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Demographic Transition, Epidemiological Transition and Nutritional Transition in Algeria

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Abstract

Being in a transition meaning there will always be phases and shifts and most importantly implication proceeding in the action of change whether reducing mortality, to limiting births, to encourage urbanization and accumulative crowds , to changing the economic system, or even to extend life expectancy, the implications of this demographic transition relates to epidemiological transition and the recent nutrition transition. Demographic shift, is considered as one of the most important changes that affect population across the world during the last centuries for Algeria, the change began during the last century, during the transformation process from the beginning, the high death and birth rates, the first is due to epidemics and famine, and the second is due to the nature of the traditional agricultural activity, which considered human resource as the power of production engine also, that the death rate is high, many of the births were somehow relying on survival more than living and eventually down the road one or two of the seven children born survived death. The first stage is the decrease in the death rate as a result of reducing causes such as infectious diseases, and during the second stage, the rates are imbalanced because most of the births survived due to the death reduction.

and the best way to reduce the birth rate was to provide contraceptives tools and persuade women to opt for the decision of having less children (birth control) , this process was the third phase of the demographic transition model, the studies applied on the country's demography stopped at this stage , Algeria so far is in the fourth phase , we aim through this study to define how we got here , what are the characteristics and whether our short future is going to change and relate to the fifth phase, with going through the determinants , and implication of each stage, and how they changed through time, or it's just going to extend in the fourth stage knowing that the change is the transitional key. While the demographic

transition was taking place, there were some implications that occurred due to the tools that contributed to the transition from one stage to another. In addition to creating two stages that did not exist 50 years ago, two additional transitions were set in parallel to it and were not placed until after the occurrence of consequences that were not calculated and predicted before, the epidemiological transition and nutrition transition, we're going to apply the models determinants to the Algerian population characteristics and define the link that related those transitions chronologically and From this point we may consider that , the fifth stages of each model that haven't been witnessed yet in Algeria are to correct the mistakes, catch up on what has been missed, or search for solutions, so how is that going to apply on our future.

Keywords

Demographic Transition, Epidemiologic Transition, Nutrition Transition, Fertility, communicable diseases, degenerative diseases.

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A special thanks to Dr CHERGUI, my colleagues and Karima for all the advice regarding this dissertation.

To Pr BENTARMOUL may God have mercy on him.

Dedication

To my **parents**

My sincere gratitude for the love, support and encouragement

I would’ve never achieved this without you and I hope this work would complete the dream you had for me

Thank you for everything

to my uncles and aunts

for the encouragement, I hope I made you proud

to my beloved brother, sisters and Kids

to my friends

Objectives:

The changes that took place in the last 20 years haven't been demographically studied enough and the latest updates recently added weren't included in the latest models due to the late publication of results concerning the entire population, the aim of this study is to discuss the revisited theory of the demographic transition in Algeria which includes two additional stages on the classical model, the fourth and fifth, depending on fertility and mortality rates, demographic growth and life expectancy, and we will try to address every factor that can affect or result from this transformation, we're targeting to cover everything related to these transitions in Algeria by addressing the following goals:

- How do these models relate to each other and What are their measurement tools?
- What effects demographic, nutrition, health patterns change in Algeria

Methods:

- The deficiency of statistical data has limited this research in terms of several determinants, especially the observation period which is needed in the chronologies, although most of the data we used this this studies were collected from the National statistics Office surveys and censuses, the ministry of health and population and hospital reform, we also had to rely on global statistical data and the most reliable sources to analyse like the united nations, world bank, the World health organization, UNICEF.

  this research is an analytical study in a purely scientific topic which concerns mainly the public health. in which we analysed the information and data, that aim to answer the questions posed regarding our topic.

Among the most important methods that we have adopted are evaluation, interpretation, criticism, and deduction. And we also relied on the process of dismantling the main elements of the phenomena, and then we deeply studied them, to reach the results and judgments, which enable us to assess the context of demography in Algeria and draw some suggestions that help determine a comprehensive view of the causes, and consequences of global models related to public health, in addition to the inductive approach that addressed theoretical issues in the research.

Results, arguments and conclusion:

- The fourth stage of the demographic transition is characterized by a fertility rate around 2.5 child per woman and a stagnation of birth and death rates, we've concluded that the Algerian rates have been in this regime for 20 years so far, and the most similar model to ours was the Great Britain structure model.
- In the epidemiological transition Algeria is in the end of the third stage, facing the degenerative man-made diseases and simultaneously the communicable disease burden still claiming deaths and since the fourth stage is about declining cardio vascular disease and reaching over 80 years old life expectancy by being able to live with the non-communicable disease without being bothered, unless the population changes the lifestyle in order to reach the fourth, their public health would be stuck in this stage until they do.
- There are two main factors that leads to opt for an unhealthy diet , choice by habit and poverty, these two divide the developed and developing countries, The Algerian diet isn't quite healthy and it's due to the second reason being classified among the low-middle income countries, and since economy is the leader cause for diet option in the country identifying the

context draws the road map to our main target which is public health and wellbeing.

- The future perspective suggests that the next stages of each model won’t probably happen in the next 20 years due to the criteria constancy unless the economy key changes however behavioural and society studies can’t accurately predict future and in every society, awareness of behavioural change comes from within Regardless of international interventions, and yet still hard to maintain how future implications would affect global sustainable development.
- We have tried, as much as possible, to propose models and cover the situation comprehensively from various aspects through the few data that we have about the Algerian population, despite the insufficiency of statistics and the absence of some basic criteria for evaluation. The analysis was through the criteria most related to the behaviours associated with demographic phenomena, as they concern the entire population.

Introduction

The Demographic transition is a pattern, changes in the population of a country, it indicates that the population will eventually stop growing when the country moves from high birth and death rates to low birth and death rates, stabilizing the population, this stabilization often occurs in industrialized countries, as less developed countries tend to lean on and follow more developed countries for their lead. At the moment Most countries have a positive growth rate, which means that their population is constantly growing.

The population of Algeria is quite small based on economic resources and especially area, but given the socio-economic level of most citizens, they practically experience the typical consequences of overpopulation. Thinking back to the history of the country's demography from the colonial period, the population was extremely low and this went hand in hand with the security, economic and health situation until 1906, the population reached 4,785,759, in 24 doubled to 8,681,785 in 1948 but after independence Algeria began to catch up and make up for its loss as it focused on the healthcare system, filling the biggest gaps by building hospitals, training qualified personnel and generalizing vaccination to gradually reduce the mortality rate also began to popularize contraception to maintain the birth rate as well as to gradually achieve parity between the rates. Currently, the annual population growth rate is about 1.8%.

looking at this positive annual change, the Algerian population continues to grow and increase. but looking at how it has evolved over time we will see that this rate is increasing in general since it was 1.3 in 2001 it has constantly increased reaching 2.1 in 2016 although we must take into consideration that the decade around this year coincides with the middle age marriage of the baby boom generation around 1977 in addition to granting social housing since the year 2000

and real estate projects that have raised the marriage ratio including the birth rate without changing the fertility rate. the annual variation has decreased gradually since it is now 1.9% but in terms of size the population continues to grow, to understand population growth it has been divided into four different phases.

first phase is around 1900 this period is called period of population stagnation. In this period, the population growth rate was very low about 1%, the birth rate was balanced by the death rate, because they were both high, there was almost no change in the population. The Algerian population was stagnating until 1945. There are strong reasons at that time, as Algeria was under French colonization, the system of distribution of food, medical care and other basic necessities for the poor and the inefficient, then the illiteracy rate was high.

People have died from epidemics like the flu. Plague, it also faced shortage of food due to colonialism, so all these factors were responsible for high birth rate as well as high death rate, and this led to population stagnation the second phase is from 1946 to 1985 this period is referred to as a period of steady population growth. After the death rate dropped and the population began to grow at a rate of more than 2 or as much as 3 percent per year simply because there was an overall improvement in health, education and sanitation throughout the country, these developments have helped control epidemics such as cholera, plague and malaria.

As a result. The birth rate remained high, which led to a steady population growth, during this period especially after independence, Algeria experienced some development, which was quite impressive. The third phase started from the year 1986 supposedly till 2000, but the country experienced a dark decade in 1990 due to a civil war that brought security, economic and social instability, but from this period especially in the year 2000 until now, we can consider this period as it is designated in the model the period of demographic explosions. Means that the

birth rate was considerably high, but the death rate continues to fall and the life expectancy is prolonged due which means that mortality has become more related to degenerative diseases and in late age not early age as that of epidemics.

Generally the term epidemiological transition is the change in the burden of disease from infectious or communicable diseases to non-communicable diseases or chronic diseases, and we are witnessing this process at the moment, mainly in developing countries such as Algeria, by analysing the demographic transition we understand that it works simultaneously in parallel with the epidemiological transition step by step and therefore we find ourselves in another transition linked to the latter due to the change in diet and development has created what is called (man-made diseases) diseases caused by human beings, the fifth stage of each model in western countries has different characteristics from what could be applied on a developing country like Algeria, we will therefore approach through this work the three transition models and will study the relationship between them and how they are applied in Algeria by trying to identify the basic tools to analyse and understand the theories and aiming to answer the following questions in order to prevent, and take measures regarding the upcoming phases for the public interest

- What is the demographic transition and to what demographic patterns of developed countries Algeria is closely related?
- According to the three models, where is the Algerian population now, and how have these transitions evolved through the timeline in in the country getting to where it is?
- What is the determinant of the Algerian nutrition diet and how did it effect health?
- What is the epidemiological transition and What are its different stages?
- where is Algeria in the epidemiological transition model?

- Since the process is ahead of us in the western countries how would be Algeria's next stages in the three models?

Overview:

- the dissertation we're presenting is divided to three chapters mainly focusing on each model of the transitions and through analytics we highlight how do they relate to each other. Chapter 1 discusses the Demographic transition in Algeria, from the historical framework to the stages to the determinants and implications arriving finally to the future perspectives and how would they impact the economy and demographic phenomena. Than we move to Chapter 2 which discusses the epidemiological transition ,from the first stage to the last describing the health determinants and factors in each stage deducting the causes and identifying the ones relating to human behaviour in the purpose of taking action in what we can do narrowing to the cause that human has control over which we discuss in the third chapter, the Nutrition transition, as identifying how the lifestyle change and why, how it used to be identifying the implications and changes and how the impact on health proceed positively and negatively.

Literature review/theoretical framework

The topic has been studied by several scholars and it is a comprehensive and broad topic that has been addressed in the form of separate parts highlighting each of the transitions separately in different periods, and after reviewing previous studies and their results, we chose to resort to the most recent and closely related to this study in particular, with the addressed goal and its associated factors.

Bait Fateh 2021 Batna university : nutrition transition and new health problems in Algeria « clarify the passage of the Algerian population through the stages of food transition, available surveys indicate that Algeria has entered the second phase marked by nutrition-related diseases. The rapid changes in food intake and lifestyle in Algeria clearly demonstrate a significant impact on the evolution of morbidity and mortality as well as the rise in obesity and risk factors for chronic pathologies. »

Habireche Mhamed 2012 Blida University , research titled Analysis of the Evolution of the Food and Nutritional Situation in the Western Region of Algeria in Two Decades (1988-2011): (case of the Wilaya of Oran and Chlef) a comparative analysis of the food and nutritional situation of households is to identify the impact and analyse the dynamics of consumption, and to give indications on the standard of living of food consumption according to the residential area, occupation, and income. Purely economic study

Hamza Cherif Ali was accurate about his thesis "Population and Nutritional needs in Algeria assessment and perspectives" and we should mention that some of the sections were inspired by his work in nutritional transition although the periods that he covered goes back to the 20th century

Delenda Aissa, and Fodil Abdelkrim, 2006 article demographic transition in Algeria the demographic history in Algeria in the first three stages and the

evolution of the natural movement and a description of the phases details by main determinants and analysing their movements and causes.

Azri khoukha, Brahim Brahamia Bejaia and Constantine, 2018 article about the demographic transition in Algeria, precisely noted the indicators from 2000 to 2015, they well specified the movements and the process of the curves and defined them with a highlight on the elderly segment and the importance of focusing on life quality, especially regarding them.

AIT MOHAND Achour, Belgium 2005 Master's thesis about Health transition characteristics and, consequences on health needs and priorities in Algeria examined through descriptive variables of the demographic, social, epidemiological conditions and the evolution of healthcare; seems to follow a pattern approaching the intermediate variant of the one later described by Omran with a tendency to polarization, approached through demographic indicators encouraging the search for an epidemiological polarization and raising fears of increasing inequalities with regard to the socio-economic current context

Leila Houti and Saada Chougrani CRASC 2018 article talks about the epidemiological transition in Algeria they had described and covered the health condition since independence until 2006 the communicable diseases burden in Algeria and the next degenerative diseases phase with the factors of change and data analysis.

Abdelfatah LEULMI, Skikda University, article about the epidemiological transition, demographic transition and lifestyle in Algeria, he has studied the demographic transition on the fertility side and the epidemiological transition since the independence, with a general overview on the lifestyle, food consumption, and expenditure of the population

Belarbi Zoubida, Blida 2 university, Epidemiological transition in Algeria has studied the shift from communicable to non-communicable diseases and highlighted the process of taking charge of the chronically ill and the capacity of the healthcare system and the morbidity profile in Algeria with a slight evaluation of the staff of the sector for the purpose of measuring the medical support.

This study is an addition or a deeper analysis to the research that was carried out by giving the current picture of the stages of the three transitions combined in Algeria to formulate a clear defined population policy by identifying the most important factors affecting population growth variables and directing population strategies to development goals that serve the public interest and ensure the security of the population situation under Various conditions in the long run, and this is by providing theoretical and applied knowledge and studying the influences, theories and previous models by comparison with the population situation in the country, including studying the possibilities of some of the proposed projections to predict the future population and its implications.

Chapter One

The Demographic Transition

Chapter one: The demographic transition

Overview

Before independence for more than a century, the situation in Algeria was characterized by security instability because it was in a colonial war, so we describe its condition as a balance between a high birth rate and a high death rate, the combination of which leads to a natural increase close to zero on average. This stage is usually characterized by high mortality due to wars, epidemics and famines. The high birth rate parallels the death rate to compensate for the deficit caused by the high rate of infant mortality and mortality in general.

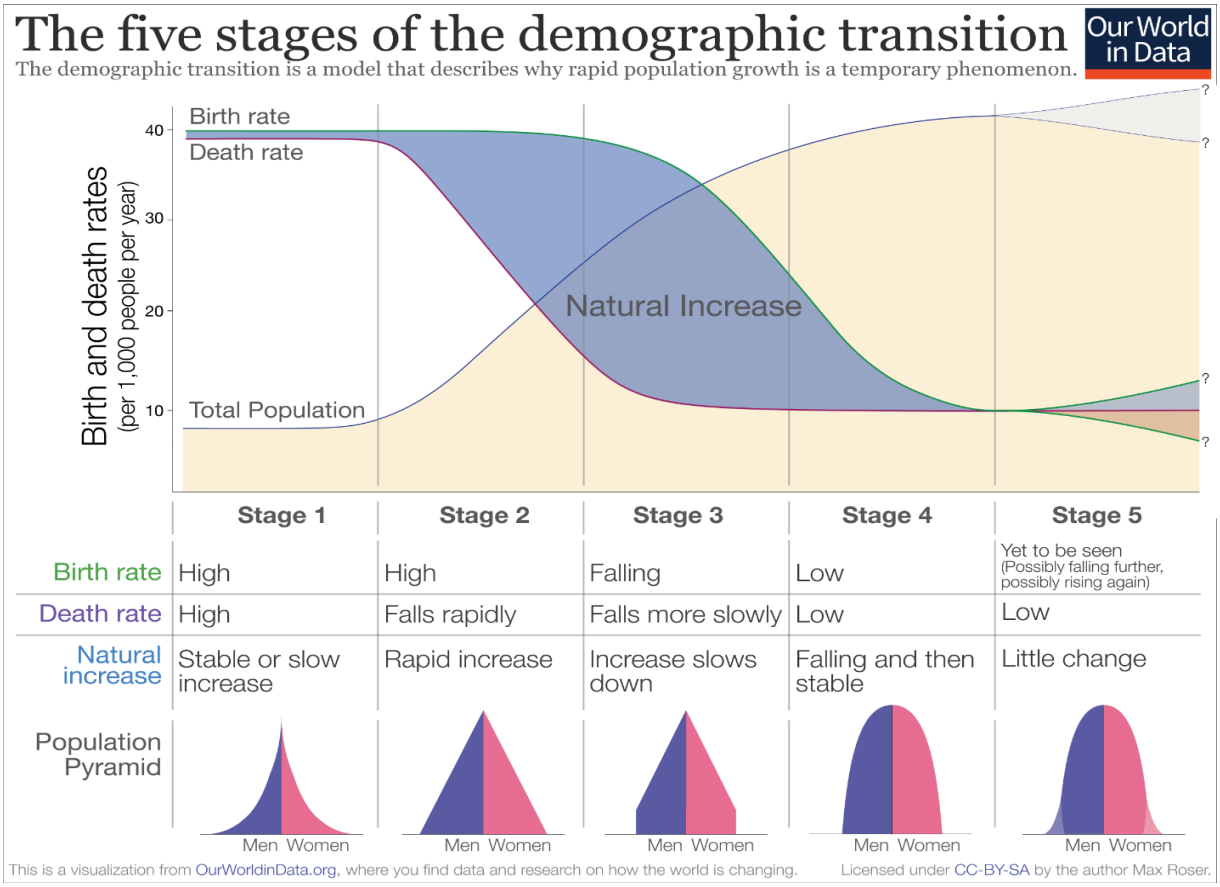
After independence, the country started facing a broken economy and countless social, economic and political problems, this is how the government from 1962 had set up the planning commission to create, develop and execute the three-year, four-year and five-year plans, eventually, development activities were introduced through a centralized planning process and the economy began to improve. Which also improved people's lives in addition to a high birth rate and low death rate, which contributed to Algeria's population explosion around 1980. The first surveys were mainly aimed at observing the living conditions of poor households, the imprint of such an orientation persists. “Many surveys serve more to determine the living conditions of certain particular layers than to determine economic relations.

After the investment plans, the death and birth rate decreased significantly and with improvement in food, hygiene, health, transportation, industry and structure, especially with the absence of devastating war or famine and epidemics, the population growth rate was somewhat contained and controlled, with the attempt to control infectious diseases at the same time, this change resulted in an increase in life expectancy. This is an indicator of development, but it has several

consequences on the social and economic levels, not to mention the demographic level in the long run. As for health, Algeria has to deal with other types of diseases that have their origins in changes in consumption patterns, urbanization, and environmental pollution. And many other factors, for which human behaviour is responsible.

The demographic transition

Figure 01: The five stages of the demographic transition model



(Roser, 2019)

Definition:

Demographic transition is the historical process by which a population moves from a demographic regime characterized by a high death rate and a high birth rate with minimal technology, education especially of women and economic development, to a new a low death rate and then a low birth rate regimes this type of evolution was observed in the countries of Western Europe by the end of the 18th century, then in all the other countries during the following centuries, as their socio-economic development progressed. Observing the demographic transition has allowed demographers to build simulation models such as those of the UN to forecast future population.

The first demographers who worked on this Population evolution of European and North American countries were in particular ADOLPHE LANDRY in France, author of "The demographic revolution" (1934) and his colleague Louise Duroy, then Frank W Notestein in the United States who formalized the theory of "demographic transition" in 1945.

The National Institute for Demographic Studies (INED) describes the demographic transition as "the passage from a traditional regime where fertility and mortality are high and more or less balanced, to a regime where the birth rate and mortality are weak and also balance each other”

the shift has occurred in many industrialized countries, the theory and model are frequently imprecise when applied to individual countries due to specific social, political and economic factors affecting particular populations.

However, the existence of some kind of demographic transition is widely accepted in the social sciences because of the well-established historical correlation linking dropping fertility to social and economic development.

Scholars debate whether industrialization and higher incomes lead to lower population, or whether lower populations lead to industrialization and higher incomes. Scholars also debate to what extent various proposed and sometimes inter-related factors such as higher per capita income, lower mortality, old-age security, and rise of demand for human capital are involved. (Wikipedia.org, 2022)

The demographic transition stages

Initially, the theory identified three basic stages, but moving forward in time and evolution led to the emergence of two additional stages the fourth than later the fifth and this is according to the changes that occurred (Frejka, 2016) the stages, changes went from, high birth and death rates, then the stage of low death rate, then the low birth rate, stagnation, then the last stage of the results of this development appeared at various levels, this is called demographic regimes, in the theory of Demographic transition, the word was first used in 1929 by Warren Thompson, then in France, Adolphe Landry, author of The Demographic Revolution (1934) and his colleague. Louise Duroy, then Frank W. Notestein in the United States who formulated the theory of the "demographic transition", was a clear theory built, referring to this historical process of population change, coinciding with the Malthusian theory of the Industrial Revolution.

The first stage was characterized by a demographic pattern with a high rate of deaths and births due to infectious disease, famine and wars, and the tendency to reproduce due to the low probability of survival. In addition to the fact that people were dependent on the land and agriculture, human power was considered the engine of the economy. The second phase represented the beginning of change as it coincided with the industrial revolution in Europe and the development of medicine, which contributed to reducing the death rate. The third phase the low

death rate compared to the high birth rate created a kind of imbalance according to the influential economist Thomas Malthus' view, whose theory coincided with the phase of the second and third stages. Where he concluded that this imbalance will lead to high population growth, to the point of economic deficiency, and that this will prevent focus on raising the standard of living and reaching a society close to the ideal, (MALTHUS, 1878) hence, society resorted to reducing births. Now that the birth rate has been balanced with death, this is what distinguished the fourth stage, the stability of the population growth rate, the improvement in contraceptive means and industrialization and women education have helped in maintaining this stability. As a result of development in the structure life expectancy increased leading to population ageing, the original Transition model had four stages, however the changes occurred after the fourth stage raised the debate of the fifth although this is more relative to the population as it differs from a country to another, more-fertile, less-fertile stated as a Stage Five. But it is mostly when fertility rate declined till reaching a sub-replacement rate (under 2 births per woman)

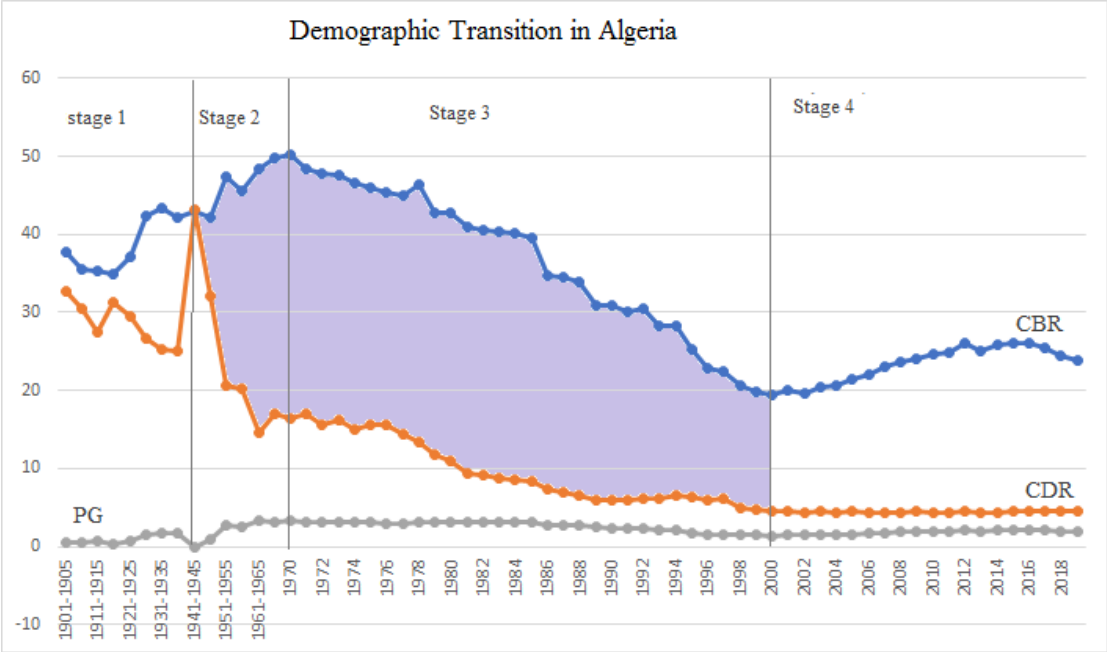
Some scholars note that due to individual natural or cultural selection, birth rates may rise again. Part of the hypothesis of the variance in the birth rate between cultures is large; However, this remains relatively according to some countries. There are societies with a higher birth rate that can't be explained by differences in income, but rather opposes the contrast of high income with the low number of children

As a characteristic of the latest stages in the developed countries, and perhaps some developing ones, is the multitude of living arrangements other than marriage, the disconnection between marriage and procreation, the increase in the rate of divorce, union breakdown, single mothers, and new union forms which declines the size of new-borns, and creates in the long term an unrecoverable

loophole in fertility, some scholars formulated this concept in addition of other characteristics as a second demographic transition but it's still a conceptual framework, that addressed mainly the pattern of reproductive behaviour and how social changes led to unplugging the child concept form motherhood. Whereas the motivation of adult self-realization within the role or lifestyle as a parent used to be completer and more fulfilling and population growth and a sudden increase in world population, in other words, triggering the decline of fertility, and the influence of the entry into modern economic growth targeting the limitation of births through the limitation of marriages. (CHESNAIS, 1986)

The demographic transition in Algeria:

Figure 02: The phases of the demographic transition in Algeria (phase 1)



First phase of traditional demographic regime (pre-transition)

Before the French colonization, the Algerian population was estimated at more than 3 million inhabitants. In 1856 it decreased to reach 2.3 million individuals before rising again to 3.3 million in 1886 and increased since then to reach 11.6 million by the year 1962. in other words, after more than half a century of colonization, the Algerian population has slowly increased by 8 million dues to the high death rate for multiple reasons. (Jonson, 1978)

Table 01: The evolution of total Muslim population in Algeria since 1845

Census year	Population (in thousands)	Census year	Population (in thousands)
1845	2028	1896	3781
1851	2324	1901	4089
1856	2310	1906	4478
1861	2737	1911	4741
1866	2656	1921	4923
1872	2134	1926	5151
1876	2479	1931	5588
1881	2842	1936	6201
1886	3287	1948	7460
1891	3577	1954	8745

Source: (CICRED, 1974)

The population included the population of Tunisian and Moroccan nationalities plus other Arab nationalities residing in Algeria.

