Achieving financial balance in pension funds requires a comprehensive reform vision that considers the demographic and economic specifics of Algeria. The proposed reforms encompass various aspects, including the adjustment of pension policies, such as reconsidering the retirement age and restricting early retirement. These measures are essential for extending individuals' contribution periods to the fund and delaying their entry into retirement, which could help alleviate the financial burden. On the other hand, stimulating the economy to create new job opportunities and attract individuals to the formal labor market will increase the number of active contributors and strengthen fund revenues.

Moreover, the pension system in Algeria needs to develop more diversified financial and investment strategies to reduce dependence on unstable oil revenues due to fluctuations in global oil prices. Through thoughtful and sustainable investments, stable income sources for the funds can be provided, ensuring their long-term financial stability. Enhancing the effectiveness of contribution collection, especially from government agencies, also goes a long way toward closing budget gaps and ensuring steady revenue streams.

Educating the public about the significance of potential structural changes to the pension system is also essential. Transparency in communicating the significance of changes and the difficulties posed by an aging population helps guarantee citizens' cooperation and comprehension of tough choices. Future generations will be more inclined to support the financial viability of pension funds if trust is established and the long-term advantages of change are made clear.

References:

1. HAMZA Cherif, A., & SALHI, M. (2015). Demographic Aging in Algeria: Reality and Perspectives. *L'HOMME ET LA SOCIETE* (11), 1-41.
2. MENDELI, D. (2015). The Standard of Living of Algerian Retirees and Pension Inequality.
3. ONS. (1962-2020). Statistical Retrospective. Algiers.
4. ONS. (2013). Activity, Employment & Unemployment in the 4th Quarter of 2013, No. 653. Algiers.
5. ONS. (2014). Algeria in a Few Figures: Results 2011-2013.
6. ONS. (2018). Algeria in a Few Figures: Results 2015-2017.
7. ONS. (2019). Activity, Employment & Unemployment in May 2019. Algiers.
8. ONS. (2021). Algeria in a Few Figures: Results 2016-2018.
9. ONS. (2023). Algerian Demography. National Statistical Office, No. 1030.
10. ONS. (2017). Algeria in a Few Figures: Results 2014-2016, No. 47. Algiers.
11. ONS. (2021). Algeria in a Few Figures: Results 2016-2018, No. 49. Algiers.
12. ONS. (2021). Algeria in a Few Figures: Results 2016-2018, No. 49. Algiers.

13. PISON, G. (2009). Demographic Aging Will Be Faster in the South Than in the North. *Population et Sociétés*, 1-4.
14. Law No. 99-03 of March 22, 1999. (1999). Amendment and Supplement to Law No. 12-83 Relating to Retirement. *Official Journal* No. 20, March 24, 1999.
15. Legislative Decree No. 10-94 of May 26, 1994. (1994). Establishment of Early Retirement. *Official Journal* No. 34, June 1, 1994.
16. Decree No. 70-116 of August 1, 1970. (1970). Administrative Organization of Social Security Bodies. *Official Journal* No. 68, August 11, 1970.
17. Decree No. 85-223 of August 20, 1985. (n.d.). *Official Journal* No. 33, August 21, 1985.
18. Decree No. 92-07 of January 4, 1992. (1992). Legal Status and Financial and Administrative Organization of Social Security Funds. *Official Journal* No. 02, January 8, 1992.
19. Decree No. 97/13 of May 31, 1997. (1997). Amendment and Supplement to Law No. 83-12 Relating to Retirement. *Official Journal* No. 38, June 4, 1997.
20. Ben Saber Ben Azouz. (n.d.). *The Guide to the Explanation of the Algerian Labor Law (The Emergence of the Individual Employment Relationship and Its Consequences)*. Algiers: Dar El Khaldounia.
21. Law No. 15-16 of December 31, 2016. (2016). Amendment and Supplement to Law No. 12-83 Relating to Retirement. *Official Journal* No. 78, December 31, 2016.
22. Law No. 83-12 of July 2, 1983. (1983). Relating to Retirement. *Official Journal* No. 28, July 5, 1983, amended and supplemented.