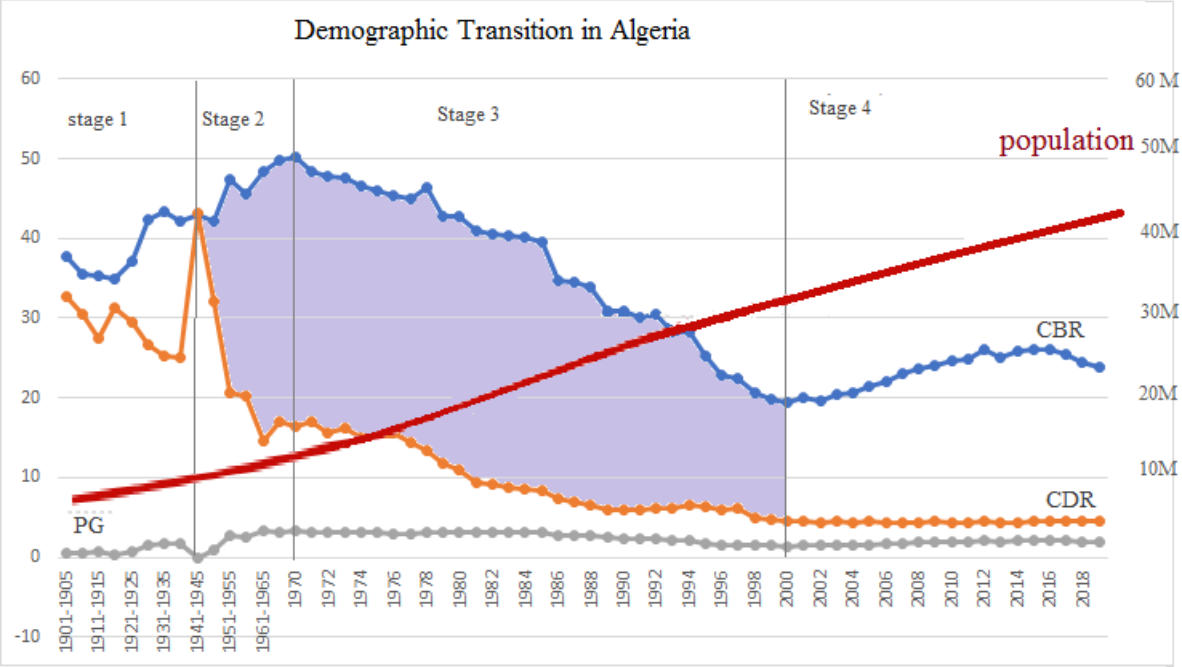
Typically, this stage is where the population experiences high mortality and birth rates from causes of underdevelopment. The first stage is called the stairs of development. The state of birth and death rates in this situation and the total population is based on epidemics, pandemics, and the economic deterioration due to colonialism not to mention the latter's contribution to the high mortality, as many births occur as many deaths also, so the population remains stationary with a natural increase rate around 0 and 0.5 from 1900 to 1945, it is characterized by a lack of family planning measures, high deaths, and infant mortality rate, in addition of the need for workers in agriculture and the lack of economic resources in all of the sectors.

children are considered as economic assets and since mortality was very high, knowing that few children will survive Algerians tend to have many. In colonial Algeria, the population lived under war, poverty, and epidemics, cholera since

1834, famine since 1866, plague, typhus in 1941 -1943 then from 1869 to 1872, and uprising of 1871, in addition to the deaths recorded due to colonialism, in particular following this series of attacks by the French colonial authorities against Algerian civilians in May 1945 which caused more than 45,000 supplement deaths, this explains the leap that the death rate took that year because it went from 25.1 to 43.1 in less than 5 years, the situation in Algeria was not similar to the primitive period when the developed countries lived their first stage of transition but in terms of demographic characteristics, it was perfectly suitable at the stage.

Second phase of the transition and decrease in mortality (transition initiated)

Figure 03: Demographic transition in Algeria (phase 2)

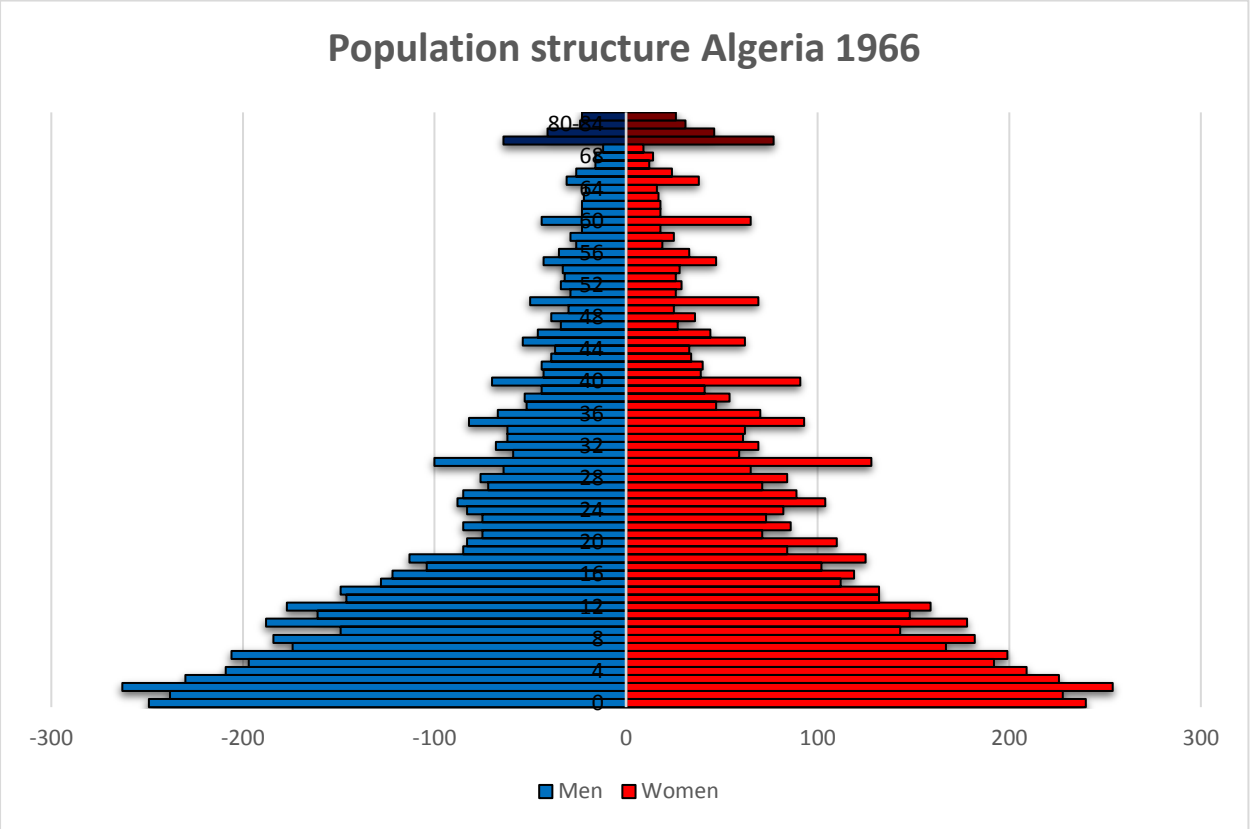


In 1950, all countries in the world had already gone through this first phase of a prior decline in Mortality rate, due to the development revolution especially in the field of health. The second stage from 1946 to 1970 is essentially an early expansion phase, resulting in a rising population because the birth rate remains high, but the death rate gradually decreases. This phase came just after the second world war, obviously, the population growth is increasing, on top of that, there has seen an improvement in health care, vaccinations programs, hygiene and sanitation, then an enhancement in food production, security stagnation before the revolution and during the independence process. The excessive mortality caused by the French colonists has considerably decreased, these are the main factors that led to the diminution, but as the graph shows, the births remained constant at the beginning of this period, and there was a gap between the birth

and the death rate. This is precisely why the total population was increasing, the life expectancy at birth increased from 33.74 years in 1945 to 41.62 years in 1950; but this one is lower but close to that of France in 1900 (50 years), which at 32 five years later until 20 in 1955, therefore, ten years later had, on this last date, begun more than a century before her fertility transition. The death rate gradually fell from 43.01 in the previous stage.

After independence, mortality continued to fall but the birth rate continued to rise, but births continued to increase, and population growth, as shown in the graph, continued to grow since it rose from 1% in 1950 to 3.3% in 1970 which led to a doubling of the population in a short time the red curve represents the average population, it has not stopped increasing since, which indicates that specific measures should be taken to reduce the birth rate in the goal of balancing with the death rate and decreasing the population growth rate, the infant mortality rate has started to fall due to vaccination.

Figure 04: Algerian Pyramid structure 1966



Source: (CICRED, 1974)

The pyramid is an observation by completed year, but sections above the age of 70 years old are *five years groups which justifies the enlargements of the tip segments*

the first observation to read in the pyramid is that it clearly shows the Algerian population evolution. The trend towards rejuvenation, the base of the pyramid widens than narrows gradually in older ages due to the high due to the high mortality, in other words the population had few survivors at younger ages and fewer as they reach 50 years old, central part and the summit are reduced. the typical second phase effect combined with the rise in the birth rate and the fall in

mortality specifically infant mortality, which insofar as it is takes place faster, the population growth rate has exceeded the 3.3% which sounds promising for a country that has just got out of war and pandemics to make up for the human losses especially for the long term, as the fertility rate at this stage was over 7 births per woman. although compared to the working age segment the dependency ratio doesn't seem compatible.

Third phase of transition and decline in fertility (advanced transition):

The next phase, extended from 1971 to 2000 is the main subject because it represents the real shift between the old demographic regime and the new, a stage of a parallel decline in birth rates and low death rates, in terms of the birth rate it is dynamically declining with the death rate which has now reached a certain constancy, from a lower level, gradually the gap between the two rates has systematically decreased by 3.2 % from 3.1 in ten years to 2.4 ten years later to reach 1.4% in the year 2000 which is an achievement when it comes to a developing country like Algeria, this indicates that many factors have contributed to this achievement on the level of health, education, urbanization, industry, agriculture, economy and change of mentality.

Urbanization

Table 02: Evolution of urbanization rate Algeria 1960-2020

Year	Rate %	Year	Rate %	Year	Rate%
		1980	43.54		
1960	30.51	**1981**	44.42	2001	**60.71**
1961	31.80	**1982**	45.30	2002	**61.50**
1962	33.21	**1983**	46.19	2003	**62.28**
1963	34.66	**1984**	47.08	2004	**63.06**
1964	36.14	**1985**	47.97	2005	**63.83**
1965	37.64	**1986**	48.86	2006	**64.59**
1966	38.84	**1987**	49.72	2007	**65.35**
1967	39.00	**1988**	50.51	2008	**66.10**
1968	39.17	**1989**	51.30	2009	**66.83**
1969	39.33	**1990**	52.09	2010	**67.54**
1970	39.50	**1991**	52.87	2011	**68.24**
1971	39.67	**1992**	53.66	2012	**68.92**
1972	39.83	**1993**	54.44	2013	**69.58**
1973	40.00	**1994**	55.22	2014	**70.22**
1974	40.16	**1995**	56.00	2015	**70.85**
1975	40.33	**1996**	56.77	2016	**71.46**
1976	40.50	**1997**	57.54	2017	**72.05**
1977	40.93	**1998**	58.31	2018	**72.63**
1978	41.79	**1999**	59.12	2019	**73.19**
1979	42.67	**2000**	59.92	2020	**73.73**

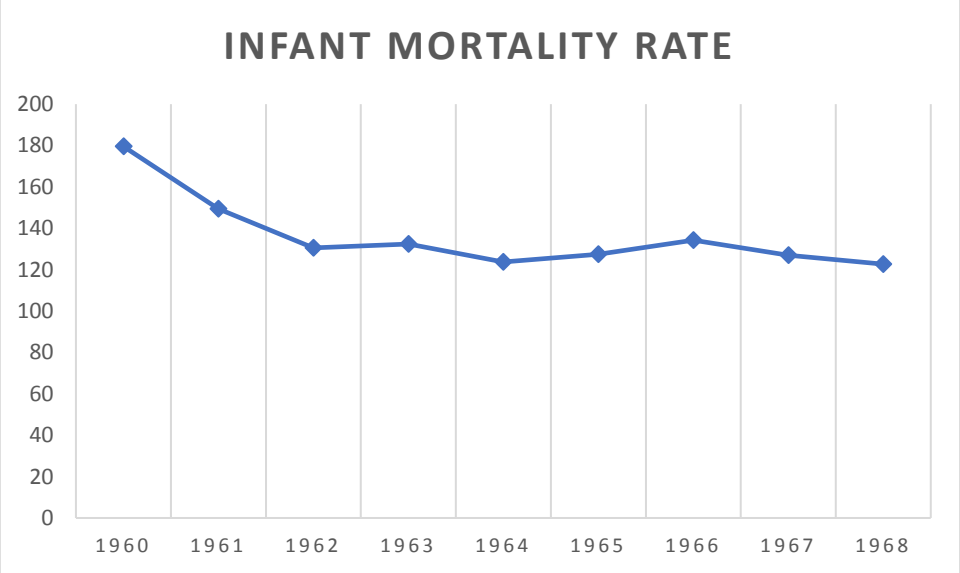
Source: (World Bank, 2021)

The population moving from farms to cities, due to the change in mentality, culture, and economic activity that make it more difficult to support a large family, the rate of urbanization has increased from 39.67% at the start of this phase to 59.92% in 2000, Improved healthcare lowers the average number of

children per woman resulting overcharges to have and raise children in urban areas, as mentioned before the classic agricultural economy relies on human labour force and having a lot of children used to be a way of reassurance in terms of future workers and in the same time compensate for the human losses caused by diseases, (a lot born but few survive), however, according to the urban context children do not provide much money and help for the household, resulting in reducing the family size.

Infant mortality

Figure 05: Infant mortality rate in Algeria 1960-1968



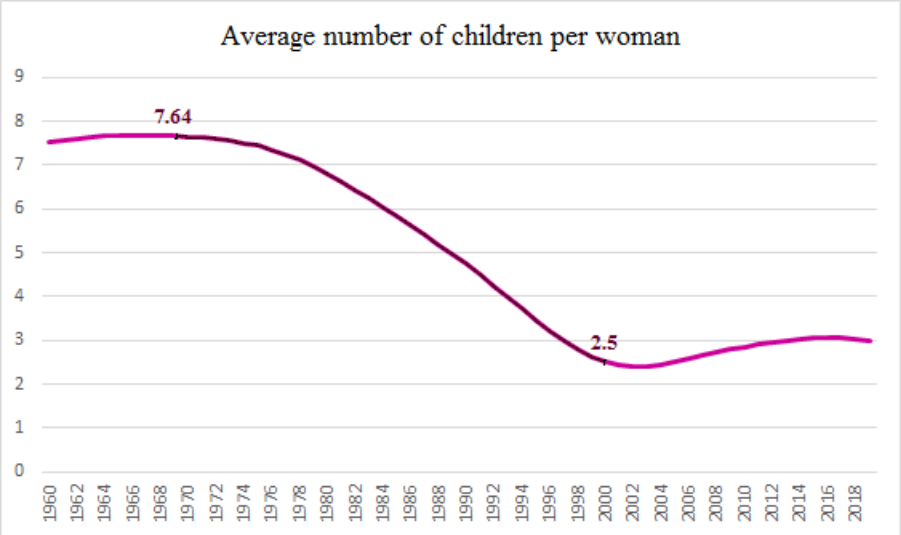
(CICRED, 1974)

The Data of infant mortality before 1962 recorded a massive death toll, what called for an investments strategy program in the health field to decrease the death rate, in addition to building hospitals, investing in education and training medical staff, by the year of 1966 the first nationwide measure has taken the generalization of vaccination against tuberculosis, then followed by a compulsory and free vaccination against: poliomyelitis, tuberculosis, diphtheria, tetanus, whooping cough and smallpox in 1969, which resulted in a drop in the rate from

179‰ to 122‰, following the introduction of measles vaccine in 1985 and the booster shots against measles, diphtheria, tetanus and poliomyelitis in 1997 the rate continue to fall gradually reaching 36.9‰ in 2000.

Fertility rate

Figure 06: Fertility rate in Algeria 1960-2018

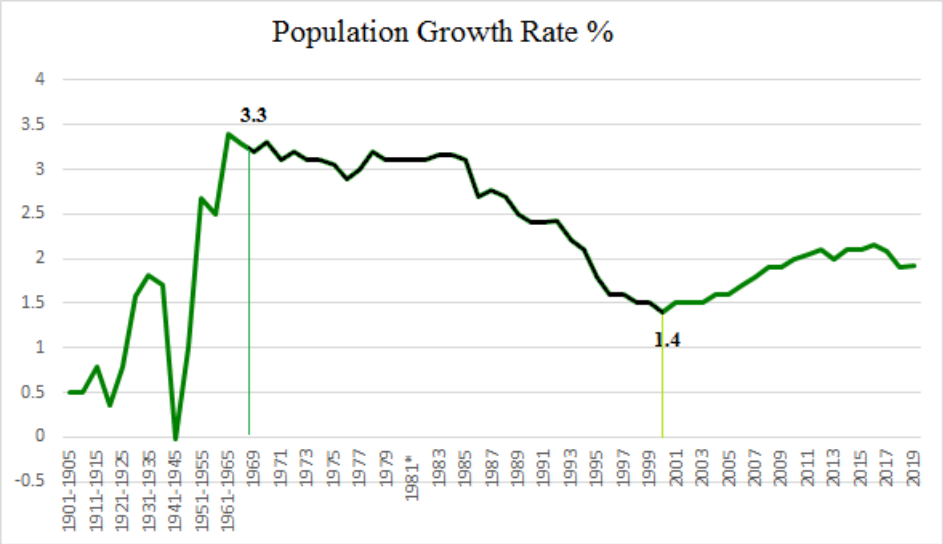


(WorldBank, Fertility rate , total for Algeria, 2023)

The imbalance resulting from mortality decrease and specifically child mortality noting the absence of the reasons why the population used to have numerous children, the state immediately resorted to the inclusion of contraceptive methods in the health program and spreading their availability even for free, in addition to awareness-raising schemes, and encouraging education, especially for female gender for the aim of reorienting the role of women in society which was exclusively having children and raising them, this led to a behavioural change towards fertility and a delay in marriage age to a phase where there would be less probability to conceive, as a consequence, the synthetic fertility rate fell from 7.64 in 1970 to 2.5 children per woman in 2000.

Population growth

Figure 07: population growth rate in Algeria 1905-2019



Source: World bank

To simplify the process, the main characteristic of the third stage is low birth rate which followed the low death rate in the previous stage, so the population growth rate started declining before even raising to the uncontrollable rate, due to the cautionary models of western populations as they preceded in all stages, the growth never exceeded 3.5% and it is decreasing towards equilibrium (1 to 0%) which is similar to the pre-transitional phase but the difference between the two is that in the first stage the balance was caused by the death of new-borns however at this stage it is because of their inexistence, lifestyle, more urbanization, a larger population, stagnant rates and above all life expectancy has increased, mortality at early stages notably declined (most of the population complete their life stages). As urbanization continues in progress particularly after the shift from agricultural activity to an industrial economy, women have more opportunities and ambitious goals, more roles whereas their primary role previously was reproduction and population growth, mentality shifted to high education, pursuing careers, integration in the labour force and profitability financially and

morally, with their limited childbearing years, they have less time and probability to procreate, this has led to a reduction in the family size, that decreases population in general, urbanization and fewer resources in a middle-income country plus the required cost of having a large family especially since children are not largely contributing in the household income or business, it has become more of a choice having them and not a necessity or for reproduction and replacement. The progression of this stage in Algeria involved a cultural, lifestyle, and mindset change that affected the fertility rate and by the year 2000 it reached 2.5 births per woman which is close to the sub-replacement rate (2.1 children per woman).

The fourth phase of demographic transition from the year 2000:

Figure 08: Population growth rate in the fourth stage

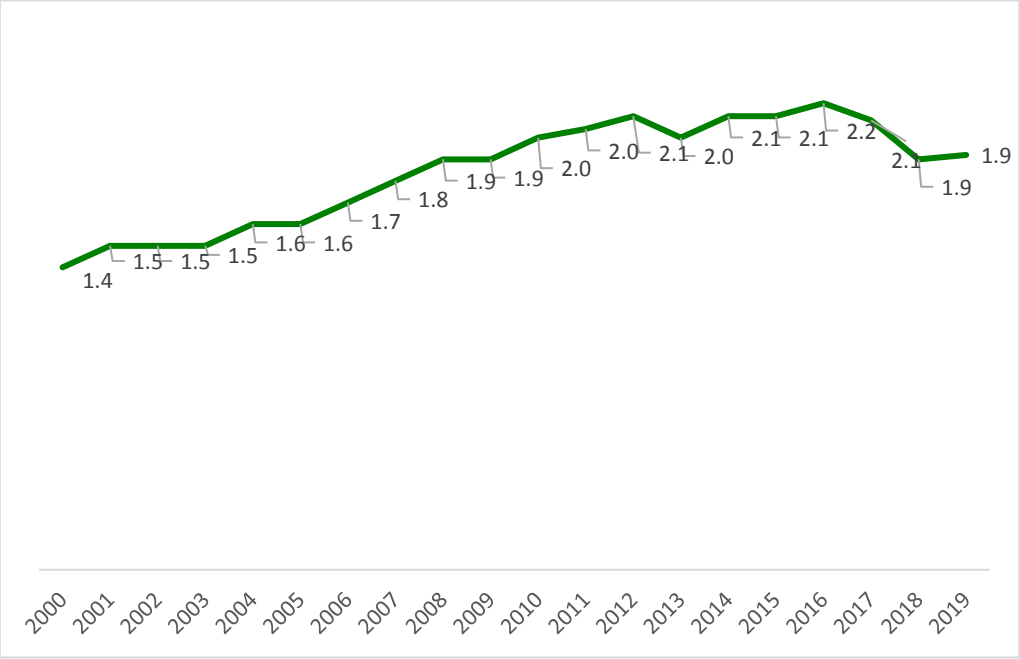
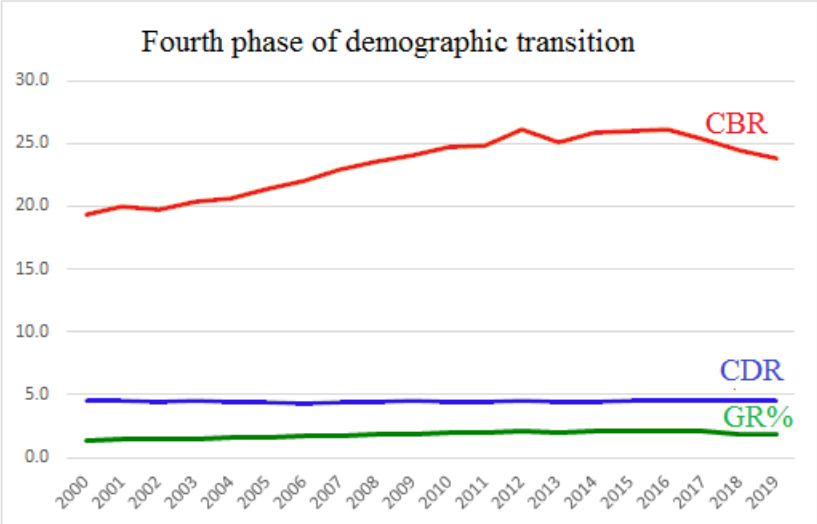


Figure 09: the fourth stage of the demographic transition in Algeria

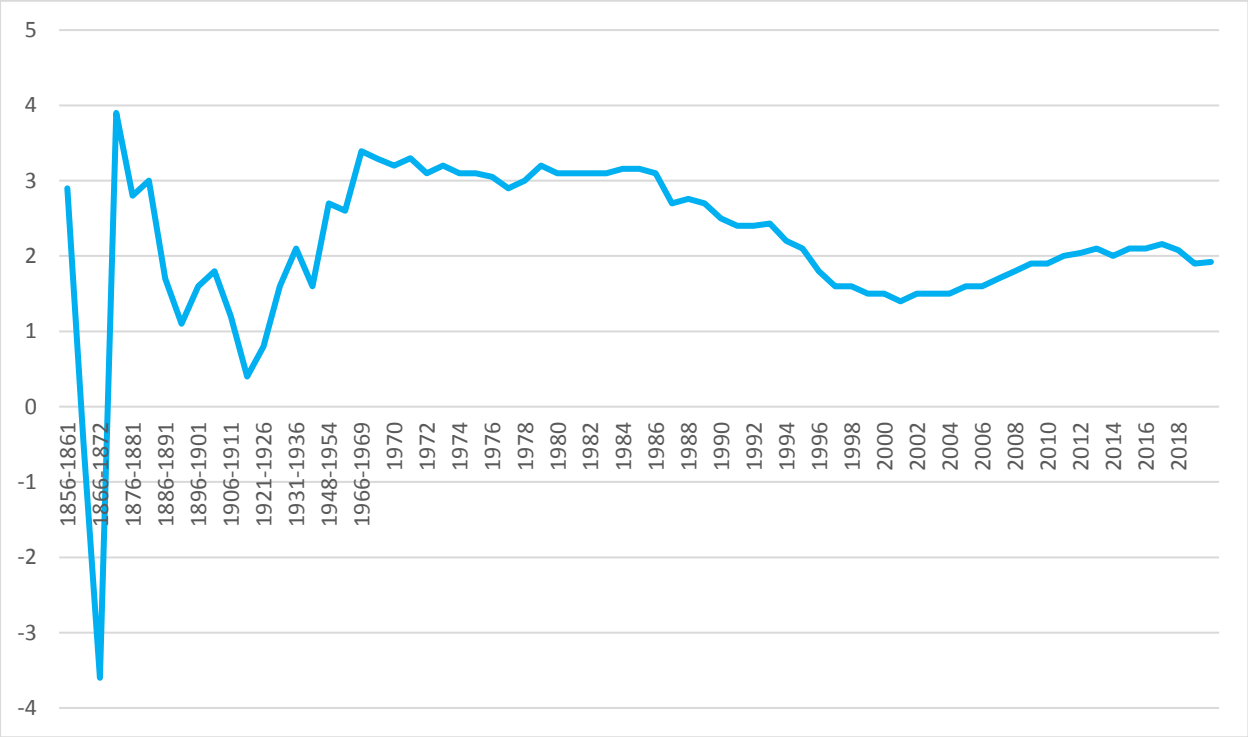


Growth stage and stationary mortality. The latest and the fourth phase begins from the year 2000 until today. This period is characterized by stagnation at all

levels, results of the plans taken in the previous stages, a sign of slowing down in simple terms, although the population growth rate is still slightly higher than that of the developed countries as we move forward in time, it started increasing from 1.4 in 2000 to 2.1 in 2013 and stayed stagnant until 2017 in parallel with the birth rate which was 19.36 and increased gradually until the year 2016 with a rate of 26 but both started to decline after that year because the birth rate in the 1970s was high it follows the same generation getting married and having children because they reach the marriage medium age during this period. The drop in the fertility rate fluctuates between 2.4 and 2.6 children per woman because of the family planning program, and the delay in the marriage medium age, the countries that were in this stage had the same fertility rate, in addition to the improvement in the quality of life, summarizing the reasons for the downward trend in the birth rate, although the death rate of the population remained constant from 4.59 in 2000 to 4.60 in 2019 a sign of slowing down this tendency is likely to mark the beginning of a new phase in the demography of Algeria.

Algerian population growth:

Figure 10: Algerian Population Growth 1856-2019



The drop in natural growth rate to -3.6 from 1866 to 1872 is attributed to counting errors. although the deaths recorded back then were linked to the series of other incontrovertible causes that marked Algeria during these five years and largely this whole stage, the cholera epidemic in 1867, famine in 1868, typhus from 1869 to 1872 and uprising of 1871, followed by violent repression, this revolt also provoked a general refusal of certain populations to be censused in 1872. Therefore, the miss records justify the negative curve course, the following census proves the deductions since the curve got back on track with a rate of 3.9% in 1876-1881 which can only be explained by the improvement in subsequent counts. The rate considerably increased until 1886 (the period also marked by the annexation of the Mzab and Ouergla's residents in 1882). From 1886 the growth rates became more logically linked to the causes, so far that era represents the early stage of the pre-transitional phase as the circumstances in the country

witnessed the boarding of French colonisation that considerably caused, by migration, the transmission of pandemics undergone in the country as they emerged before in Europe, in addition of a massive famine and economic destruction through the practices of raids which represented in the grain silos looting, herds removal and burning lands and tree fields, villages destruction and Muslim population massacres. (CICRED, 1974) (Maison, 1973) the following increase was due to the eradication of the pandemics, as one reason for mortality got excluded was the country still going under colonisation which requires human forces to join the defences or compensate for the predictable losses until the next tip of 3.3% in 1966 noting that the fertility rate was more than 7 children per woman, in this sense, they mark the brutal increase in mortality linked to the first world war in 1914-1921 as the growth dropped to 0.4%, the economic crisis also affected the Algerian peasantry, followed by the next drop in 1936-1948 to 1.6% after escalating again, because of the massacres of May 1945 after the second world war, the statistics mark these years an increase in the general Muslim mortality rate respectively to 130 then 198‰ of that of 1940, before returning in 1943-1944 to 150 then 135‰, and to 135‰ then 132‰ the 1944 rate, before falling back to a somewhat lower level in 1947. Infant mortality rates also reported a peak in 1945 (128 ‰) against less than 100 in other years, while official birth rates did not show but a slight decline (from 48 in 1944 to 43.4 and 41.5 ‰ in 1945-1946) the emergence of epidemics that involve the vulnerable segments of the population. (Gouvernement Général de l'Algerie, 1948-49) (finances, 1950-1951)

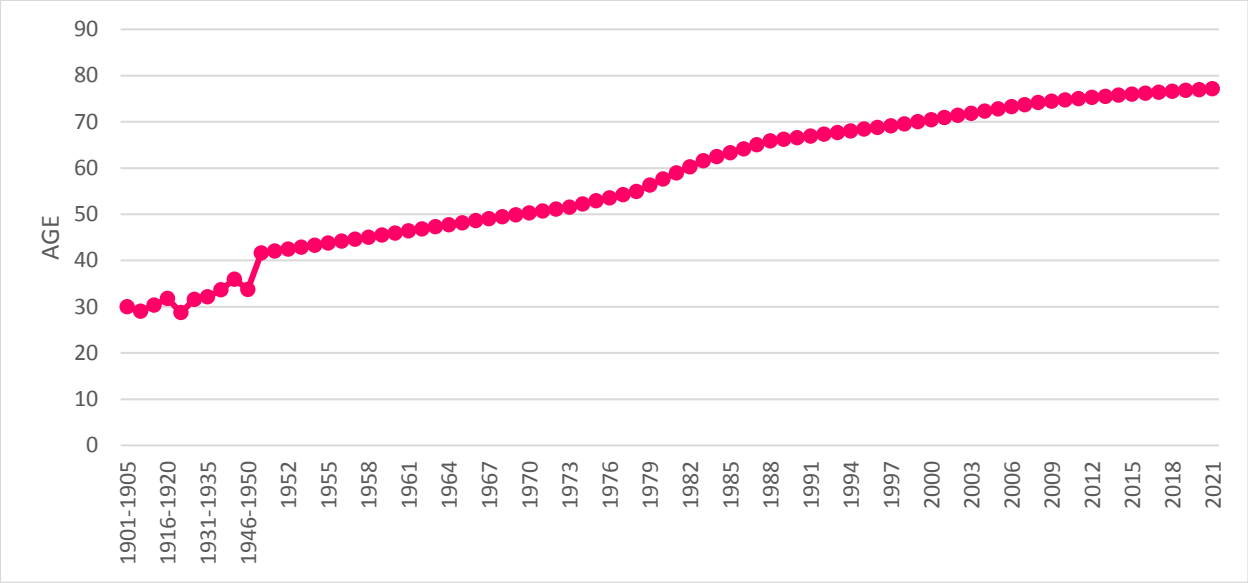
Demographic transition consequences

The elderly and the young children segments represent the dependent population that must be supported by the middle working segment. This will impact the distribution of output into expenditure in a developing economy, one of the main

reasons is the increasing number of new-borns which was the case since always but the difference in supporting ratio involves the survivors at late ages simply because life expectancy has increased after the independence.

Life expectancy

Figure 11: Life Expectancy at birth Algeria 1900-2021



Source: World Bank

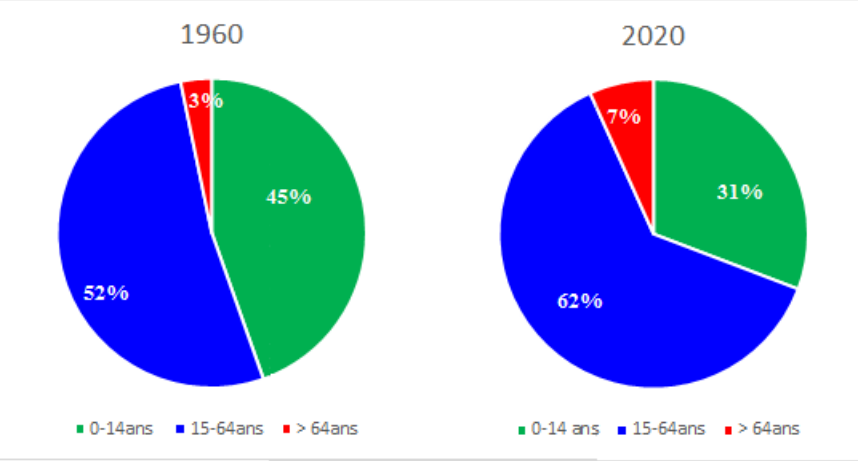
Life expectancy before independence witnessed a fluctuation due to the circumstances and the highest rate was around 45 years old, this conflicting pace stopped after 1962, as it began to rise, just because of the absence of war factor. The increasing trend that started after then until around 1980 As the graph shows, was linked to the social, and environmental factors, economic and health care practice development, the improvement in nutrition, that contributed to the decline in infectious diseases the advances and contribution in agriculture, also the improvements in personal cleanliness, and better housing which combined represent mainly economic criteria. life expectancy jumped significantly to 65 in 1988 and remained or slow gradually increasing, it continued to expand towards

a higher age to seventy years in 2000 and 77.14 in 2021 This increase is due to improved health conditions while considering the significant decline in child deaths, many of the greatest gains in life expectancy due to the recession of communicable diseases.

We take the years 1960 and before when life expectancy was less than 50 years. A woman might have spent 70 per cent of her adult life Bearing and raising young children now down to about 14% means more time and economic opportunities for women. In many cases, and less time to have children, contraceptive practice is a factor in this, since in Algeria family planning began in 1967, and the overall general fertility rate of women reached 250‰ this rate was one of the highest in the world, the average age at marriage was 18 years and the total fertility rate was 7 children per woman now the average age at childbearing at first childbirth has exceeded 31.8 years, in other words, in the previous conditions childbirth and pregnancy exposed the female gender to a high risk of mortality, as there has been an important proportion of prenatal and childbirth-related mortality however after the development improvements, the gender's life expectancy also rose.

Age segments distribution

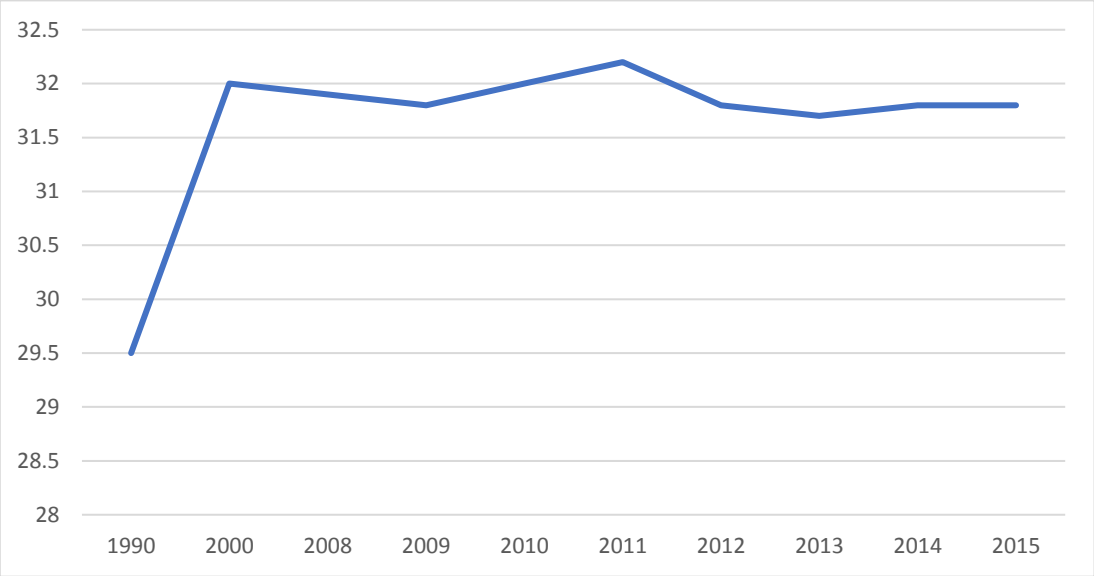
Figure 12: Age segments distribution %



The graphic shows the change since 1960 means that Algeria is already beginning to age, especially since the excluded proportion in the younger age segment was added to the youth and elderly, but currently, it still has a substantial number of young people entering the labour market. This is called the demographic dividend. On one hand, the demographic dividend can positively contribute to the economic output growth if this segment can be usefully employed, but on the other hand, there is also a risk of having such demographics because the unemployment rate is high due to multiple reasons which the most important is the economy's dependence on unsustainable resources, in addition to the problem of insufficient income, this may be a potential problem, although, the graph shows a dominance of the youth segment.

Maternity medium age and women celibacy

Figure 13: Maternity medium age 1990-2015



The most important keys to population decline are the delay in marriage and maternity age since mostly it is not possible to have children in Algeria except within the marriage framework and as a consequence of high education and development in lifestyle, technology, and imitation of western stereotypes, the latest statistics state that the marriage medium age in 2019 reached 27.1 years old for women and 33.9 years old for men, this indicator is taking a progressive increasing pace for men since the first observation from 1966 (23.8 years old) due to the shift in lifestyle, education and career path which takes time, and importance in order to provide a financial requiring to get married as house and job or stable salary, this rate with the development evolution criteria should've been predicted for both genders which is the case although it has actually increased for women until 2008 reached the peak of 29.1 years old which justifies the maternity medium age of 31.9 years old, then it decreased to 27.1 (maternity medium age 31.4 years old) which calls for questioning the reasons. Recent field research based on a survey has identified the three ranking causes for the late

marriage age and has concluded the first contributing cause was unemployment and lack of job opportunities which concerns men more than women, the second and third contributing factors were actually the high marriage costs, expenses and dowries And since the delay in the age of marriage affects women in terms of the ability to have children and its association with a specific age 2008 rate was the tocsin that leads to decline the age of females for reducing the conditions and criteria for marriage since it is exclusively and mostly linked to the reasons related to their decisions, it is likely that this is the reason for the decline in age especially since the age of men is still rising, meaning the reasons associated with the delay in their marriage age still exist. (ONS, RGPH, 1966) (ONS, RGPH, 2008) (MSPRH & UNICEF, 2020) (Bouamoucha, 2021)

We should take into consideration the women's celibacy at the age of 30-34 Which represents the last five years of high fertility, with an 86% chance of conceiving before reaching 20% after the age of 35 their proportion reached 34.7% in 2008 and only 62.4% were married (exposed to the probability of conceiving at that age regardless their ability and the choice whether to have a child or not) as for 2019 the proportion of celibacy declined to almost 26% at 30-34 and the next five-year group it increased to 23.3% and remained the same for ten years. however, maternity medium age has witnessed a stagnation ranging around 29.5 and 32.2 years old since the 90s. (ASRM, 2012) (Hammouda N.-E. , 2009)

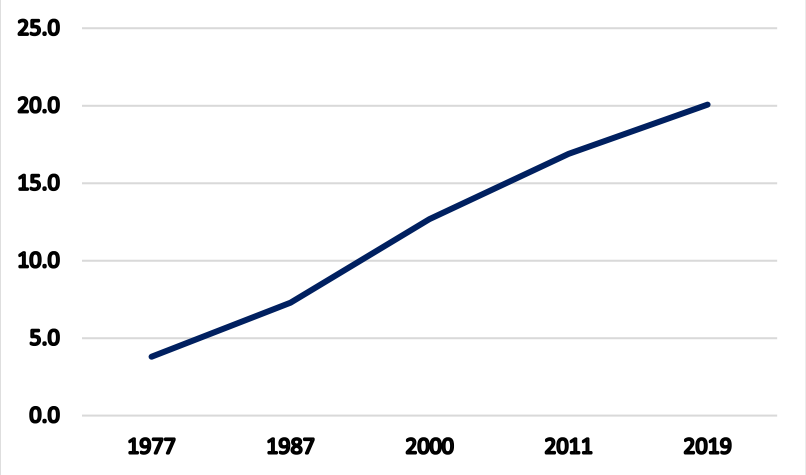
Employment

Table 03: proportion of active women from the total women at working age

	Occupied	looking for job	total	Women at working age	%
1977	138234	21310	159544	4201592	3.8
1987	365094	65260	430354	5905165	7.3
2000	797083	285718	1082801	8535311	12.7
2011	1561000	324000	1885000	11160441	16.9
2019	2062000	529000	2591000	12910112	20.1

Source: (ONS, 2019) (ONS, 2011)

Figure 14: proportion of women integration in the labour force



One of the most common misconceptions is that including women in the labour force affected the fertility rate or somehow negatively contributed in childbirth rate although since the start by 1977 the active women population was estimated to 159 544 women with a rate of 3.8% of the women in childbearing age of which more than 13% were looking for job and not actually occupied, these rates

progressively increased but not highly taking leaps as in 2015 employed population was estimated at 10,594,000 people, and women had an occupancy rate of 26.4% making up a volume of 1,934,000 employed, forming thus 18.3% of the total women in childbearing age reaching 20% by the year 2019 of which 25.6% of them are looking for job and not occupied, meaning the rest of them (80%) are unoccupied housewives who decided to remain at the rate of 2.9 child per women And this is assuming that only these women are having children which is absolutely not the case, meaning conclusively that women's job doesn't affect the fertility rate. (ONS, Emploi et chomage, 2015)

Projection 2040

The next stage is the debated stage, some say it is already happening in a few countries, others say it will come and some consider it to be part of the fourth stage because the birth rate remains down and death rates continue to decline, female attitude towards reproductive behaviour remains the same, this could lead to a negative Growth rate.

With the country's development, life expectancy will increase, birth rate decreases leading to the population ageing, one of its implications that can occur is the changes in the population structure as the younger generation decreases, there would not be enough human resources to cover the jobs with industrialization to support the dependent segments, the elderly support ratio is decreasing, this dynamic raises the issue of how many people are working to support both the elderly and the younger generation.

Dependency ratio United Nations Definition:

- The dependency ratio relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64years old).
- Unit of Measurement: Per hundred persons aged 15-64.
- Purpose: Dependency ratios indicate the potential effects of changes in population age structures for social and economic development, pointing out broad trends in social support needs.
- Relevance to Sustainable/ Unsustainable development (theme/sub-theme): By relating the group of the population most likely to be economically dependent (net consumers) to the group most likely to be economically active (net producers), changes in the dependency ratio provide an indication of the potential social support requirements resulting from changes in population age structures. In addition, the ratio highlights the potential dependency burden on workers and indicates the shifts in dependency from a situation in which children are dominant to one in which older persons outnumber children as the demographic transition advances (that is, the transition from high mortality and high fertility, to low mortality and low fertility). A high dependency ratio indicates that the economically active population and the overall economy face a greater burden to support and provide the social services needed by children and by older persons who are often economically dependent. A high youth dependency ratio, for instance, implies that higher investments need to be made in schooling and child-care. (United Nations, 2007) (Wikipedia, 2018)

Demographics and projections

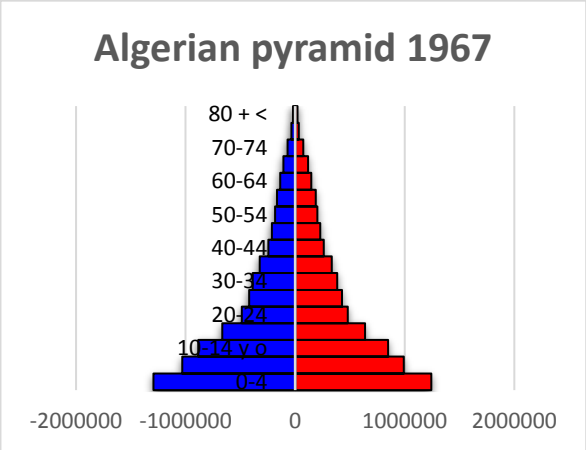
The crude birth rate of Algeria is 22.153 ‰ after it was 48.44 ‰ in 1971. The average number of children per woman is exactly 2.89 children per woman which reflects an insufficiency in the future if the population continues at its growth changes pace, in terms of birth rate, mortality and fertility, It will become difficult to achieve stabilization in reproduction, population structure and population replacement, especially if the projection for the year 2040 happened, which shows that the fertility rate will reach 2.1 child per woman, (the exact replacement rate) which means that the net rate will be 1 girl per woman, and this is due to the femininity rate of 0.488.

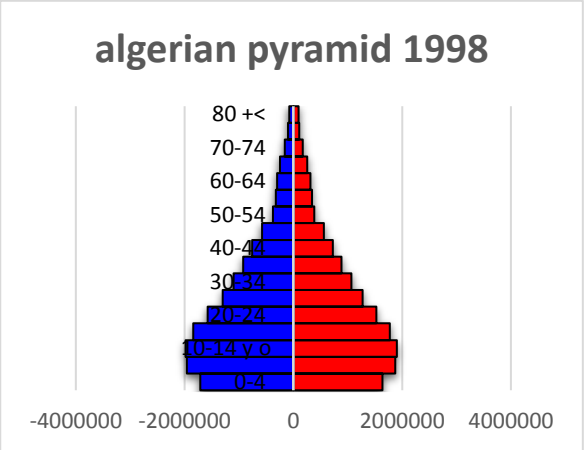
The number of births has been reduced by almost a quarter due to balancing the increase in population especially after the reduction in the death rate that occurred after independence and the investment in strategies devoted to the goal of improving conditions, health care including contraception, Since 2000, the birth rate has been increasing slowly, the number of children per woman was 2.4 in 2001, which is significantly lower than 2015's rate of 3 births per woman, but it dropped again in 2021 to 2.8 which means that it's taking another declining pace despite the decline in marriage medium age, hence in terms of reproductive behaviour, the accuracy of predictions to how the population is going to act especially since there are plenty of factors that drive people and women particularly to have or not have many children, we can rely on two economic and social hypothesis; either the theory of the relationship between economic and population growth meaning that the fertility rate is reflecting the fluctuation in population's socioeconomic level or it is related to social factors like awareness of incompatibility between what's been given for what cost, and unrewarding education. Births are generally infrequent recently in the early 20s, this phenomenon is particularly accentuated in urban cities, and with the average age

of marriage of 34 years for men and 32 years for women in 2020 and still going higher through time and considering the fact that Female fertility peaks around 20 years, then gradually decreases from 30 years to 35 years, until decreasing much more quickly then, it is inevitably logical in 30 years there will be a woman out of three that does not have children between 30-40 years old, and even if they become mothers they would have the average of two children.

The rural regions that we should rely on when it comes to increasing our birth rate, are going towards a severe decline and are almost tied up with the fertility in the urban areas (Ali, 2017) despite the difference in activity and lifestyle, as they represent 27% in 2020 meaning that it would decline to lower than 20% after 20 years.

Relationship between demographic transition and structure (pyramids)



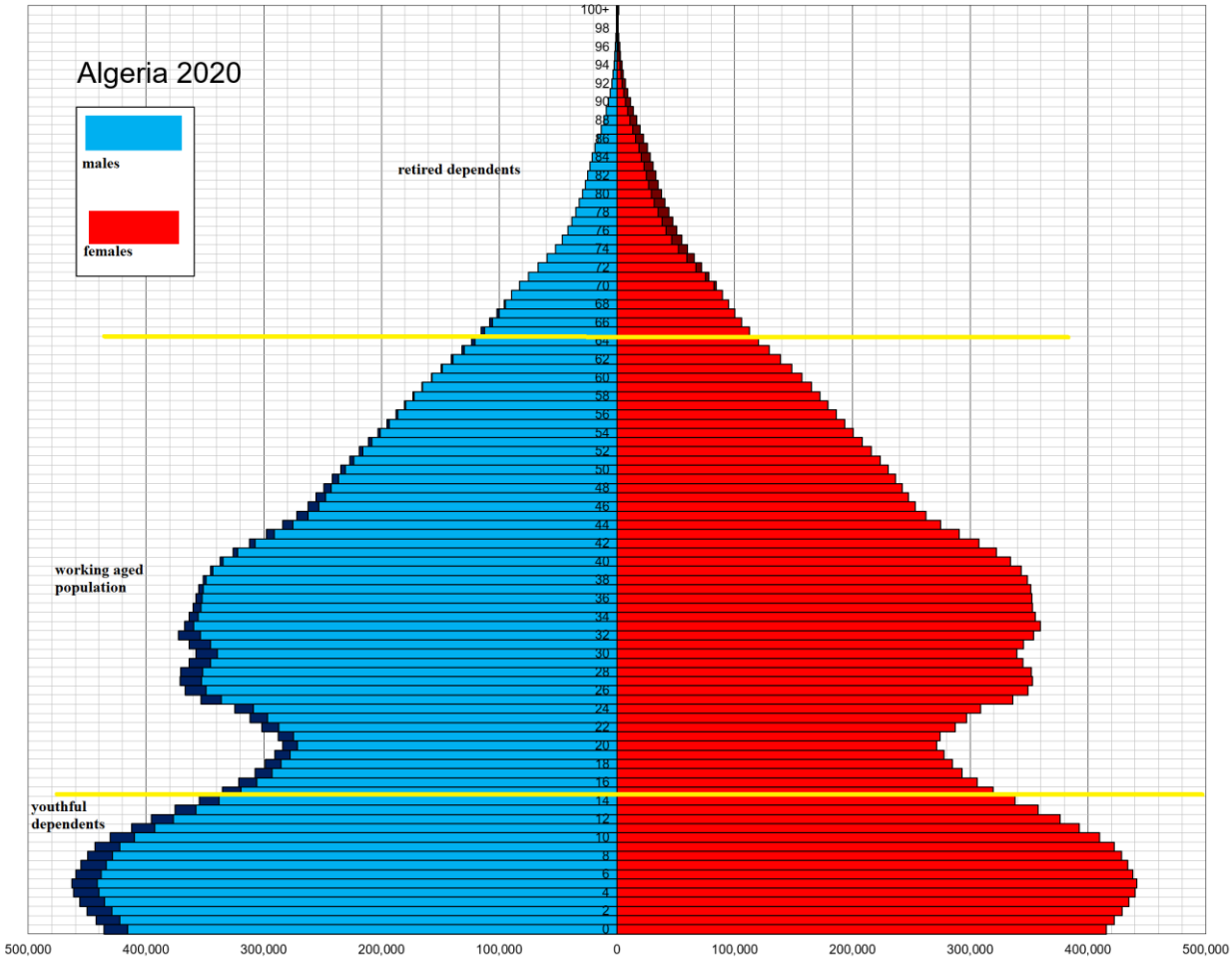


Population statistics are among the most important data that social scientists and policy experts have to work with, but understanding and making accurate predictions requires knowledge of the internal characteristics of the population such as age distribution and sex. Pyramids evolution through time can provide Information about health quality, death at young ages, economically active population and dependency ratio.

The 1967 population pyramid shows a rapidly growing period, with the majority of the population being in the younger age groups at the bottom of the pyramid, the structure of 30 years later in 1998 shows that the population's next born generation 0-14 gradually widened to over 2 million per five years generation, than seemed shrinking back proportionally however the narrowed areas in 1998 represent more than 3 million children between (0-4) years old, in fact, the pace is leading to an old population based on the western models. The pyramid of 2018 and the current structure shows a sort of recovery in the birth rate after its previous quick decline but not assuredly because that coincides with the baby-boom generation reaching the marriage and reproduction age which led to broadening the base even more concerning the 2015-16-17-18 generations in addition of the fertility rate that exceeded 3 births per woman because those of the following three years show a decrease in births so the base paces towards restriction. Until 2021 Algerian population is still under the status of a youthful population and the shape will witness a fluctuation between increasing and narrowing in the coming years according to the upcoming generations reaching childbearing years.

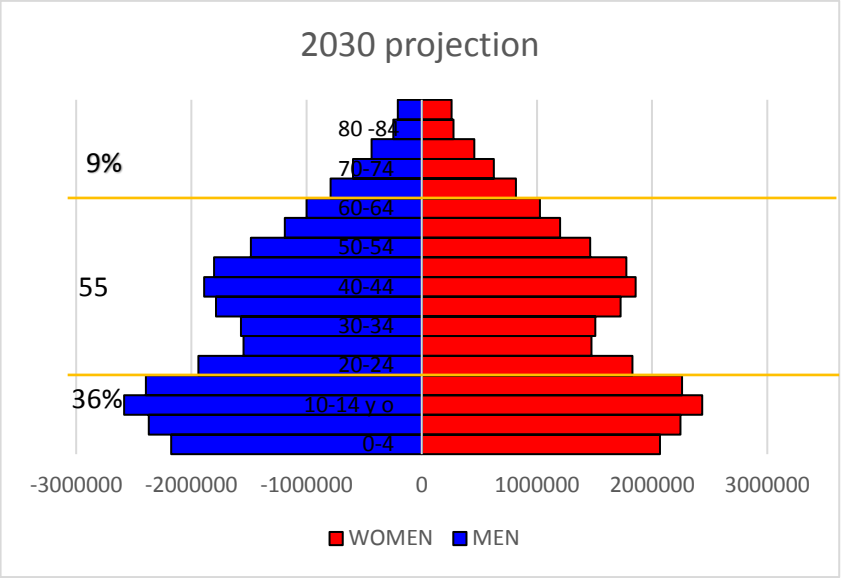
The total population is almost certain to double over the next few decades, where most of the population is clustered around the middle of the graph because of the engagement in the pre-reproductive age groups, but certainly not before ten years.

Figure 15: Population Pyramid structure – Algeria 2020



Comparing these three age pyramids side by side is supposed to show us three different stages of the demographic transition, according to the CBR and CDR, there's not much difference between the first and second one however as the regime moves from a pre-industrial society to an industrial or post-industrial economy, the country began the process of industrialization, recording an increase in life expectancy and a drop in infant and general mortality rates, and a decline in birth rates compared with the beginning of the transition thanks to the improvement of medicine, sanitation and food supply.

The population will slowly increase as the number of people reaching childbearing age increases. In ten to twenty years, it started trending to the constrictive structure model, the 2020 pyramid is showing the beginning of Re-expansion on the base part at the age of 0-14 years, and this is due to the density of the population in reproductive age, which aligns with the fertility rate (3 children per woman). With the generation of the late nineties and the beginning of the 2000s, reaching the stage of childbearing age, in addition to the hindsight of marriage age lately to over thirty years old, we will conclusively see a further restriction in the baselines by the year 2030 Since the



(ONS, La demographie Algérienne 2019 n°890, 2019)

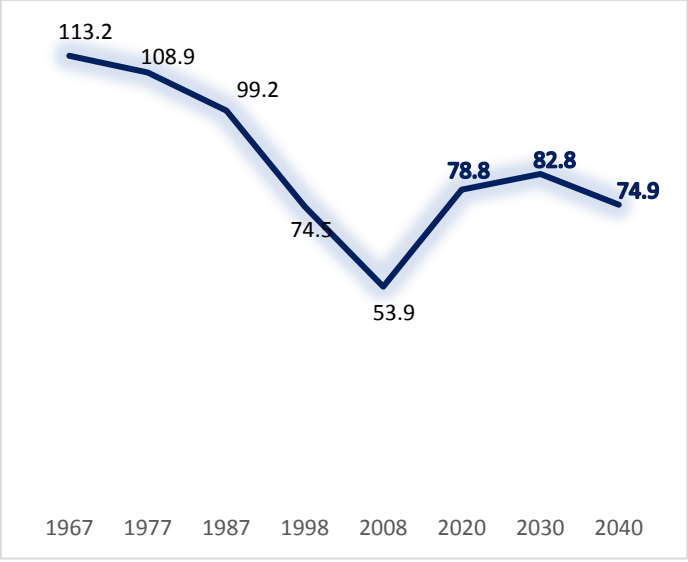
narrowest generation lines will be aged around 30-35, hence gradually developing the mature developing countries age structure, in the pyramid of ten years later, we can see a stationary structure by the year 2040 at this current reproduction rates. The national statistical office predicted that life expectancy will exceed 80 years old by then, with this in mind it is axiomatic that the elderly proportion will increase.

The proportion of the population ageing 20-65 will represent 55% of the total in 2030, most of them 35-45-year-olds this indicates the next enlargement of children base after, also that this whole segment represents the workforce that Economy should benefit from, especially since the majority of them are young

and at low risk of performing and contributing positively with their highest profitability.

The International Labour Organization divided countries by share of the population aged 65 and over in total population, those with a percentage of under 7 % as not aged, [7-14] % as ageing and over 14% as aged population, based on that, the country still has good running years with a strong workforce with a reassuring economy ahead since the population at working age represent more than 55% however In 2019, the unemployment rate reached 11.4% of the working population. In total, 1.449 million people are looking for work, which should be excluded from the total middle segment and added to the dependent proportion. also exclude the calculated number of workers between the age of (15-24) from the dependents and join them to the working proportion, the actual dependency Ratio would be 78.4, this is under the assumption of including non-workers by choice such as housewives, and those who cannot work but not included in the category of those looking for a job, to the working segment proportion, meaning that the economic classification is hypothetically applicable if the whole category aged (20-65) is contributing in the workforce.

Figure 16: Dependency ratio evolution calculated



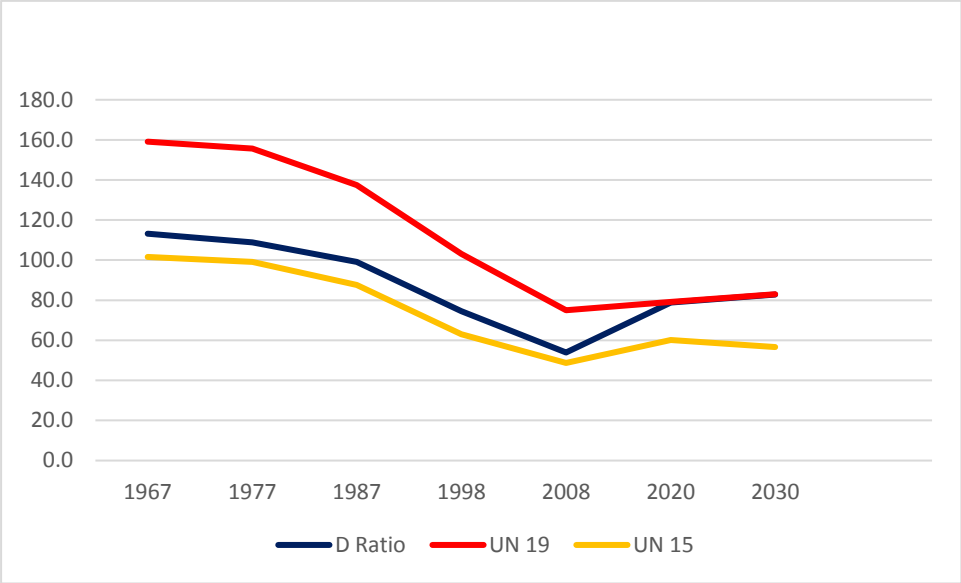
Source: ONS 2015 labour and unemployment survey n° 726

- *The reason of including the 15-19-year-olds after in the dependent segment after 2008 is that 26.9% from them are contributing in the labour force**
- *the figure shows how close our calculations to the United Nation prediction according to both approaches (Dependency Ratio 0-15 and 65+) and (Dependency Ratio 0-19 and 65+) ***

*TN_Transition to adulthood. UNICEF 2018

(UNICEF, 2021) (ONS, 2015)

Figure 17: Dependency ratio comparison with the UN

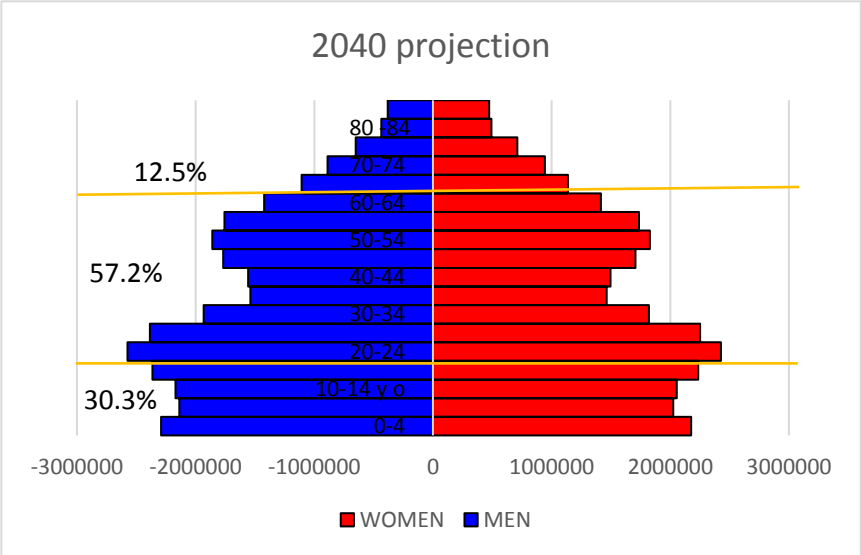


***United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website.* https://population.un.org/wpp/DataQuery/ (UN, 2019)

The legal retirement age in Algeria is 60 years old on the condition of completing 32 years of work. According to Decree No. 20-107 of April 30, 2020 setting the conditions for continuing work after the legal retirement age,

the worker may request a postponement of the retirement age, within the limit of 5 years after the legal retirement age, 65 years old, the blue curve represents the dependency ratio calculated from the ONS data, the yellow curve represents the united nation's ratio with including the 15-19 to the labour force and retirement at 60 years old, and the red curve is the ratio based on the latest standards with excluding the 15-19 from the working segment and delaying retirement to the age of 65. The calculation of the empirical data, shows from the parallelism of the blue curve with each of the others, that the change in the Algerian working category started after 2008.

Based on the UN's new standards and calculations the dependency ratio was 78.8, which is reliable since it is practically the same as the empirical data. this allows us to predict it through the projections of 2030 and 2040, this indicator shows that the best economic reassurance Algeria has witnessed what is known as a "window of opportunity" in 2008 with a dependency ratio of (53.9) a period of reaping the "demographic dividend" because society has a relatively high rate of potential producers than consumers. Since 1967 it was very high reflecting a great imbalance in the economy with a ratio that exceeds 100 then it began to decrease since 1987 with a ratio of 99

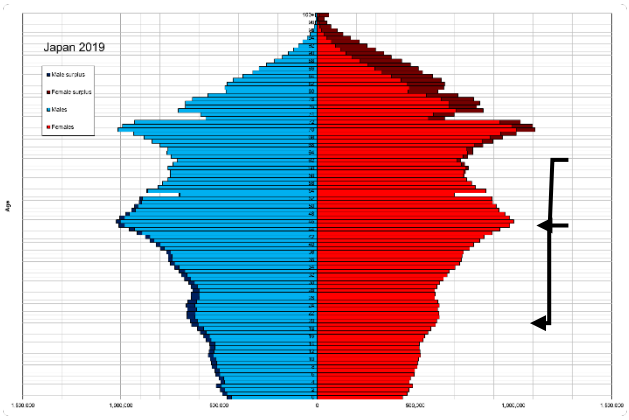


(ONS, La demographie Algérienne 2019 n°890, 2019)

indicating that we have passed the stage of imbalance but entered the risk and taking precautions stage. However lately in 2020, the ratio re-increased to 78.8 roughly indicating that 78.8 people depend on 100 workers. In addition to the 2030 projections, which show that the density of the number of workers is insufficient to reduce the burden, the average may indicate a further increase to reach 82.8 dependent which is not promising, as the necessary precautions must be taken on whether the working people contribution would meet the need of at least two people to ensure a level that is not classified as good but generally acceptable, this should be considered as a tocsin that threats the level of life and economic reassurance that Algerian population aspire to live. Fortunately, in 2040, it starts to drop again to 74.9 as (0-19) drops to 30.3% and the working class rises to 57.2%, even with 12.5% of seniors still won't affect the percentage though There will be a large proportion of older workers - (45-60) in the workforce.

Also, undoubtedly in the future as fertility levels decline, and the proportion of older people continues to increase, eventually as the population ages, it adds pressure on Social Security to bear, but fortunately, we can predict when and where the pyramid structure will narrow and expand, taking into account the health, social and economic determinants.

Based on the demographic Transition models the Algerian structure is in stage four through the 2040 projection and determinants, we are going to measure if the perspective is applicable on the fifth stage, to define the field of comparison we need to set the three distinguishing characteristics, starting by the elderly segment which should exceed 14% of the total population,



secondly, the life expectancy higher than 80 years old, thirdly, fertility rate under the sub-replacement rate (under 2 births per woman), to precisely narrow the concept, it is when the birth rate goes below the death rate, the population starts to decline and the natural growth rate witness a stagnation at the negative level there are a few countries at this stage such as Germany, Japan, Greece, Ukraine, Croatia and some countries that will face it in the next decade, where the birth rate and death rate are close to par. The negative growth rate is the main consequence of the demographic transition and the result of the process from the start as the mortality and birth rate decline, life expectancy increases to a specific age although the generations accumulated to a later age will live the death event in that age in multitude instead of the death scattered over the years, which will result in a rise in the rate at a certain age, any particular year, and this has already been predicted by the United Nations, where the death rate will rise to 14‰ for Japan in 2035 which coincides with the large 70 years old generation reaching the life expectancy age, then 16.3‰ in 2065 which concerns the next largest segment at that age, these rates are hard to beat up by birth rate (7‰) means the growth will remain negative for around a century.

The population of Algeria is estimated to be 57 million inhabitants by the year 2040 which is still not populated compared to the western countries when they were at this stage, if we take a western country at the fifth stage as a comparative example like Germany, what seems to be concerning in the fifth stage is the women's behaviour towards fertility. The most common characteristic among the countries living the fifth stage besides high life expectancy is the fertility rate under two children and still declining, as Germany's fertility rate reached 1.54 births per woman in 2019, fertility decline became tightly associated with the economic development at this stage, Japan as the most emergent country in demographic development as it developed the new concept of healthy life

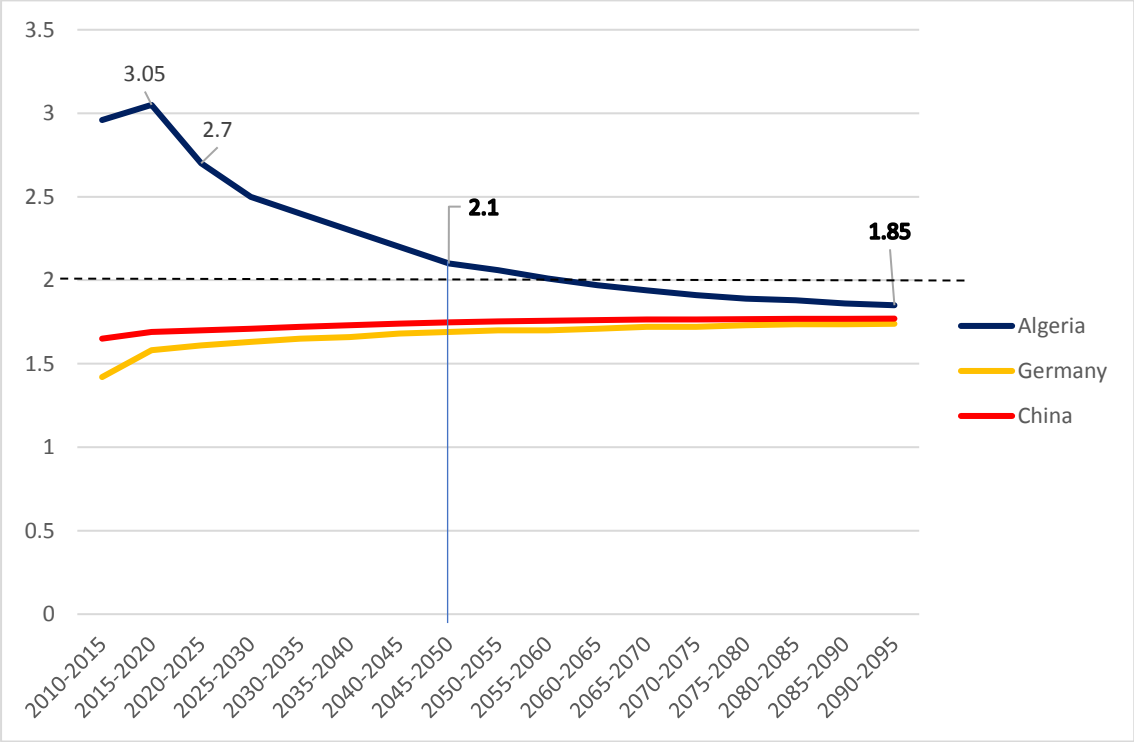
expectancy which is 77 years old, has a fertility rate of 1.36 births per woman, this implication won't exclusively, lead to the risk of reproduction.

The phenomenon of deepening the "baby bust" is a problem of long-term perspectives that can lead to an economic depression, most of the fertility curves indicate a regression, this trend will lead in the long run to the desire to have fewer children to the point of threatening the economy in terms of the number of workers. Whom the economy depends on to support children and the elderly, especially since the shape of the structure indicates this. The fertility rate in Algeria was 2.4 in 2003 and the reason for its increase to 3 in 2015 and 2.9 in 2020 is that it follows the curve of the birth rate which in turn relates to the generation bearing these children, the structure taking the direction of a cog pattern. The fertility rate is likely to follow fluctuations. Global fertility rates indicate that the number of children is more related to social and economic development, in other words, rich societies tend to have fewer children and poor societies despite lack of resources tend to have more children. Theoretically, this is the inverse relationship between the economy and births in a way that fewer children lead to a shortage in the workforce, and less economy leads to more children, which means that it is a cycle in which they alternate, each time one factor controls the other, and each specific factor is a key to solve the other's problem, however, the theory based on observation is relative to the dominant economic activity, and social behaviour; in the sense that even China, before abandoning the one-child policy, had a similar fertility rate to Japan's and Germany's, without the same cause, and the problem lies in the policy used to persuade and push women to reduce and in this case not having children is difficult to retreat in the short term so that the lifestyle considers the child as a dependent, obstacle, burden and somehow unrewarding which seems unerasable, especially in industrial countries (Malthusians) which is not the case of China which changed the concept of the Malthusian economy so that the agricultural

economy grows as the population increases and at the same rate, if not twice as much and, here we recall the pattern that regards children as the resources and engine of the economy and invest in the multiplication of generations as future employees and financial resources by creating windows of opportunity and creating enough jobs to accommodate the upcoming working-age population. However the Chinese policy was controversial and considered arbitrary against human rights, especially in terms of the method adopted and the penalties imposed as a result of its violation. the goal was not at all doubtful, which is to reduce the birth and fertility rate hence the population in the country, and as a result of this policy Fifty years after its implementation, the habit on lifestyle in the Chinese cities dominated the fertility behaviours as the generations who got used to small families with no siblings and demoted the need for children to be family supporting workers adopting the theory of high investments in one child rather than thinly splitting the income among several children, this was concluded after surveys of 2019 statistics, which showed that despite the abandonment of the one-child policy in 2016, the birth rate began to decline to 10.5% after it was somewhat stable around 12.95%, in addition to the fertility rate, which only increased by a percentage It is almost absent 0.03 to reach 1.7 children per woman in 2019, which conclusively means that the baby bust phenomenon is the worldwide consequence if not the first aim to resolve the economic predicted problems but most importantly it concludes that in the neo-Malthusian principle no matter what policy has applied, the results affect in the same way. (WorldBank, 2019)

Fertility Projection

Figure 18: UN Fertility Rate projections



Source: The United Nations Data 2022

Fertility rates in Algeria are on the decline, and although the country is still at the beginning of stage 4, the fertility rate is bouncing up and down between 3 and 2 which is a slight risk as it reaches the edge. UN projections clearly show that within thirty years, the fertility rate will reach the sub-replacement rate which is the tocsin that will then decline, and for a middle-income developing country it represents a risk to economic sustainability especially since we cannot be reassured that the country will reach enough high economic development infrastructure by then, to sacrifice labour economy that it can be harnessed to the development rather than considering it as a resource drain meaning that the Baby bust phenomenon should not be the key to resolving the economic deficiency in this context. The demographic transition models and projections are not predictions but more likely suggestions of what has been experienced and why,

the process explanations of different countries models help in terms of future precautions, the individual behaviour probabilities could be uncertain but in large communities like country population, they are accurate most of the time. We took two examples to compare with Algeria's fertility rate projection based on their differences in the fertility declining appliance, Germany Under the Malthusian theory of fewer births increases investments in surviving children that have more global dimensions such as economic deficit and population growth using women's fertility behaviour, role-changing strategies and family structural concepts aimed at lowering fertility in the long term . And China's short-term approach to the one-child policy, the principle directly targeted the fertility and birth rate by forcing most women and families to adopt a specific fertility behaviour, which later led to acceptance, in other words, despite the difference between the approaches the consequences were the same. they both had a sub-replacement fertility rate thirty years ago although Germany is trying to increase this rate, and despite interventions including payments, entitlement to parental leave and childcare, the projections suggest that they provide a modest increase in fertility rate. The fertility decline in Algeria was following the western country approach including Germany which seems eventually regrettable, hence what seems concerning is the change that could occur in less than 30 years, however, the differential cultural factor that distinguishes the Algerian population from the two other countries which are promising in terms of maintaining fertility rate for the long term is the fact the population of the study is religiously linked to Islam and by that, we should state that Islam strictly forbids extramarital relationships and does not recognize alternative living arrangements other than marriage, nor the disconnection between marriage and procreation, in Algeria procreation happens only within the framework of legitimate marriage in addition to considering having children as a rewarding privilege (Rachedi, 2020) We can consider this as an indicator of the tools that enable us to control fertility, without

resorting to policies or societal trends, such as birth control, pushing people to decide not to have children or limiting births for some reasons, given that society originally undergoes through obstacles that prevent this, and that's under the hypothesis of fertility being the economic problem which is not the case, bottom of the line, the low fertility is not a sustainable solution while the country's problem is purely economic which seems worsening because of the none sustainable resources, the aim to avoid any further non-resolvable implications should considerably attain a slightly higher fertility rate fluctuation while the age structure still provides momentum for the population growth and unplug the fertility behaviour from the psychological repel, in addition to the fact that the country's surface and density ratio completely indicates that it is not relevant yet with the low fertility rate. (PRB, 2001)

***Baby bust**: decline in birth rate*

Pronatalist policies

Government pronatalist policies are designed to increase birth rates, often through financial incentives such as birth bonuses, child benefits, and tax credits.

Replacement fertility level

The replacement fertility level is the total fertility rate needed to keep a country's population constant. It is equivalent to approximately 2.1 children per woman.

Conclusion:

Algeria as an independent country has witnessed a stability before the 1830 and since the start of the French Colonization the country went through the characteristics of the first phase of the demographic transition high mortality and birth rate because of the famine and poverty caused by the colonization forces in addition to their shift which transmitted global epidemics undergone that time and by the end of the 19th century, unfortunately the country was still under colonialism which caused further human losses and kept increasing the mortality rate until the peak of 43‰ in 1945, and birth rate very high and fluctuate over 40 ‰ for the purpose of compensating, after that phase the mortality started to decline under the same circumstances, however it remained like it was before 1945 until independence, reaching under twenty and kept declining while the health system, vaccines and the economic sectors being improved, simultaneously birth rate kept increasing with the absence of mortality, reaching 50‰ until 1970. After the actions taken in the health sector by providing contraception, and education sector by integration and encouraging the education of female gender, birth rate started to decline as marriage and fertility got delayed , introducing the concept of family planning, female career and ambition in the work force has taken fertility rate to another level, as mortality declined population started to reach higher ages and life expectancy increased with the medical improvements to 70 years old, the context remained until 2000 as birth rate reached a very low level compared to how it was before and that is what marked this period of time and classified it as the third phase of the demographic transition, after the year 2000, mortality reached 4.5‰, the crude birth rate 20 ‰, and fertility rate reached the lowest rate in the Algerian history with the rate of 2.4 children per woman, the infant mortality has declined from 14.5‰ in 1970 to 3.3‰ in 2000 and the population growth rate has declined from 3 to 1.4%, the

fourth stage in the country started from these rates , and what mainly distinguishes it is the growth rate stability and the stagnation of the improvements in all determinants especially death rate as it remained practically the same since then, the birth rate started increasing again and population growth slightly following it, life expectancy continued to increase reaching 77 years old and resulting in an enlargement of the elderly segment from 3 to 7%, the secondary characteristics that are taking places as important determinant are the urbanization which increased to 73% and maternity medium age delay reaching over 31.5 years old since the fourth stage started, not to mention the delay in marriage medium age for both genders especially feminine as this gender has limited childbearing years, which directly affects the fertility rate based on the demographic transition model. The fifth stage in the future would take place around the year 2050 as women's decision choice to have children and to get married would negatively be affected to conduct fertility to a sub-replacement rate hence low birth rate and life expectancy would reach over 80, causing a higher death rate for this enlarged segment reaching that age; as a result, both of the determinants would drive to negative population growth.

Chapter Two

The Epidemiologic Transition

Chapter 2: Epidemiological transition

Introduction

The term epidemiologic transition is the change in the burden of disease from infectious disease to non-communicable disease, this process varies in the taken from one country to another, the history of epidemiological transition has shown that simultaneously along with the demographic transition it took the western side more than it took the developing countries.

In 1971, Abdel Rahman Omran set his theory as to how it is that patterns of mortality have changed over time. Omran proposed that there's been three phases of epidemiological transition, pestilence and famine from prehistory to the mid-18th century. Infectious disease was the major cause of death, especially after the appearance of agglomerations and when people started living in communities and city-states, traveling trade between city-states led to a wide spread of pandemics and during that time, there were other important causes of death. Such as war and famine that devastated a lot of populations besides the low standard of living, poor hygiene and no access to effective healthcare in Algeria this context extended till the early 20th century, according to the theory, phase two is the age of receiving pandemics which was between the middle of the 18th and the middle of the twentieth century with the industrial revolution which improved nutrition, sanitation and resulted in a major reduction in the rate of infectious disease and epidemics, evidently, this Didn't apply to all countries, many of them especially the third world ones were living in squalid conditions mainly because of the war, the third phase characterized by the increase in life expectancy and surviving till late ages resulting in death by what call natural causes, but are in fact age-related degenerative diseases, such as diabetes, cardiovascular, and more serious diseases like cancer in the mid-20th century. due to vaccines, antibiotics , improvement

in the social determinants of health and the increase in life expectancy, during this phase population is dealing with the prevalent diseases amongst the elderly which lowers the quality of life and health at late ages ,also due to other factors such as changes in lifestyle and dietary changes this contributed to an increased obesity which itself an indicator of several diseases like diabetes, cardiovascular diseases, cancer, and more, so this was basically the theory of epidemiological transition.

Algeria was a country that suffered for a long period of war during its transition and it had to solve the problem of high mortality on both sides, for130 years it has faced major events, Epidemics, famines, colonialism and even after independence and the end of these causes of mortality, the regular rhythm according to the typical death and epidemiological transition theory, have been interrupted for a decade because of the civil war in 1990.

Non-Communicable Diseases (NCDs) are represented mainly by four major groups of pathologies: cardiovascular diseases, cancers, chronic respiratory diseases and metabolic diseases constitute major causes of morbidity, mortality and disability and weigh heavily on the system. Algerian health Prevention of NCDs requires the establishment of a surveillance system for prevalent pathologies and common modifiable risk factors such as tobacco consumption, unhealthy diet, insufficient physical activity or sedentary lifestyle and harmful use of alcohol. (INSP, 2022)

Definition

Epidemiological transition is the process by which the pattern of mortality and disease in a population is transformed from one of high mortality among infants and children and episodic famine and epidemics affecting all age groups to one of degenerative and human-made diseases (such as those attributed to smoking

and obesity) affecting principally the elderly. It is generally believed that epidemiologic transitions prior to the 20th century were closely associated with rising standards of living, nutrition, and sanitation.

So mainly, the theory describes the change in population distributions concerning patterns of mortality, fertility, life expectancy, and leading causes of death. Any infectious disease expresses itself in different epidemiological forms.

• Epidemic: Appearance and spread of a contagious infectious disease which strikes at the same time and in one place a large number of people, animals or plants

• Endemic: describes a disease that is permanently present in a particular region or in a certain group of individuals.

• Pandemic (from the Greek pan which means "all" and demos which means "people") it is an epidemic present over a large international geographic area. In common sense, it affects a particularly large part of the world's population.

The models of transition

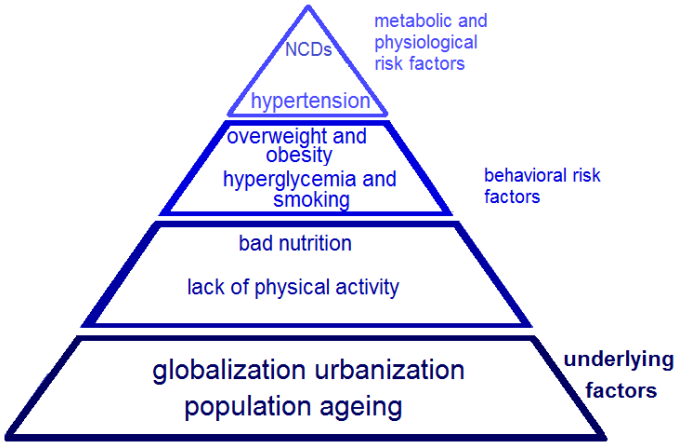
Omran developed three models to explain the epidemiological transition than he updated his theory into five models divided into two of which two models started in the 18th to 19th century and the remaining three happened in the 20th century the basic theory sets:

1- Classical Western model: (the United Kingdom, Sweden and Germany) Countries in Western Europe typically experienced a transition that began in the late eighteenth century and lasted over 150 years to the post-World War II era.

2- The accelerated model: experienced a rapid transition as a result of a few decades of intensive war-driven industrialization followed by post-war occupation. The accelerated transition follows a pattern similar to the Classical/Western Model except that it occurs within a much shorter time span. China might be considered another example of this model.
3- Contemporary/Delayed model: Due to slow economic development, countries experienced delayed transitions that have lasted into the 21st century. Medical and public health improvements have reduced mortality, while the birth rate remains high. Cultural traditions combined with political and economic instability and food insecurity mean that mortality for women and children fluctuates more than for men. Mauritius might be considered another example of this model. (Omran, 2005) (Wikipedia, 2022)

In the updated theory he developed five models:

1- Classical model
2- Accelerated/ Semi-western model
3- Rapid model
4- Intermediate model
5- Slow model (OMRAN, 1998)



Epidemic definition

It is the rapid spread of disease to a large number of hosts in a given population within a short period of time. (Wikipedia, 2022)

The Centers for Disease Control and Prevention defines an epidemic as the occurrence of more cases of disease, injury, or other health condition than expected in a given area or among a specific group of persons during a particular period. Usually, the cases are presumed to have a common cause or to be related to one another in some way. Epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. Outbreak carries the same definition of epidemic, but is often used for a more limited geographic area. Cluster refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known. Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. (CDC, 2012)

Epidemiology definition:

The word epidemiology comes from the Greek word epi, meaning on or upon, demos, meaning people, and logos, meaning the study of. In other words, the word epidemiology has its roots in the study of what befalls a population. Many definitions have been proposed, but the following definition captures the underlying principles and public health spirit of epidemiology: Epidemiology is the study of the distribution and determinants of health-related states or events in

specified populations, and the application of this study to the control of health problems (CDC, 2012)

Communicable diseases definition (CD)

Communicable diseases, also known as infectious diseases or transmissible diseases, are illnesses that result from the infection, presence and growth of pathogenic (capable of causing disease) biologic agents in an individual human or other animal host. Infections may range in severity from asymptomatic (without symptoms) to severe and fatal. The term infection does not have the same meaning as infectious disease because some infections do not cause illness in a host. (DHS Wisconsin, 2021)

Non communicable diseases definition (NCD)

Chronic conditions that do not result from an (acute) infectious process and hence are "not Communicable". Also defined as a disease that has a prolonged course, that does not resolve spontaneously, and for which a complete cure is rarely achieved, such as Cardiovascular disease (e.g., Coronary heart disease, Stroke), Cancer, Chronic respiratory disease, Diabetes Chronic neurologic disorders (e.g., Alzheimer's, dementias), Arthritis/Musculoskeletal diseases, Unintentional injuries (e.g., from traffic crashes)
(CDC, 2013)

Risk factor definition

An aspect of personal behaviour or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition. (CDC, 2013)

The epidemiological transition in Algeria

The stages of the epidemiological transition

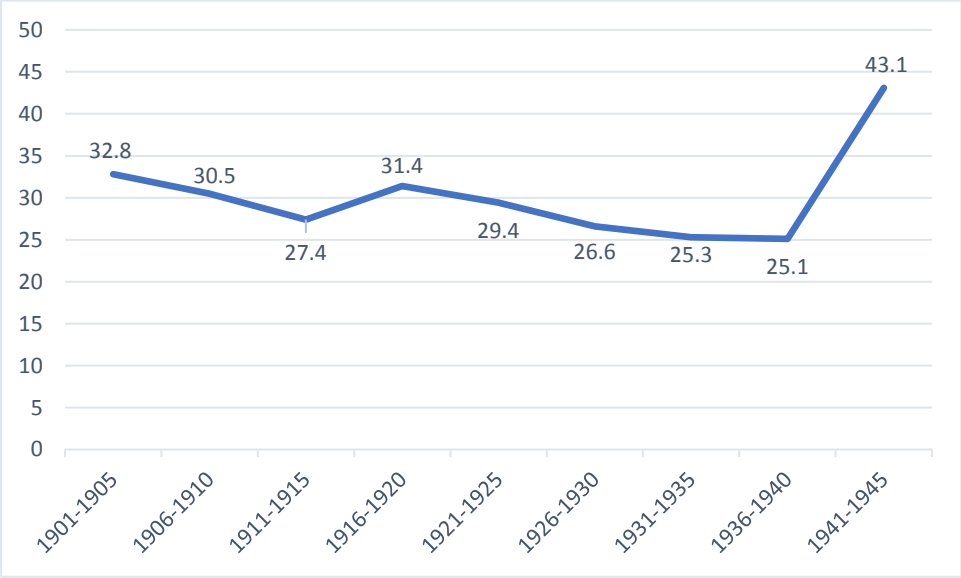
Based on Omran's initial theory it is divided into three phases

- The age of epidemics and pandemics when mortality was high at all ages especially under 5, low life expectancy, less than 40 years old, low population growth rate.
- The age of receding pandemics when mortality progressively declined allowing life expectancy to reach a high level and population growth sustained and begin to be exponential.
- The age of degenerative and man-made diseases when mortality continues to decline and eventually approaches stability at a relatively low level, high life expectancy, and decline in fertility.

Epidemiological transition stages in Algeria

First stage in Algeria (high mortality)

Figure 19: Crude death rate ‰ Algeria 1901-1945



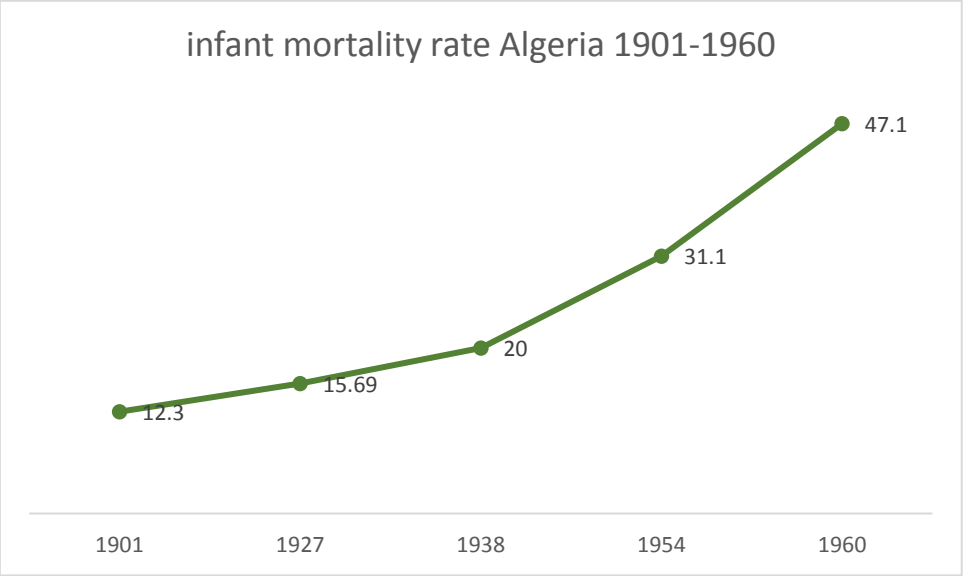
In the first phase and before the observation, mortality in Algeria was extremely high from the early stages, the plague epidemic of 1867-1868 left its mark on the population Between 1850 and 1935, 158 cases are listed in Algeria but only two cases came from inside the country.

The first wave in 1834 at Oran Military Hospital spread through the city killing nearly 1,000 people. It expanded to mostly the whole western area accumulating nearly 1,500 victims, in 1835 12,000 deaths have been recorded in the capital Algiers and 14,000 deaths in Constantine, it remained until September 1849 (ABID, 2006) in 1851 the first sanitary conference defined the diseases quarantines of plague, yellow fever and cholera then in 1926 the convention was extended to typhus and smallpox. (Kadir, 2018) Since 1900, the death rate in Algeria began to fluctuate due to the multiplicity of causes of death, the most important of which is that Algeria was in a period of war, in addition to coinciding with the two world wars. And it began to rise to reach its peak after World War 2 and the massacres of May 8, 1945, when the death rate reached 43.1 per thousand. In 1947, tuberculosis vaccination became compulsory for certain groups. In 1950 it became compulsory for everyone from the day after independence to the present day.

The evolution of infant mortality rate:

It’s the number of deaths of those under the age of one year old per thousand births.

Figure 20: Infant mortality rate Algeria 1901-1960



Source: (Direction générale des statistiques , 1976)

Infectious diseases contributed to a high percentage of deaths of infants under the age of one and all deaths in the post-neonatal period, the observation from the 1901 generation shows an increase with the rate of 12.35‰ due to lack of access to healthcare and immense illnesses concerning mothers and new-borns, this rate continues to increase until the year 1960 reaching 47.1 ‰ which represents 20% of the new-borns that year, since then the infant mortality rate begins to decline slowly over the years, especially after independence.

The second phase

Post- Post-independence phase has remarkably witnessed a decrease in death rates of all ages vaccination programs, access to drinking water, improving living and hygiene conditions, and vector control have significantly reduced communicable diseases.

Table 04: Quotients (per 1000) of infant mortality by generation by housing sector and gender

	Générations								
	1960	1961	1962	1963	1964	1965	1966	1967	1968
Urbain Rural	146 195	146 151	137 127	115 140	128 122	114 134	123 139	113 133	105 131
Sexe masculin Sexe féminin	172 188	153 146	151 111	156 106	120 127	127 127	140 128	138 115	125 120
Algérie du Nord	179	149	130	132	124	127	134	127	123
Nombre de décès à moins d'un an	457	393	356	418	399	423	457	423	395
Nombre de naissances vivantes	2 545	2 631	2 728	3 159	3 226	3 321	3 404	3 332	3 220

(TABUTIN, 1974)

Table 05: Infant mortality evolution 1990-2015

Year	Rate ‰
1990	46.8
2000	36.9
2008	25.5
2009	24.8
2010	23.7
2011	23.1
2012	22.6
2013	22.4
2014	22
2015	22.3

(Kadir, 2018)

In 1963 after the independence, the government launched a malaria eradication program, but the application was launched in 1968. Malaria eradication is considered to have been achieved around 1985, because the country has confronted imported malaria and a few persistent, it also has executed the national tuberculosis control program which was established in 1965 and served as a

model for the world health Organization, which has allowed the reduction of cases.

All the epidemics that were ravaging the country were the number one priority after the citizens' security.

There were plans mainly dedicated to the health system, hospitals, vaccines and improvements in medicines, since the 1970s, these actions have enabled a significant depletion of contagious disease.

Crude death rate in Algeria

Figure 21: crude death rate (‰) 1945-1980

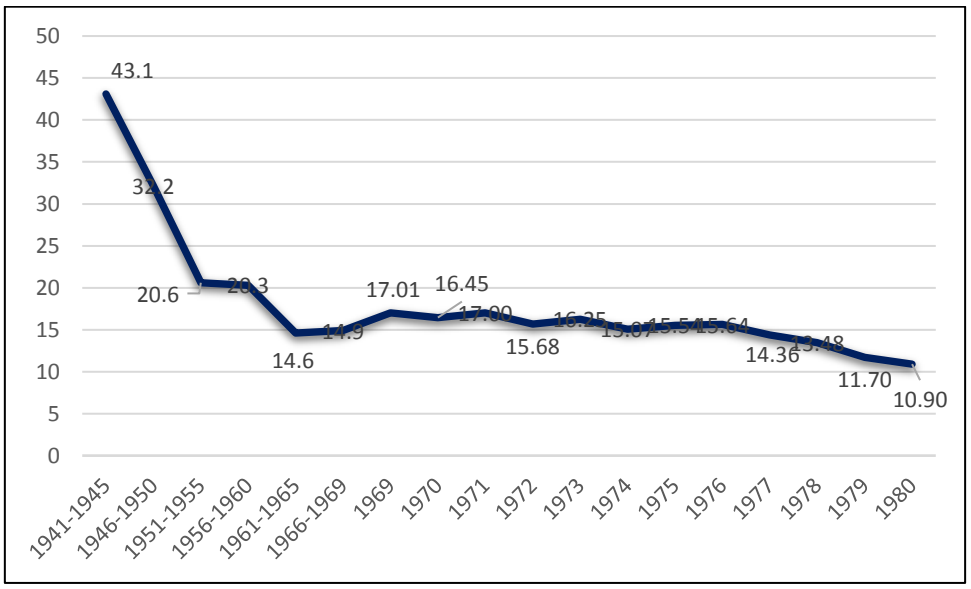


Table 06: Evolution of indigenous malaria from 1968

year	cases
1968	12630
1972	1940
1977	58
1982	67
1987	64
1992	106

1997	197
2002	307
2004	163
2005	293

(Kadir, 2018)

The country went through a maintenance phase from 1986 for the purpose of surveillance to avoid the resumption of transmission, this precaution was essentially based on the detection and treatment of any occasional outbreak due to an import of cases.

As it is obvious the CDR has remarkably fallen since the year 1950 with a rate of 32.2 till 1965 reaching 14.6 then started rising progressively and remained constant for a whole decade due to imported malaria that the country experienced in 1977, with a 46% in 1978, 80% in 1980, and over 95% from 1985, also tuberculosis lung gradually descended from 150 cases per 100,000 inhabitants in 1966 to stabilize at 22 cases during the 1990s (INSP, 2011)

Various measures were taken within the framework of development plans, which resulted in a positive improvement in terms of health, which appeared in the decline and stability of the mortality rate. Health policies manifested in the establishment of free medicine and popularization of vaccination as well as the protection of mother and child and in the framework of controlling demographic growth. The program included the generalization of contraception to the whole population in the public services throughout this period, in terms of death rate, birth rate, and as a result, the growth rate the country has achieved the lowest level of mortality in its demographic history by then and began to achieve a balance in public health indicators such as life expectancy which reached 60 years in the 1980s.

Death causes in 1970

Table 07: Evolution of the main death causes in 1970:

tuberculosis	5.80%	
Enteritis and other diarrheal disease	6.30%	
other parasitic and infectious diseases	12.10%	36%
pneumonia	11.80%	
heart diseases	12.1	
accidents (all-causes)	11.1	
respiratory system diseases	7.8	
obstetric complications	6.7	64%
other causes of prenatal mortality	6.3	
symptoms ill-defined disease state	2.7	
unspecified	17.3	

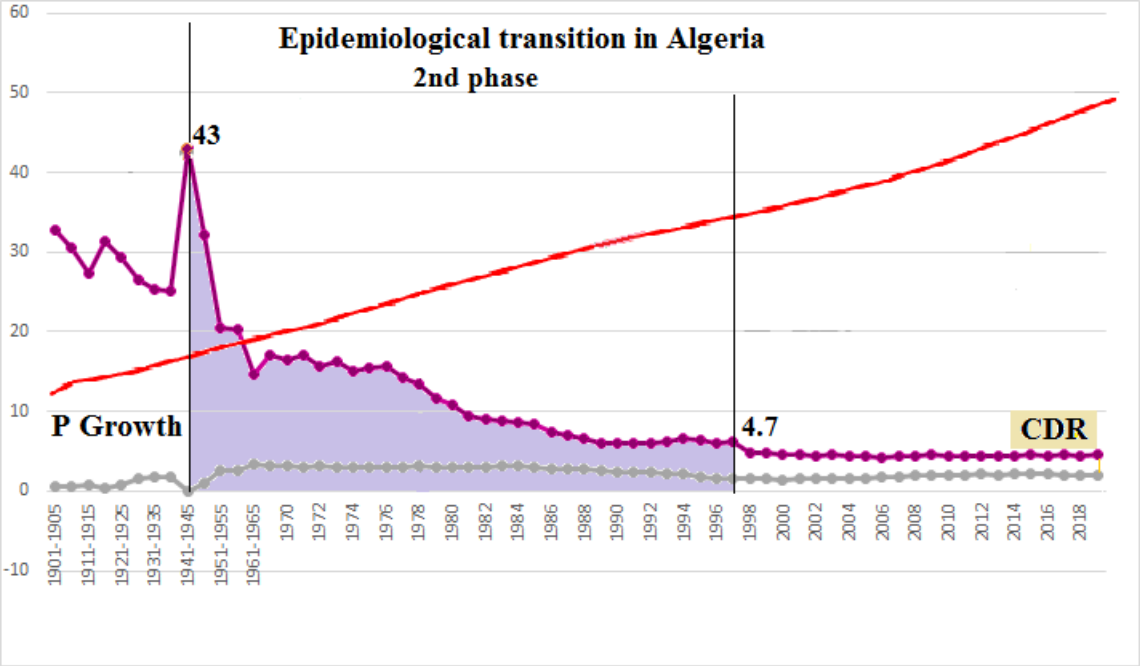
(Ouchfoun & Hammouda, 1993)

This study shows that the causes of death observed in the 1970s in Algeria were practically the same as those of the countries like Great Britain or the United States of America at the end 19th century since those communicable diseases were pandemics, the health plans against them were universal and in Algeria, the Decree of June 17, 1969, was undertaken mainly for making vaccination against tuberculosis, diphtheria, pertussis, polio and smallpox compulsory and free of charges and in July same year the obligation of free screening, prevention support and full coverage of patients with tuberculosis. and dedicate all the necessary effort to malaria eradication. The health indicators of the Algerian population since the independence were practically very low, high mortality, low life expectancy. the predominantly communicable and parasitic diseases are generated by the state of environmental hygiene and aggravated by chronic malnutrition which affects part of the population. Among these prevalent

diseases, the most important was tuberculosis ranking the first, Malaria is the second scourge these diseases affect adults and infants alike, it is necessary to add all child infectious diseases: measles, tetanus, whooping cough, diphtheria, polio, pneumonia and diarrhoea, for which vaccines were scarce or non-existent they were the leading causes of infant mortality and disabilities. Among the other communicable diseases, typhus, typhoid fever, cerebrospinal meningitis and trachoma, are diseases present in the endemic epidemic and for which there are no exhaustive data. The only statistical morbidity and mortality data related to the year 1970 were from the hospital's structures and, despite their insufficiency, it is possible to sketch an epidemiological profile which confirms the predominance of infectious and parasitic diseases. The latter are at the forefront of causes of hospital death with (36%) and reasons for hospitalization excluding the ones for childbirth and obstetric complications. Although if we analyse the death causes rates, we see through the data that those related to heart diseases and accidents occupy 12% and 11%, which are significant proportions, as they began to appear due to the beginning of the decline in infectious diseases, which allowed us to focus on other causes of death, especially those related to obstetric and prenatal mortality in addition of the life expectancy that began to rise since this period, which leads to the inevitable rise in the death rate related to late ages disease, until this stage the country's still following the original model theory as we start to see the emergence of the chronic and man-made diseases versus the receding of the epidemics.

The epidemiological transition in Algeria (second stage)

Figure 22: Epidemiological transition in Algeria (the second stage)



This second phase of the epidemiological transition represent the shift of the death causes as the mortality moves from the communicable diseases to the new regime of non-communicable diseases as people start to live longer, while population still fighting against epidemics and try to lower mortality that has fallen below 10‰ we may consider the emergence heart diseases and some hygiene related death causes, accidents and malnutrition diseases which requires at this stage devoting the medical efforts on both sides.

Communicable diseases

Table 08: Evolution of the main contagious diseases in Algeria (1990-2000) for 100000 inhabitants

Disease	1990	1995	2000	2001	2002	2003
Measles	7.46	34.51	11.28	8.97	18.88	50.02
Tetanus	38	34	10	20	17	7
Diphtheria	0.12	3.49	0.01	0.01	0	0.02
Whooping cough	0.1	0.04	0.1	0.46	0.18	0.07
Waterborne diseases	42.2	39.76	26.87	25.58	20.46	16.18
Cholera	6.6	0.018	0	0	0	0
Typhoid fever	17.62	15.08	8.52	4.96	7.65	2.13
Viral hepatitis	15.69	11.85	8.94	9.01	7.46	6.57
Dysentery	7.25	11.62	8.65	9.36	7.5	6.11
Brucellosis	0.66	9.3	10.97	10.42	9.92	8.79
Leishmaniasis	8.39	5.4	14.44	14.03	23.45	43.45

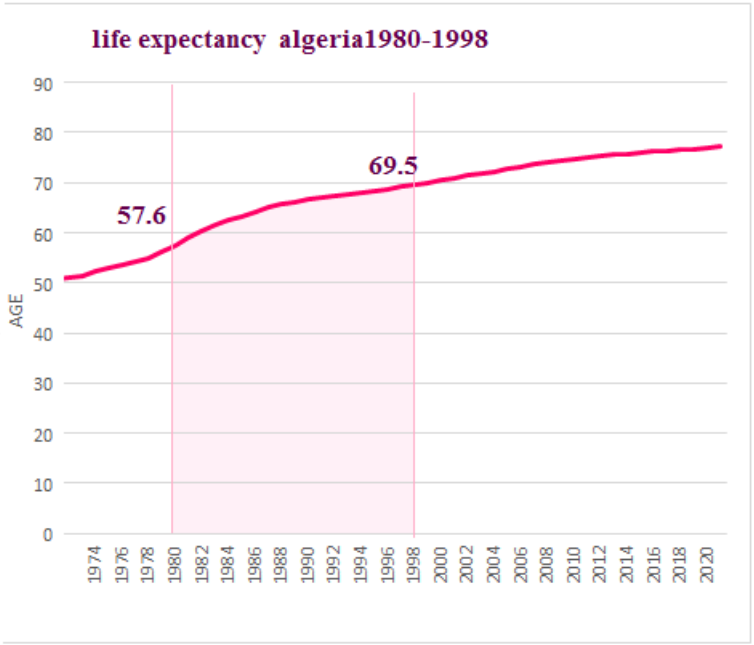
Source: INSP and MSPRH

This stage shows the process of evolution in terms of infectious and parasitic diseases as the proportion of the majority decreased except for two, measles with an incidence rate of 50.02 cases per 100,000 inhabitants in 2003 then dropped back to 9.14 in 2004, in addition to 2,766 cases of brucellosis were recorded in 2003 and 3,385 cases in 2004, with an increase in cutaneous leishmaniasis which spread in 2003 (14,571 cases) rate of 43.45 per 100,000 inhabitants in 2003.

Since the compulsory notification in 1990 of cases of AIDS and HIV seropositivity, the epidemiological profile of HIV has always been that of a low-level epidemic, with a low prevalence in the general population of less than 0.1%.

Life expectancy (second stage)

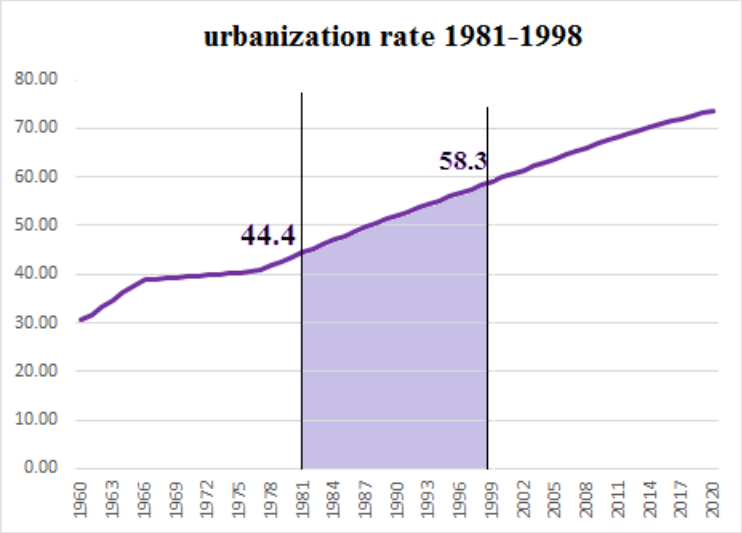
Figure 23: life expectancy in Algeria 1980-1998



The tangible improvement in the health sector appeared in the significant leap that life expectancy took in the process, which completely changed the curve's pace. As we note at the beginning of the third stage, it was 57 years old, and at the end of it around 1998 it reached 69.5, this indicates that the health condition in Algeria was under control despite the political and security instability. This was noticeable in the death curve in purple. We note that the death rate started increasing from 1990 to 6.56‰ in 1994 and settled between the two rates until 1998 when it recorded 4.8‰ This is a significant improvement, especially with the circumstances that coincided with that era.

Urbanization (second stage of the epidemiological transition)

Figure 24: Urbanization rate % 1981-1998



This stage is also linked to the second stage, as we see the death rate decrease as life expectancy and population growth consistently increase reaching almost 30 million by the end of this stage, the population have more access to medical technology and food so some of the diseases that used to kill are no longer a threat, the implications of this demographic growth are significant while Algeria is a young country with a high birth rate and low death rate. The urbanization rate raised from 25% in 1954 to 44.4% in 1981, to almost 60 % in 1998 especially later in this phase, the civil war in this dark decade led to more urbanization, and people left the rural zones for security reasons to the urban cities, this invading urban phenomenon costs agricultural land, thus creating pressure, because all these rates are going further up. Knowing that urban and rural developments and mobilization are subject to the expense of land resources, and the high urban concentration. This choice to urbanize peri-urban agricultural land is the easiest fulfilment of the population's needs according to the current lifestyle which resulted in people living and working closer to each other, so even infectious diseases that do not have much impact at this stage still weaken the human

immunity leading to the requirement of using and consuming antibiotics although the heaviest burden is dealing with degenerative diseases as people live longer.

The third stage of the epidemiological transition

Causes of death can be grouped into three categories: communicable (infectious and parasitic diseases and maternal, perinatal and nutritional conditions), non-communicable (chronic) and injuries (*WHO)*. The measures taken in the Algerian health sector against infectious diseases showed a remarkable development in improving the mortality rate and reducing it to 4.7 ‰ in 2021 although at the beginning of this stage by the year 2000 there were still some unresolved diseases that must be treated, especially when the urban rate increased to 60%, life expectancy still going high characterizing the phase with the emergence of non-communicable diseases, mainly in the southern area of the country, 427 malaria cases have been recorded in 2003 and down to 99 in 2004 the study confirmed that this is due to the trade with sub-Saharan countries. (MSP-RH 2004)

Communicable diseases (third stage)

Table 09: Burden of communicable diseases % the year 2013 and 2020

Notifiable diseases	2013	2020
Tuberculosis	53.5	53.6
Cutaneous leishmaniasis	17.35	2.9
Brucellosis	11.36	11.8
Foodborne illness	7.89	9.0
Hepatitis B	3.67	2.1

Meningitis CS	2.82	2.2
Hepatitis C	1.81	2.2
Malaria	1.58	0.0
Hydatid cyst	1.11	0.7
Typhoid	0.39	-
Whooping cough	0.18	0.1
Visceral leishmaniasis	0.15	0.0
Measles	0.07	0.7
Human rage	0.06	0.1

WHO Cooperation Strategy with Algeria 2016 - 2020 p 17

(INSP, 2020)

As can be seen from the table, since the implementation of the National Tuberculosis Control Program in 1966, tuberculosis has remained a major epidemic problem and remains a public health priority., the incidence in 2013 reached 53.5/100,000 inhabitants, and 75/100,000 in 2015, despite the immunization coverage of 99% of the one-year-old children (WHO & UNICEF), its death rate was 8.10/100,000 and by 2020 its prevalence accounted for more than half of infectious and notifiable infectious diseases, accounting for 53.6%. The proportion of leishmaniasis cases was 43% in 2003, it dropped to 17.35 in 2013 to 2.9% in 2020, the next two ranking CDs slightly increased while some of them slightly decreased indicating that the health system is still trying to control the communicable diseases with the fluctuation of results due to the high rate of urbanization to 73% and the population's living daily contact, especially among children.

Infectious diseases have dramatically changed, that tetanus and malaria have been eradicated In addition to the incidence of measles, whooping cough and typhoid fever decreased significantly by almost a nihilistic proportion except for the one-year-olds they run a slight risk as immunization proportion reached 95% in 2015,

also, no cholera cases have been recorded since the nineties. This is a promising indicator in terms of epidemiological health, but the disruptions highlighted the emergence of some foodborne diseases which increased from 7% in 2013 to 9% in 2020, with the continued observation of meningitis 3.8% and hepatitis A 4.8% and (B and C) 2.2 and 2.1 respectively.

The accumulated cases of AIDS in June 2004 were 2292 cases and Between 2005 and 2009, the number of people seropositive confirmed by (the LNR National Reference Laboratory for HIV / AIDS infection) was 2460 including 585 cases in 2008 and 684 new cases in 2009. in which 282 deaths were recorded in December 2006 and the active file in December 2007 recorded 294 deaths.

(*Source : Bilan des activités des CDR, années 2006, 2007, 2008 et 2009*

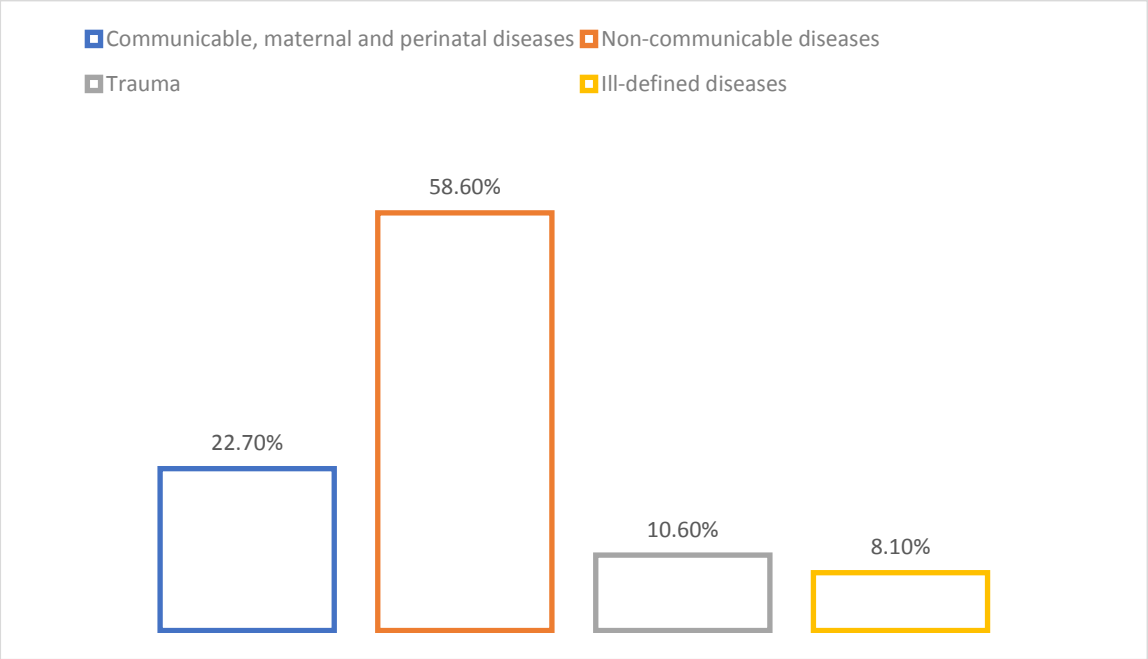
*Centres de Dépistage (CD) et les Centre de Référence de Prise en Charge du VIH (CDR)**

In 2014 a total of 9,103 people have been diagnosed with HIV positive which 1,632 people (17%) have been diagnosed with the AIDS disease in addition to 503 new diagnoses of HIV infection lately, the number of new cases of HIV infections diagnosed has been relatively stable, varying between the average of 700 and 800 diagnoses per year. In 2015 UNICEF recorded 500 children under the age of 15 living with HIV and the prevalence of it was 0.10 among people aged 15-49. The proportion of cases of communicable diseases reached 4.4% in 2020.

There's a trend of decline in communicable diseases and an increase in the non-communicable death causes, mainly cardiovascular disease, and accidents, as we see Malaria and cholera were the first targets in the eradication program as we don’t see any cases in the latest table of 1990 although cholera vanished by the start of the 21st century.

Distribution of deaths by disease group according to GBD

Figure 25: Death causes since 2002



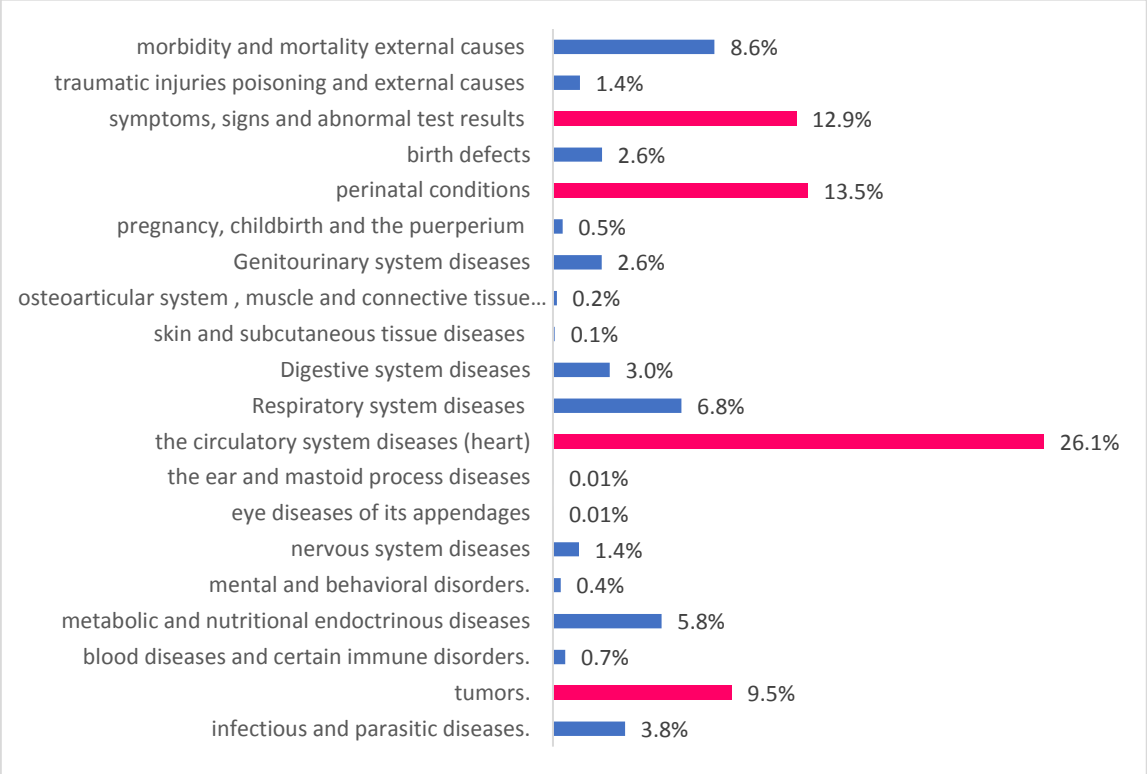
Global Burden Disease, TAHINA, Transition and Health Impact in North Africa 2002

The beginning of the new century coincided with the end of the dark decade in Algeria with the previous improvements in the health sector and the restructuring of hospitals, as well as vaccinations against epidemics, that is, provisions to control diseases and thus deaths. The year 2002 marked the change in pathology, the difference in the death causes began to appear from infectious to chronic diseases, this appeared through the death causes, that now the highest proportion concerns the elderly category, which means that the largest deaths are the population who have completed most stages of their lives, and this is an indicator of remarkable progress at the level of the health system. in the graph, the proportion of chronic diseases ranked first with 58.6% of the distribution of deaths by non-communicable diseases mainly dominated by cardiovascular, tumours, respiratory disease and diabetes while the communicable, maternal, perinatal and nutritional diseases represent 22.7%. and still, this proportion

concerns the most vulnerable and largest segment of the population, which is the unvaccinated children. The proportion of deaths by unintentional trauma such as accidents is 10.6%, it has appeared in the third phase with the urbanization and industrialization increase, this raises the stress and crowd that forging a new path in the mortality rate.

distribution of deaths by disease group

Figure 26: distribution of deaths by disease group based on ICD 10



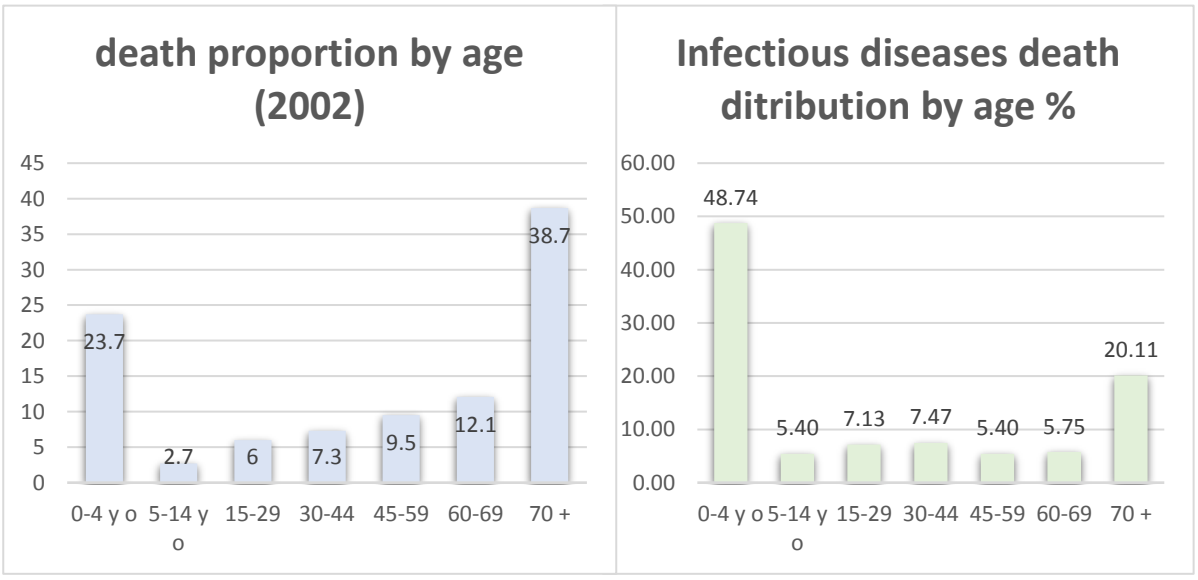
International Classification of Diseases, 10th edition, TAHINA 2002

In the global distribution of deaths according to ICD 10 by disease group, we note that 58.6% of non-communicable diseases deaths are mostly dominated by heart diseases with a proportion of (26.1%) of the total, the next three highest rates are perinatal conditions (13.5%), cancers (9.5%) and trauma (8.6%) this death

process is far from over since the causes are linked to the new lifestyle, as modernization increases the intensity of these man-made diseases will continue to lower the life quality leading to more implications.

Two classifications were considered to analyse the death caused by NCD: The Global Burden of Disease (GBD) and ICD 10. In the GBD classification, the death disease groups identified as non-communicable diseases are the four ranking first place, heart, tumours, respiratory diseases and diabetes as a nutrition-related disease. In the group of non-communicable diseases, cardiovascular disease ranks first among causes of death with 44.5% followed by deaths from malignant tumours noted in 16.0% of cases. Deaths proportion from respiratory tract diseases and diabetes mellitus were 7.6% and 7.4% respectively. *(tahina)* (Hammouda, Ait Hamadouche, Afiane, & Bouhadef, 2002)

Figures 27: death proportion and CDs deaths by age



TAHINA 2002

Table 10: Perinatal deaths distribution 2002

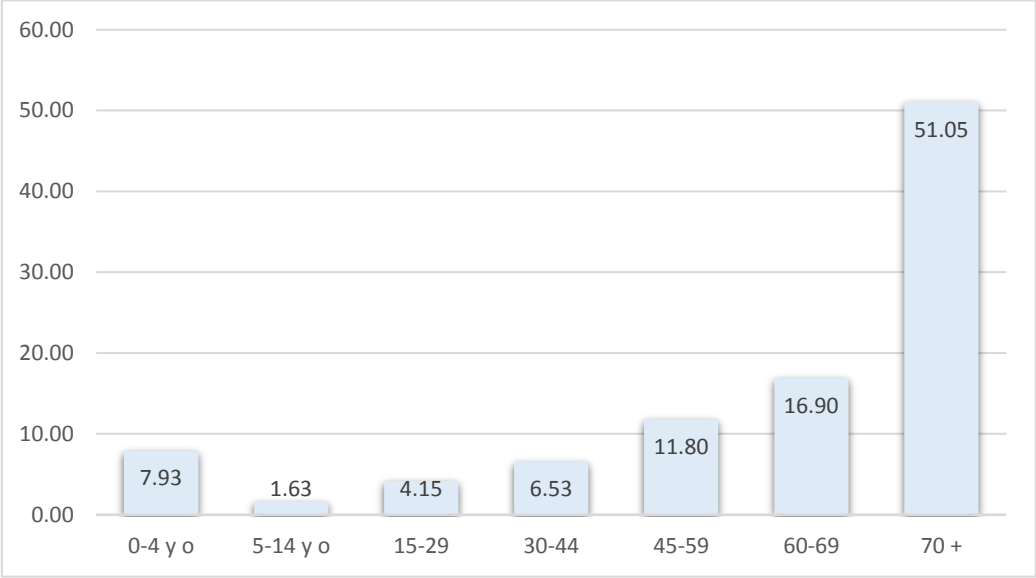
age	cases	%
0-7 days	1526	84.3
8-28 days	284	15.7
total	1810	

TAHINA 2002

The start of the third phase is already promising given that the majority of deaths are in the 60s and over, although the next big proportion is the 0-4-year-olds meaning that infectious diseases still threaten a certain part of the population, which we can see clearly in the second graphic throughout the distribution by age that it touches more the children under 5 since they are transmitted airway, digestive tract or through the skin cutaneous and those recur regularly and seasonally as a geographically limited epidemic such as Measles, hepatitis, Meningitis, and brucellosis and they get worse in population with asthma or immunocompromised, which are mostly neonatal and in infants under one year old and the category over 70 because older people are the second vulnerable to infectious diseases, they face more risk of developing an infection because their resistance declines due to changes in their immune system and physiological changes in their organs, which justifies the high mortality in these two segments. (ROOST, 2014)

Deaths by non-communicable diseases

Figure 28: non communicable diseases death distribution by age



Tahina 2002

According to the 2002 data, chronic diseases have become the main death cause of the elderly as the proportion of the deaths over 60 years old reached 67% and they're mainly the people over 70 with a rate of 51%, the new degenerative diseases claim a segment that already represents a low proportion of the total population and, they're causing a low life quality due to the gradual loss of physical and mental capacities, hearing loss, cataracts, high blood pressure, osteoarthritis, diabetes, certain cancers, serious cardiovascular disorders, and metabolic syndrome, this increased risk of disease presents a considerable challenge and can have an impact on well-being.

Population over 15 years old with chronic diseases

Table 11: population aged 15 and over with chronic diseases

age	cases	total surveyed	%
15-19	423	10873	3.9
20-29	887	23467	3.8
30-39	1607	22438	7.2
40-49	3259	17522	18.6
50-59	5061	14470	35.0
60-64	2709	5419	50.0
65-69	2305	4107	56.1
70-74	1720	2733	62.9
75-79	1382	1993	69.3
80 &+	1766	2539	69.6
no response	14	67	20.9
total	21133	105628	20.0

Source: MICS 6 2019

The latest study has shown that non-communicable diseases have become one of the leading causes of death in recent times, especially after the consequences of urbanization and a variety of death factors such as tobacco and poor nutrition. In 2019, the study MICS 6 conducted on a representative sample consisting of 105,628 people showed that the proportion of chronic diseases cases is 20% among the total surveyed but profoundly this rate is mostly over sixty-year-olds, starting from the age of 15 the under thirty represent almost 8% and above that age starts to increase especially near sixty-year-olds as in each age segments from the sample they represent more than the half, until the 70-74 year-olds, the cases represent 63% and the more we go up in the elderly category, the higher the percentage, as shown in the table, the last elderly category includes 69.6% patients

Medical death causes

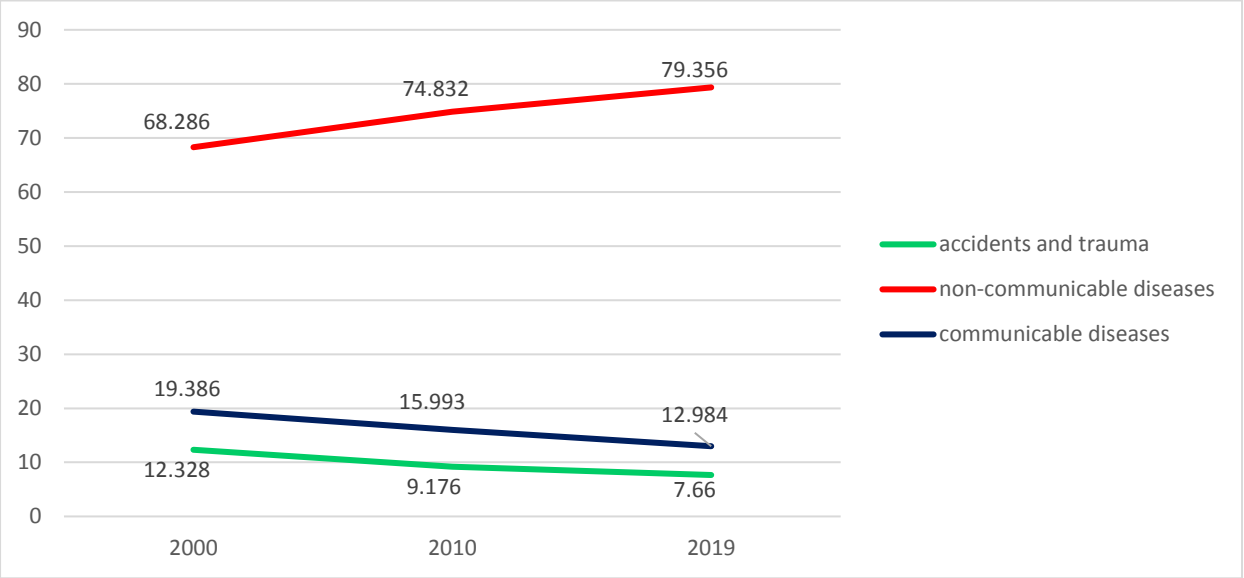
Table 12: Medical death causes in Algeria 2015-2016

Disease Group	Cases							
	2005	%	2013	%	2015	%	2016	%
infectious diseases	1161	2.9	1772	2.8	2458	2.9	2560	3.1
conditions of the perinatal period	7135	17.7	9700	15.4	10474	12.4	9536	11.5
Abnormal Ex Symptoms and Findings	11294	28.1	12167	19.3	19279	22.7	18996	22.9
tumours.	2612	6.5	6147	9.7	9560	11.3	9845	11.9
diseases of blood-forming organs	310	0.8	790	1.3	923	1.1	901	1.1
endocrine diseases	2035	5.1	3312	5.2	4022	4.7	3496	4.2
nervous system diseases	411	1	909	1.4	1563	1.8	1600	1.9
diseases of the circulatory system	7330	18.2	13621	21.6	17812	21	17836	21.5
Respiratory system diseases	2091	5.2	3957	6.3	5037	5.9	4931	6
digestive system diseases	1098	2.7	2049	3.2	2697	3.2	2759	3.3
Diseases of the genitourinary system	843	2.1	1759	2.8	2360	2.8	2310	2.8
Birth defects and chromo	1402	3.5	2729	4.3	3148	3.7	3210	3.9
Injuries and external causes	2231	5.5	3963	6.3	4987	5.8	4369	5.2

Source: INSP, 2015-2016 medical death causes Algeria

Proportion of deaths by category

Figure 29: deaths proportion from the total deaths by causes 2000-2019



World bank, world prospects, Algeria 2019

The evolution of death causes from 2005 to 2016 shows a variety of impact as some of them increased and other decreased, the three high death causes were firstly, death by abnormal symptoms signs, clinical and laboratory findings with a rate of 28% that decreased to 19.3% in 2013 then increases again to 22.9% in 2016, secondly, heart diseases as the proportion has jumped from 18% in 2005 to 21.6% in 2013 than lately stayed sort of stagnant until 2016, although the rates at this stage are still higher than the previous one due mainly to a rise in hypertension risk factors, the ageing of the Algerian population and increasing rates of obesity and diabetes, the next ranking death causes are the conditions of the perinatal period with a considerably high rate of 17.7% in 2005 it gradually declined to 11.5% ten years later indicating the progression in the country's health system but still indicating a high risk in perinatal mortality because of the less than 2 years birth interval, preterm delivery, anaemia, congenital anomaly,

previous history of early neonatal death and low birth weight. tumours and respiratory diseases curves have shown an important increase due to the expansion in the older age segment which in turn piled up the incident cases concerning the respiratory diseases, it is attributed to air pollution in general due to urbanization and industrialization, besides the high rate of smoking, as for the infectious diseases the rate has slightly risen in ten years with 0.2% to 3.1%, The persistence of contagious diseases to this day is associated to the movement and overcrowding in cities with poor sanitation, and high pollution.

The third stage in Algeria started around 2000 until today, as we observe from the provided data a double burden of disease, emergence of non-communicable diseases while infectious diseases still exist, we're seeing the emergence of numerous chronic diseases and multiple causes leading to death or lowering the life quality, the figure shows how the accidents and trauma line, with the communicable diseases, declined from 2000 to 2019, however, the non-communicable diseases line increases starting from 68% in 2000 to 79% of the deaths in 2019, on the other hand, they represent the majority of deaths in the whole period.

Accidents and trauma

with the evolution and urbanization rate reaches 73.7% in the year 2020 some death causes are taking places because of this development, we note the following most important death causes among the accidents and trauma category:

Tobacco: as the main problem causing respiratory complications, and lung cancer, also affects the body's functioning leading to other types of cancer, or even death at a younger age, it also can be the origin of multiple heart complications and other chronic diseases, the WHO classified it as the number

one leading risk to NCD's in the world among the four ranking reasons, the remaining three are, unhealthy diet, physical inactivity, and alcoholism, in Algeria the 2003 stepwise survey

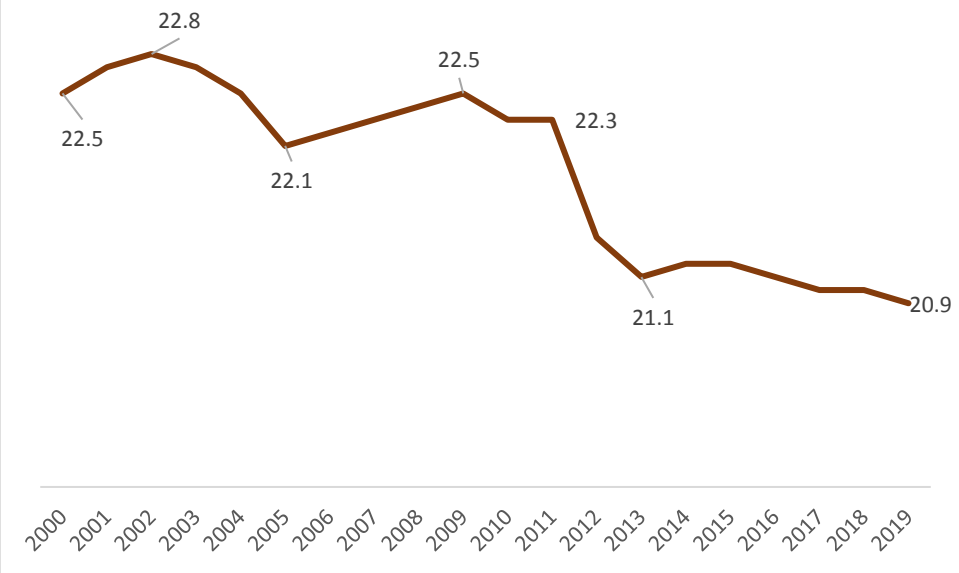
showed that the prevalence of smoked tobacco consumption is 15.1%. this is significantly higher among people aged under 45 with proportions of (25-34 years 15.5%, 35-44 years 13.9% and 55-64 years 11.9%). Males smoked more than females (38.1% vs 0.5%), the most recent statistics state that it causes 15,000 premature deaths each year in Algeria, on average 40 deaths per day, (Fortaki & Brahamia, 2019) the prevalence rate is 16.2% of the consumption of smoking tobacco in Algeria among the population aged from 18-74 years of which 32.2% are men and 0.4% are women 86.4% of the sample are daily smokers (addicted) and 8.9% are non-smoking tobacco users (MSPRH, 2017) in 2018 the smoking rate reached 18.8% (Worldbank, 2022)

suicide is one of the social phenomena more linked to mortal behaviour, mental illness, traumatic stress, substance use and impulsivity, loss or fear of loss, hopelessness, and chronic pain and illness, noting that the country has emerged from a traumatic period due to terrorism the suicide death rate in 2000 was 4.5 per 100,000 inhabitants, this rate didn't much reduce as the stress and pressure going up but it decreased a bit reaching 2.5 in 2019, in 2017, 3,1% of the surveyed subjects declared they had thought about ending their lives during the last 12 months preceding the survey, and 0.8% said they had already tried so, (MSPRH, 2017) indicating that the mental health and social preoccupations and lack of void are in progress as well as development, due to the emergence of technological advancements in communication tools, raising awareness beside filling a social void via expanding the communication zones to globalization through social media, however, the current social and urbanization lifestyle consequences has some new causes

that might contribute in the suicidal attempt as the psychiatric disorders Social isolation, orphanage, separation, divorce, widowhood or important financial factors, Unemployment and the existence of Severe negative life events so basically and mostly social disorganization, lack of integration and solidarity (Durkheim, 2005)

traffic accidents: The rate of traffic accidents is an indicator of progress for countries because it is linked to the improvement of roads and the people's awareness to comply with the traffic law. For Algeria, despite the high rate of urbanization and the population number, which increases in overcrowding and congestion of roads as well as cities, the indicator of traffic deaths has decreased since 2000, according to the World Bank, this rate reached 22.5 per 100,000 death and peaked in 2002 at a rate of 22.8, then gradually decreased to reach 20.9 in 2019.

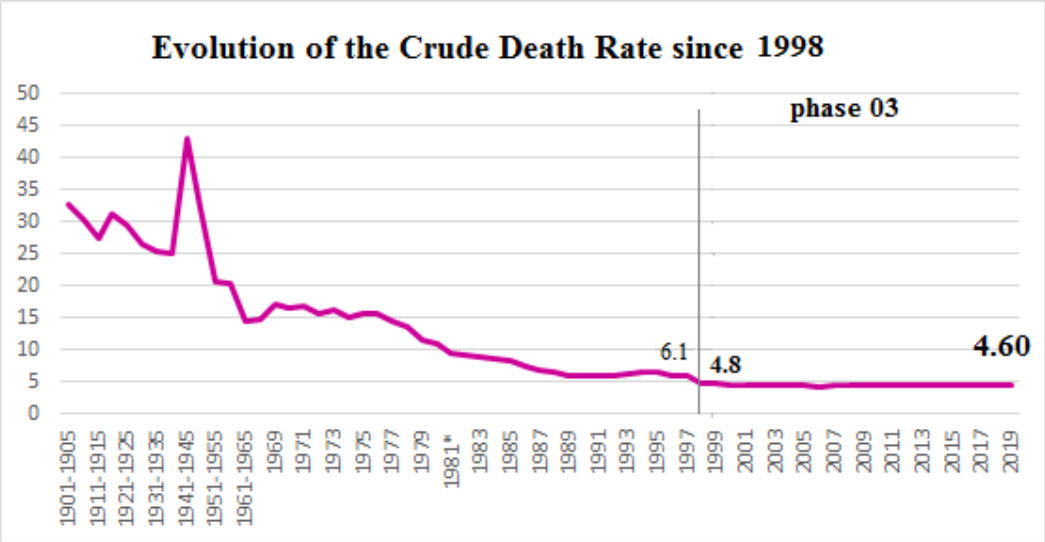
Figure 30: traffic accidents death rate Algeria 2000-2019



(WorldBank, 2019)

Crude death rate evolution (third stage):

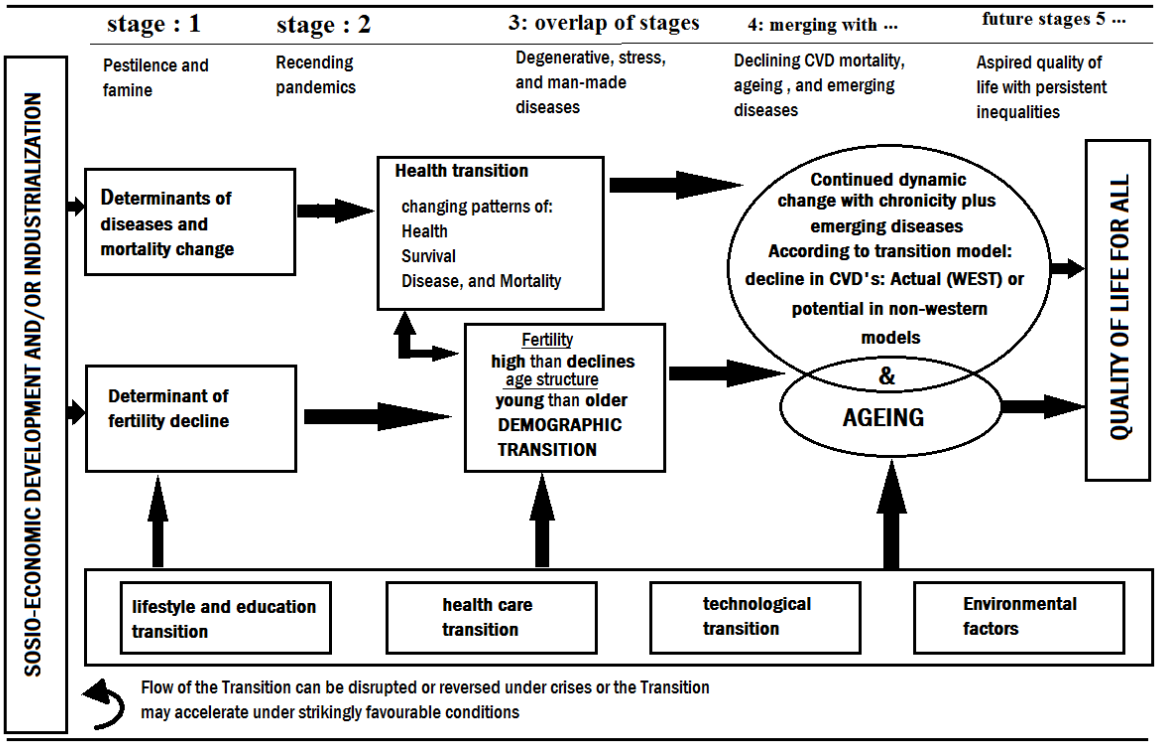
Figure 31: Crude death rate since 1998



This stage is somehow linked to the second stage in some similarities, as we see the death rate decrease and life expectancy increases, Algerians have more access to medical technology and food so some of the diseases that used to ravage the population are no longer a threat, but the concern could be the urbanization, and people living closer to each other, infectious diseases do not have much impact as degenerative diseases but the main characteristics that mark this stage are the high life expectancy 77 years old and the low Crude death rate which is 4.6 ‰, thanks to developing technology and medicine, however at that extra age more than 70% of people carry cancer, heart diseases and diabetes, these man-made problems caused by diet and sedentariness, became the aim to improve the well-being, it opens new access to a next phase, aiming to control and be able to live with these diseases and to survive even longer without suffering or undergoing an inability in terms of health, as the higher income countries went through four stages in the mid-20th century till now it is considered as a future perspective that raises the challenge that Algeria must accomplish and at the same time

concentrate on the prevention against these diseases which requires lifestyle changes to reach a higher level of development in the health sector.

Figure 32: The epidemiological transition theory



(OMRAN, 1998)

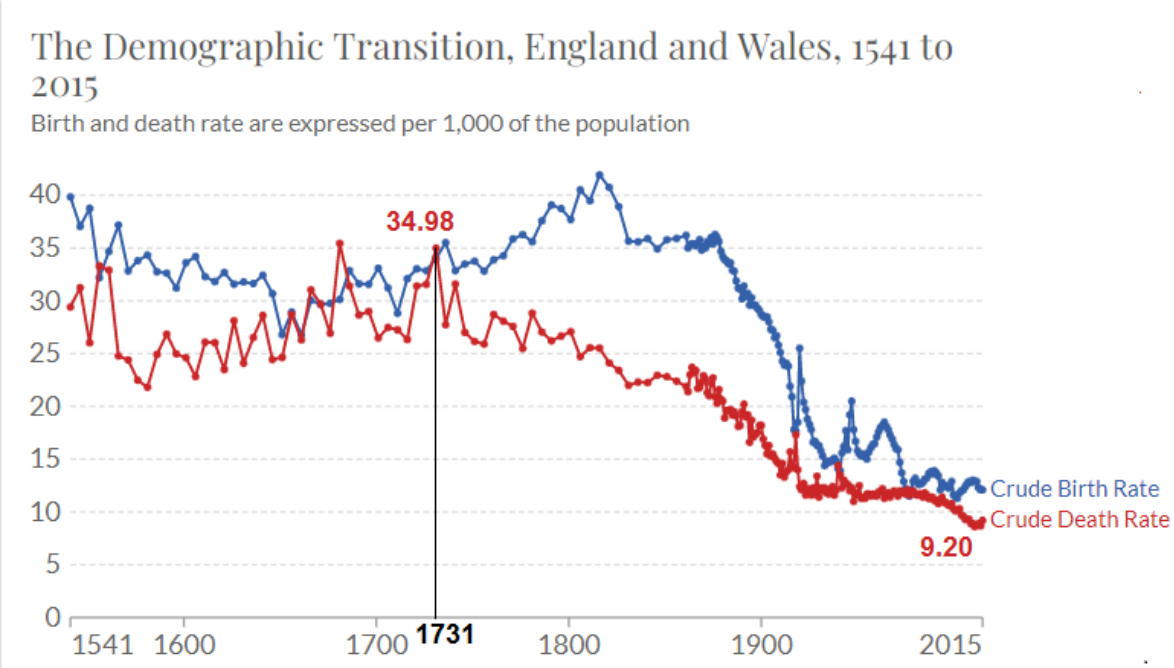
Fourth stage: The association between the epidemiological transition and the demographic transition helps to resort to it in chronology and duration of each stage, and comparing to how long it took the high-income countries which preceded Algeria in both transitions, it is possible to use this as a reference that enables us to predict the probability of how the next stage would be and when especially since they are at the end of the fourth stage and some of them are in the fifth. When Omran set his original theory, he talked about three stages of the epidemiological transformation, but in his last update in 1998 He added the appearance of a fourth stage, as time extended in addition to some changes that have taken place in public health and population structure, and the possibility of a fifth stage, he explained their characteristics. and how ageing and fertility are

related not just as consequences but also factors in restructuring populations, refining progress, including determining the lifestyle and controlling the behaviour of individuals and society at all levels and especially in terms of nutrition, activity, economy etc.

Every period that took a place before the second phase is considered as a first stage no matter how long it took because the change starts to happen, based on the downward slope of the crude death rate curve, for example in the united kingdom it took 284 years since the second phase especially that the mortality before has witnessed a massive variation between the high and low precisely in infant and child mortality this was interpreted by Wrigley and Schofield when they initially described the recovery of life expectancy in the eighteenth century as marking simply a return to earlier conditions, rather than marking the onset of an epidemiological transition, the first observation included in phase one started from the mid-sixteenth century than the amplitude of the mortality crises diminished according to the historical demographer Edward Anthony Wrigley and the Cambridge history group starting by plague disappearance after the 1660s, adult mortality has improved however child mortality kept worsening till the end of the eighteenth century. (Davenport, 2014) (Wrigley & Schofield , 1981)

This explains the phases measurements based on the medical improvements against epidemics and how it changed the crude death rate from the 1730s without switching back to the rate it reached before once it started to decline.

Figure 33: The demographic transition England, 1541-2015



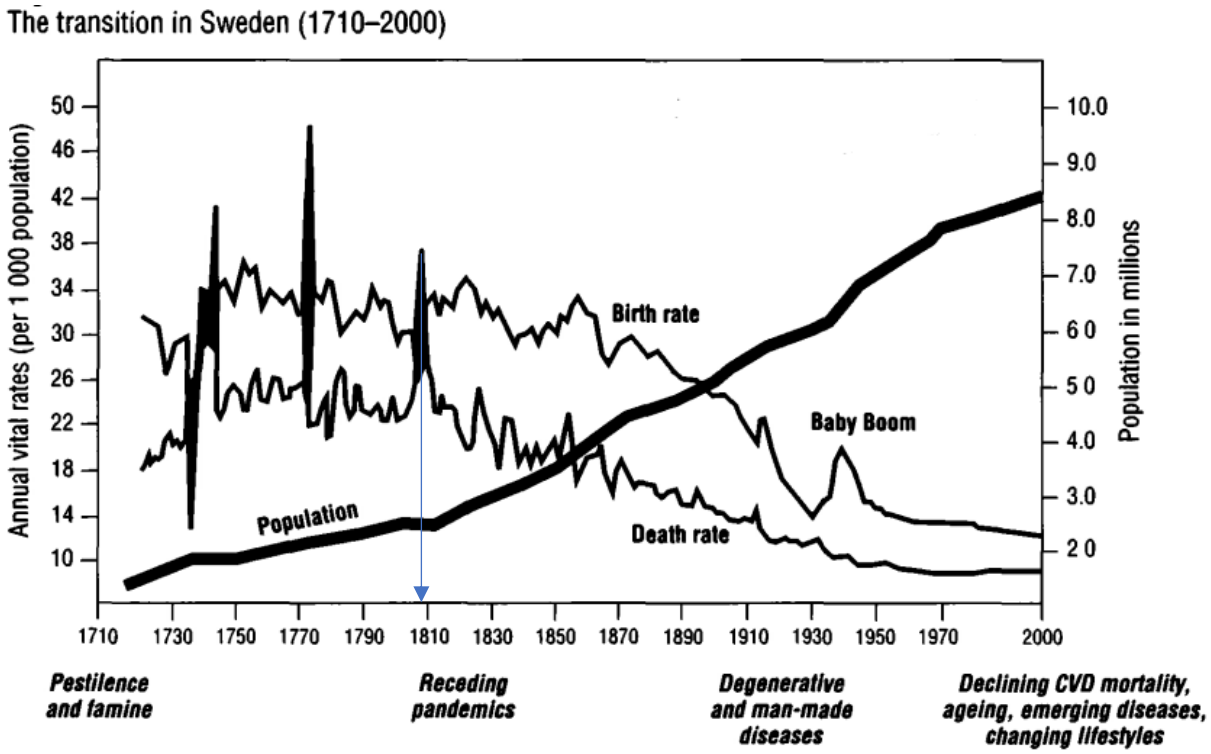
Source *: Our World In Data based on Wrigley and Schofield (1981), Mtchell (2010), and UK ONS (2016)*

Note: Death Rate excludes military lossed in 1915-1919; 1939-1946. OurWorldInData.org/world-populationgrowth/

The same case for the second example taken by Abdel Omran Considering the curve diminution, the second phase in Sweden started in the early 19th century and it took since then approximately 200 years, the pre-transition phase was characterized by a fluctuation up and down in the CDR until it settled in descending continuously after the 18th century and as he put, based on the Swedish data, that are generally acknowledged as reliable, the demographic trends in Sweden over the last three centuries demonstrate that the rise of the population of western societies in the 18th or 19th century was associated with mortality decline and this in turn, was determined more socially than medically, (OMRAN, 1998) health care developments were too limited to have a significant impact at that time. Few decisive therapies existed and the surgery practised by

barbers at that time, was not an accepted medical profession, much more influential were some personal, lifestyle, social, and environmental factors which alone, or in combination with marginal health care practices, made the change possible. Included were: Improvements in nutrition, which not only reduced the undernutrition factor in mortality but also contributed to the decline in infectious diseases.

Figure 34: demographic transition Sweden



Data from 1710–1960 from: Velorse, E. *Elements of natural movement of populations*, Oxford, Pergamon Press, 1965
Data from 1960–2000 from: *World population prospects, 1996 Edition*, New York, United Nations, 1998

(OMRAN, 1998)

So basically the epidemiological transition as the demographic transition took over two centuries in western societies, but it took less than a century in developing countries. 70 years For Algeria since the start of the second phase and for some other countries took less or more, it mostly depends on how much can a country afford to take actions in lowering the death rate, and the reason for the difference between the two types is that the first undergone all the steps of

discovering the diseases doing the research with the emergence of the industrial revolution and medical improvements however the second category just had to identify the disease and be able to improve its health system and import the vaccine and medical measures.

The reason for resorting to the western models is that they preceded in the stages and them being ahead enables us to predict our upcoming stages by taking into account the present context, some of them developed a new concept in ageing called the healthy life expectancy determined by physical activity, life satisfaction and financial status, health status, stress, and cognitive function, such as Japan and Canada with a 74.8 and 73.2 years old while the regular one reached 84.4 and 80.6 years old. (Fleury-Payeur & Azeredo, 2021) (Juneau, 2021)

To simplify the fourth stage of the epidemiological transition it is the process to reach 80 years old life expectancy, the delay of chronic diseases, and re-emergence of communicable diseases and Algeria so far is in the third stage as the death causes shifted from natural diseases and epidemics to man-made and degenerative diseases at a later age meaning our next stage is maintaining and controlling those diseases so the population would be able to live longer with the disease without being bothered, raise the life quality and medical improvement in parallel by prevention opting for a healthier lifestyle, and delaying degenerative disease, these characteristics push life expectancy length forward above 80 leading to an old population structure The national statistical office projected life expectancy at birth for the year 2040 at 82 years for men and 83 years for women, estimated that Algeria will have a population of 57,625,000, meaning it will probably be already at the fourth stage by then. And it might take a short amount of time to get there and a shorter time to remain before skipping to the fifth stage.

Stage five:

When we talk about the fifth stage according to chronological order, we begin with the hypothesis of Omran in 1998 about its characteristics, as he indicated that the traditional method of measuring the health level concerning morbidity and mortality and the progression process in the field leads to a fifth stage in the areas of the mid-twentieth century in a stable manner that can be considered an extension of the fourth stage. It may be one of the greatest achievements of mankind in controlling diseases with medical development in reaching a higher average life expectancy of up to 90 years, but the stage will be characterized by an inevitable contradiction in the rise in age.

Chronic disease and psychological deterioration, not to mention isolation. Separation, depression. The deterioration of the social situation, and in the same regard, the escalation of health care and nursing costs, which in this way exceed how much the retirees can afford. Ageing may lead to increases in social, economic, health, rehabilitation, psychological and emotional needs. The second hypothesis indicates that this stage is mainly characterized by the re-emergence of infectious and parasitic diseases because of the increase in antimicrobial resistance to antibiotics, and novel zoonotic infections. (Olshansky, Carnes, Rogers, & Smith, 1998)

Unfortunately, humans are inevitably facing both consequences and yet globally still haven't got to the fifth stage, the addition of some population structural unexpected consequences have taken place such as fertility-related changes which already resulted from industrialization and globalization, the elderly started to live the ageism phenomenon as they become inactive as we explained in the demographic transition chapter. The challenge against difficult infectious diseases remaining a public health issue, since the start of the 21st century the world has seen multidrug-resistant tuberculosis, HIV and malaria treatment

resistance, Ebola and more infectious organisms, Algeria while still in the third stage facing both types of diseases witnessed more than 300 cases of cholera and 2 death in august 2018. (PasteurInstitut, 2018)

WHO definition of antimicrobials and zoonosis: Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death.

As a result of drug resistance, antibiotics and other antimicrobial medicines become ineffective and infections become increasingly difficult or impossible to treat. AMR occurs naturally over time, usually through genetic changes. Antimicrobial-resistant organisms are found in people, animals, food, plants and the environment (in water, soil and air). They can spread from person to person or between people and animals, including from food of animal origin. (WHO, 2021)

Zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans and there are 200 known types of them. (WHO, 2020)

In 2018, the National Institute of Public Health recorded 23,078 tuberculosis cases divided into 7,053 cases of Pulmonary Tuberculosis and 16,025 cases of Extra-Pulmonary Tuberculosis and 900 cases of rabies in 2019, including 15 deaths, in addition to 2,726 cases of malaria including 3 deaths in 2020. (INSP, 2019) (WHO, 2021)

Algeria skipped some of the worldwide epidemics since the beginning of the 21st century but some others threatened public health as the WHO reported less than a hundred confirmed cases of swine flu in Algeria from august to December 2009. (WHO, 2009-2010)

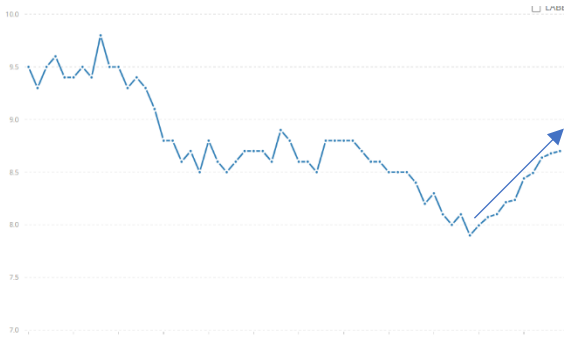
While the world was suffering from the emergence of several epidemics, the country has overcome because migration to the countries bearing them was not frequent as it has been recently, and we avoided some of them thanks to early precautions as soon as they appeared like SARS first identified in China 2003, MERS COV 2012 in the middle east, Ebola haemorrhagic fever in central Africa 2013, ZIKA fever in south America 2015-2016.

Unfortunately, by the end of 2019, the world has witnessed a major re-emergence of respiratory communicable disease identified as coronavirus disease (SARS COV 2) threatening and killing a specific category of the population, Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer. It first appeared in China and then spread, the source of its transmission to humans still lying under hypothesis, whether it became pathogenic before or after the spillover event, because many of the early infected were workers at the Wuhan Seafood Market, it has been suggested that the virus might have originated from the market, however, other research indicates that visitors may have introduced the virus to the market, which then facilitated the rapid expansion of the infections. (WHO, 2022)

While it still hasn't been cured yet or identified majorly, it’s still threatening to claim victims so far, the problem is that it represents what we previously mentioned about the resistance to antibiotics so the experiments in its treatment are still subject to intensive study. The virus develops a resistance to human immunity, and mutates, claiming an important number of people in waves that worsen one stage after another, it has accumulated in two years till January 2022 over 329 million cases around the world and almost 6 million deaths, the Algerians statistics recorded over 226000 cases of which 6412 died and still counting.

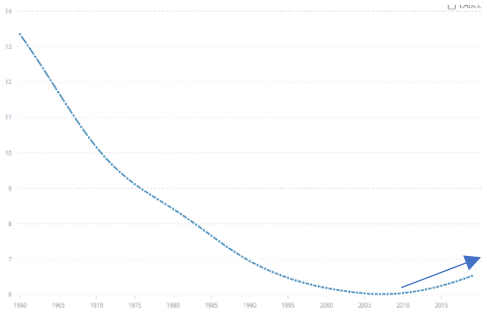
Considering the Previous events, we may say that the actual stage is the anticipated fifth one but it was full of events so some countries have not yet reached the fourth stage, they have been affected by the stage of the twenty-first century, and for this reason, where people are still struggling to survive, the expansion of rapid change in public health has not yet united, and no scientist asserted that it is a stage yet because of the speed of The sequence of events and the non-ending of the last global epidemic.

It must be taken into account that the epidemic did not affect the health process in terms of quality so that it targets only a specific group, which is the category of sick or poor-healthy elderly and the chronically ill, and avoids children and young people in early ages, and we base this on the recorded statistics as the Crude Death Rate in 2020 is 4.7‰ since 2014 even in the previous census it was 4.6‰, infant mortality continued to decrease to 20 in 2019. Back to Omran's hypothesis, it's more likely to relate the fifth stage to ageing as the epidemiological transition is defined by mortality rate and its changes, we take the example of the USA as it ranked first place in the most affected countries by COVID 19 with a total of almost 67 million cases and over 873 thousand deaths its crude death rate started to increase since 2009 from 7.9‰ to 8.7‰ in 2019.



USA CDR

Brazil ranked second with deaths over 621 thousand it went from a CDR of 6.04‰ 2009 to 6.5‰ 2019. We can say that the USA, Brazil, Italy, Japan and countries with an old structure model had already a rising CDR since 2009 and before because the proportion of elderly or people at a high risk of facing death So with or without this latest pandemic, the increase in the curve was already predetermined it only got anticipated. Precisely the Damage affects life expectancy and might prevent it from escalating for a while and not death rate process, it can't be considered as the next stage yet, for developing nor developed countries, because its characteristics are summed up in high life expectancy followed by relatively high crude death rate and old structure model, unless we take in account the slight reorientation of the CDR curve it could be the start of it not to mention the social implications specifically for this segment that may be socially isolated, living alone, undergoing family violence, loss of a spouse, ageing-related cognitive impairments and disabilities, particularly for the population predisposed to health problems.



Brazil CDR

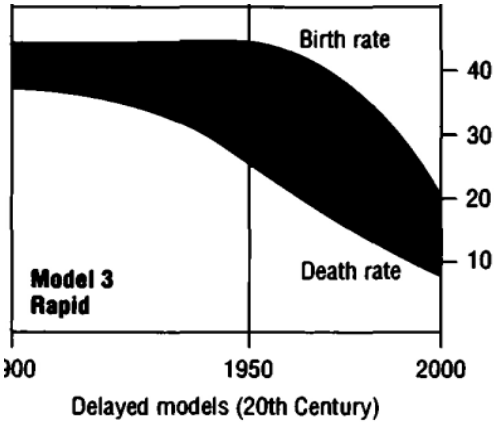
Conclusion

The epidemiologic transition is basically the shift in the death causes from communicable to degenerative diseases, the principal determinant is the death rate, and its movement process goes through a variety of secondary determinants and factors or health indicators such as life expectancy, infant mortality and the percentage of population aged 65 and over . In Algeria this transition started because of the main reason of diseases transmission which is migration, the first phase began since the French colonization as it caused population starvation, poverty and resources deficiency in addition to death by direct forces attacks, not to mention the transmission of the global epidemics undergone that time in Europe, the phase continued even after the beginning of the 20th century, death rate was and remained around 30‰ until the independence although the peak of the death rate was in 1945 when it reached 43‰, the second phase started by then, infant mortality was very high because of the vulnerable immune system and intensive communicable diseases impact reaching over 14.3‰ deaths among new-borns between 1960-62, but general mortality started to decline and as soon as infant mortality followed, after the improvements in health system and vaccines, it reached by the end of this second stage in 1998 3.4‰ and general mortality rate was 6‰, life expectancy started to increase as death rates has declined reaching almost 70 years old and still continue to increase, the third stage is characterized by the stagnation of the crude death rate as it reached 4.7 and slightly stayed at that rate until today, the mortality at this stage concerns the elderly segment as they reached 77 years old, they're witnessing an emergence of degenerative diseases over 50, which are mainly caused by humans, due to the lifestyle and nutrition.

The fourth stage is not yet applied on the Algerian model since the death rate hasn't started to increase again due to the increase in the old population segment

and their high rate of death which associate this transition and stage specifically to the fifth stage of the demographic transition.

In the updated Epidemiologic transition models by Omran, the rapid transition model represents the Algerian experience as it started to happen after 1900 describes the experience of rapidly industrializing or socially developing countries and territories, countries began to decline to moderate levels one or more decades before mid-century. He suggested that in the fifth stage of the model humans might still run a risk of facing other unpredictable pandemics due to population density, migration, high animal origin food diet , affordable technology enhancing the biological unexpected outbreaks all these and other transmission factors making humans an easy target, and based on his expectations, there will be other unknown forms of viruses or bacterial cause the re-emergence of new types of communicable diseases and controlling them while urbanization rate is high going to be difficult, whether its new or transformed , zoonotic, climate change, water or laboratory, it's expansion dynamics, Age does not necessarily lead to poor health, but several health problems inevitably manifest themselves humans age, hearing loss, cataracts, hypertension, osteoarthritis, diabetes, certain cancers, cardiovascular disorders, metabolic syndrome, all these health problems can affect the quality of life, health also concerned mental wellbeing and the elderly segment would face a social abundance that can cause mental, psychological disorders in the fifth stage.



Chapter Three

The Nutrition Transition

Chapter Three

Nutrition transition in Algeria

The Algerian ancient nutritional profile

The Algerian nutrition diet is characterized by a mixture of modern and traditional, and this is what we can see through observation, but its geographical nature dictates the nature of the diversity of the diet according to the climate. Geographical conditions and characteristics of the different regions in them, but the most important element by which we can measure the type of diet is the share of expenditures allocated to each food type, with reference overtime to review the consumption pattern during periods simultaneous with the demographic and epidemiological transition stages to be able to measure the changes and the extent of their interrelationship with causes, motives and factors It is known worldwide and is influenced by it, Also, how did the food pattern change to what it is, and how was the nature of the coastal strip and the hill and the consumption of the desert region, and how it has now become with the concentration of most of the population in the north. The relationship between food and health is the strongest influence relationship that we can base on mapping priorities in terms of consumption It is included in the lifestyle, and rather it is the most important element in addition to the fact that most of the diseases that the population suffers from at this time, and specifically the cause of death, are influenced by the lifestyle, especially food. Therefore, through the research, we want to determine the points of interconnection between the two transitions and how the same factors led to the changes on three levels. Urbanization and rural migration remain important factors because of insecurity in the rural sector, land tenure problems and unemployment. as for the rest of the country, comprising 90% of the land

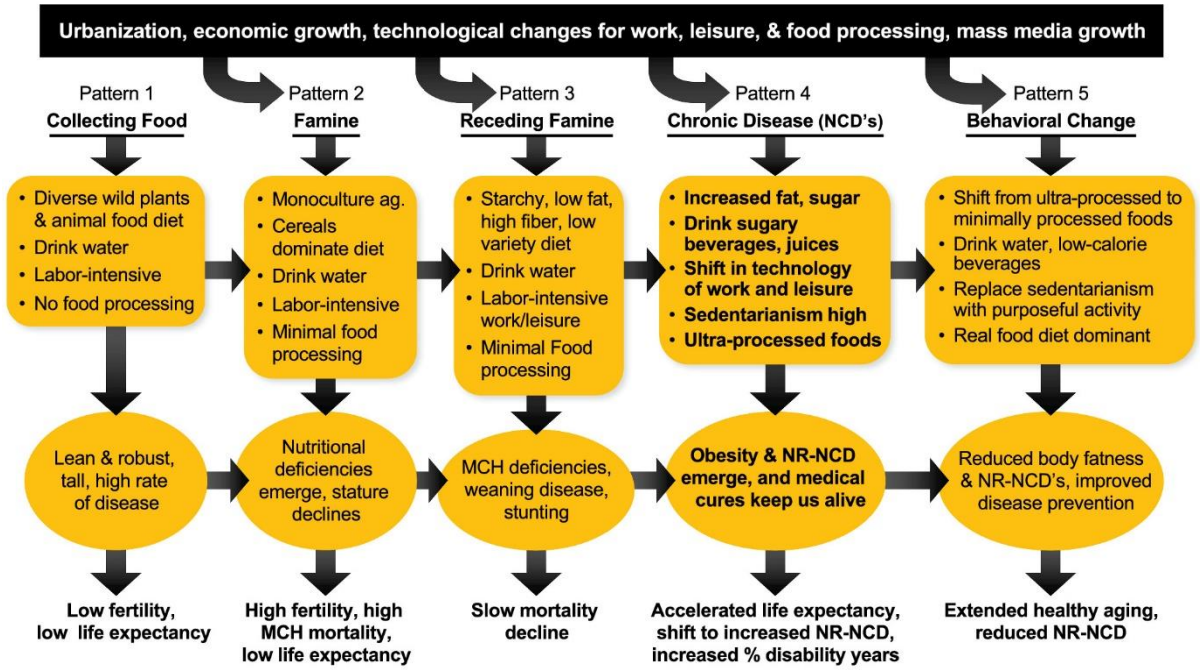
surface, is arid and its population is scattered, rural and poor, diverse nutrition problems affect this population but undernutrition is predominant. (FAO, 2010)

This is based on the concept set by Barry Popkin in 1993, where he developed a scheme that includes the change in the pattern of nutrition and its characteristics from the era of famine and hunting until today.

The nutrition transition theory retains the radical changes in patterns of the human diet that had accumulated through time and space, the idea was originated by Dr BARRY Popkin and sparked by the theory of the demographic transition, which describes the change from the pattern of high to low fertility and mortality which is typical of the modern industrialized phase, as well as epidemiological theories in which the population moves from one pattern to another. While epidemiologic transition focuses on complex changes in health patterns and the interplay between them and their demographic, economic and sociological determinants and consequences. this transition is linked to the improvement and progress of nutritional hygiene, sanitation, medical knowledge and technologies, the epidemiologic transition is linked to the demographic transition as well as to the nutritional transition.

The figure summarizes the nutrition transition model and how it relates to the epidemiological and demographic transitions according to Popkin.

Figure 35: The nutrition transition theory



Barry M POPKIN Obesity Reviews, Volume: 23, Issue: 1, First published: 10 October 2021, DOI: (10.1111/obr.13366)

As a change in food consumption and energy expenditure that coincides with economic, demographic and epidemiological changes, the passage from a traditional consumption of cereals and fibres precisely to a Western diet rich in sugars, fats and foods of animal origin according to this model table.

DEFINITION and overview on the concept

The nutrition transition is the shift in dietary consumption and energy expenditure that coincides with economic, demographic, and epidemiological changes. Specifically, the term is used for the transition of developing countries from traditional diets high in cereal and unrefined crops and low in animal products to more Western-pattern diets high in sugars, fat, and animal-source food, and low

in fruits and vegetables, These changes are linked to the rise in diet-related diseases associated with overconsumption And undernutrition. (UN, 2022)

Barry Popkin 2008 pacific health summit – the nutrition transition

The nutrition transition model was first proposed in 1993 by Barry Popkin, and is the most cited framework in the literature regarding the nutrition transition, although it has been subject to some criticism for being overly simplified. Popkin posits that two other historic transitions affect and are affected by the nutritional transition. The first is the demographic transition, whereby a pattern of high fertility and high mortality transforms to one of low fertility and low mortality. Secondly, an epidemiological transition occurs, wherein a shift from a pattern of the high prevalence of infectious diseases associated with malnutrition, and with periodic famine and poor environmental sanitation, to a pattern of the high prevalence of chronic and degenerative diseases associated with urban-industrial lifestyles. These concurrent and dynamically influenced transitions share an emphasis on the ways in which populations move from one pattern to the next. Popkin used five broad patterns to help summarize the nutrition transition model. While these patterns largely appear chronological, it is important to note that they are not restricted to certain periods of human history and still characterize certain geographic and socioeconomic subpopulations. (wikipedia, 2022)

The patterns of nutrition transition

- The first pattern is the stage of Palaeolithic man/ hunter-gathers when human main consumption was the wild plants, animals and water, the labour was intensive as everything has to be done by human himself starting from transportation, to hunting and escaping danger, setting the fire, protecting and providing security and food, resulting to lean and

robust human beings but threatened by a high natural disease rate. and demographically low fertility and life expectancy.

- The second pattern is the beginning of settlements and the monoculture emergence period, also famine emergence with the discovery of agriculture, the man began to depend for his food relatively on the process of nature and developed some ways to provide food dominantly cereals, but high fertility and natural changes resulted in a fatal famine, and nutritional deficiencies, emergence and decline stature meaning high fertility due to stability but also high mortality especially mother and child and low life expectancy.
- The third model of industrialization and the decline of famine, where man developed the field of agriculture, industry and the age of the machine, and the man began to eat seasonal foods characterized by carbohydrates in general, rich in fibre and low in fat, in addition to his physical activity, whether in the field of agriculture or industry which led to a shortage in maternal and child health due to the high rate of fertility and weaning due to dwarfism diseases, but as a positive result of industrialization, the development in the medical field reduced the mortality rate to a large extent, and raised the challenge to direct the focus on maternal and child health.
- The fourth pattern: The period of non-communicable diseases which was characterized by a nutrition diet high in sugar, fat, processed food and caloric beverages, in addition to, a lack of physical activity due to the shift in work, leisure and technology which led to the obesity prevalence and new range of on-communicable diseases, that are nutrition-related, demographically a high life expectancy with a shift in morbidity from communicable to degenerative disease overall physical laziness and disability period.

- The fifth pattern revolves around the desired social and behavioural change towards nutrition, aspires to reduce fat, sugar and caloric beverages intakes, increase fruit, vegetables, fibres and water, replace sedentariness with purposeful activity, aiming to reduce body fatness and nutrition-related NCD's, in the purpose of extending healthy ageing, disease-free.

Nutrition definition

- Nutrition is the biochemical and physiological process by which an organism uses food to support its life. It includes ingestion, absorption, assimilation, biosynthesis, catabolism and excretion. Human nutrition deals with the provision of essential nutrients from food that are necessary to support human life and good health. In humans, poor nutrition can cause deficiency-related diseases such as blindness, anaemia, scurvy, preterm birth, stillbirth and cretinism, or nutrient excess health-threatening conditions such as obesity and metabolic syndrome; and such common chronic systemic diseases as cardiovascular disease, diabetes, and osteoporosis. Undernutrition can lead to wasting in acute cases, and stunting of marasmus in chronic cases of malnutrition. (Wikipedia, 2022)
- the substances that you take into your body as food and the way that they influence your health (Cambridge dictionary, 2022)

Algerian nutritional historical framework

With the beginning of the middle of the twentieth century, in particular, the beginning of the third stage of the epidemiological transition, with the extension in the life expectancy, diseases related to the life span of body and organs functioning properly, and researchers and medical scientists began to search for the causes of these diseases related to age, which with time caused death and since

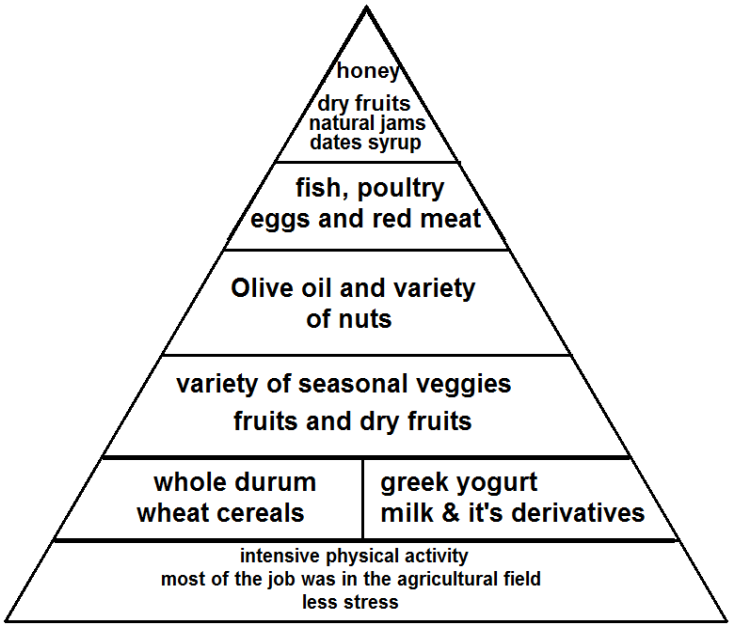
most of the changes in Algeria followed one after the other after independence, the third phase of the epidemiological transition coincided with the end of the twentieth century.

Scientists found a close relationship between non-communicable diseases and food, as the elderly survivors of infectious diseases did not suffer from symptoms of late age diseases, but rather these diseases were limited to the period after the era of industrialization and urbanization through this section, we will define and list the stages of the food transition and make a note about the nutritional transition in Algeria, while addressing the two demographic and epidemiological transitions and when they are linked in their chronology.

We will begin to analyse since the third stage because the primitive inhabitants of the world shared the same characteristics, related to the first stage and age of famine in the second stage, in addition to the lack of statistic data, besides the weak reliability and inaccuracy although the country was in the past within the Numidian kingdom and some of the characteristics about the type of food consumed by this population got the acknowledgement of the world's reliable organizations which enables us to have an overview on the lifestyle and food in that era.

The Numidian dietary pattern depended on the climate specific to the region of Algeria and what the country's agriculture produced, and since the Algerian topography differs and the Numidian country, which included Tunisia and Morocco back then, the diet differed from the secondary aspect, such as sources of protein, vegetables and fruits, but the basis of the diet was hard wheat by which bread or couscous cereals was made, which in turn was the most consumed and comprehensive dish as it varies based on the grains size and it can be eaten on its own, flavoured or plain, hot or cold, as a dessert with sugar or honey and dry fruit or as a side dish. But mostly accompanied various vegetables, chickpeas or other

beans and meat, poultry or fish depending on the territory in addition to the agricultural production of olive trees, they excelled in the manufacture of olive oil, which was the main source of fat besides the nuts. The Numidian diet was distinguished by dishes that included seasonal vegetables. As for the fruits, they were consumed fresh, their only storage method for food was through fermentation and drying. Numidians used sheep and goat milk for cooking, and they left the cows for ploughing, and it was only eaten on religious occasions. The most common meat they relied on was the meat of sheep, birds, rabbits and fish, especially chicken, geese, pigeons, tuna and sardines. Food was served and eaten in dishes and they had 3 meals per day, the diet was classified as a Mediterranean diet and qualified as balanced, healthy and integrated although it differs from the Greek and Italian traditionally recognized diet.



From the end of the 16th century to the beginning of the 19th century, the food pattern remained as it is, due to its dependence on local agriculture and topography, and even after the French colonial occupation, in 1830 the country went through a phase of famine, poverty, diseases and a high death rate, but the traditional food entered the documentation stage and Inheritance from one generation to another, and according to historians, the food pattern was affected by the conditions of the occupation and the weakness of the economy, which was affected by various factors such as land burning or seizing, the lack of workforce,

and agricultural, grazing activities, it was affected by the share of daily meals and lack of consumption.

This whole phase was the third stage of nutrition transition based on Barry's concept.

The Fourth stage

By the independence of the country in 1962, there was a huge change in the population demographic structure and health infrastructure, Algeria has embarked on industrialization which contributed to raisin health and economic levels and marked a complete twist on the population's lifestyle, behaviour, activity and housing sector and above all way of thinking and has created an influx of implications that links the nutrition transition to the demographic and epidemiological transitions; we will try to analyse and determine the mutual overlap in causation between the transitions.

Nutritional transition definition

It is the evolution of food consumption and energy expenditure that coincides with economic, demographic and epidemiological changes. Specifically, the term is used for the transition of developing countries from traditional diets high in grains and fibres to more Western diets high in sugars, fats and animal foods, (wikipedia, 2022) but the transitions from a situation marked by high mortality and a high birth rate to a situation of low mortality and the low birth rate did not take place at the same time or with the same intensity depending on whether the subject is in a rich country, intermediate or poor. The epidemiological transition that follows the demographic transition is in fact multifactorial: certainly health, but also economic, social and cultural.

Relation to economic development

The roots of the nutritional transformation are mainly due to economic factors, without ignoring the social and cultural factors that resulted in.

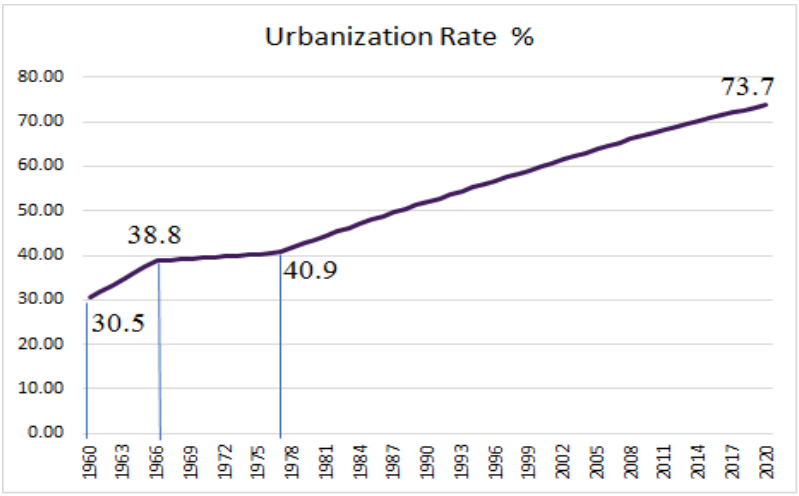
Since the demographic and epidemiological change began in the industrialized and developed countries, the nutritional transition monopolized these areas for a significant period, but since the pace of the stages related to the two transitions was much faster in developing countries than in other countries, the nutritional transition followed the same speed related to each country, but rather being low and middle-income, pressures have negatively affected the poorest populations in these countries.

Globalization has played the most important role in changing the way food is accessed and available in countries, and demographic shifts from rural to urban areas are pivotal to achieving this as well as the global marketing of food and the change of activity from agricultural to industrial and administrative this leads to changes in lifestyle, which in turn contribute to the nutritional transition. Technological developments have led to facilitating hard work and changing daily tasks, in which a muscular effort is exerted that contributes to the body's work cycle and conditioning, thus changing the energy and caloric/ effort ratio including expanding leisure time and increasing inactivity rates, in addition to consuming food based on edible oils. Animal foods, manufactured materials and preservatives, directly negatively affect human health not to mention the cultural and social factor that influences population choices related to appearance and status.

Urbanization

The forces of globalization are strongly influencing many lifestyle changes in developing countries. Major changes in economic structures from agrarian to industrialized economies the process went through a gradual change starting from Some of the major health problems resulting from urbanization include poor nutrition, pollution-related health conditions and communicable diseases, poor sanitation and housing conditions, and related health conditions.

Figure 36: The Urbanization rate



The evolution of the shift from rural to urban areas started to raise right after the independence with a rate of 30.5% Since the French colonialism began to evacuate its citizens, and the exodus from the mountains and the countryside began to recover lands and cities, and after 1966, we note a start of stagnation or a weak increasing start from 38.8% which coincided with the agrarian revolution in Algeria, where the state allocated, in stages , plans to invest in agricultural land and the field of industry. *By the year 1967, 49% of the Algerian workers were working in the agricultural sector, 21% in the trade sector, and 17% in industry, and after 1970, the beginning of the second plan, the agricultural sector only

benefited from 14.9% of investments. However, more than 100,000 jobs have been created in the sector. (LASSASSI & HAMMOUDA, 2012)

By the start of 1980, the government started new plans where most of the investment went to the industrial sector, with the dominance of underground and petroleum resources over the country's economy, which made the industry a predominant activity, and the population began to move away from the rural areas due to the change in their activity, and this contributed in the increase of urbanization rate as it reached 73.7% in 2020.

Social factors and lifestyle change

Globalization is considered an influential factor in changing the lifestyle. The transition from an agricultural activity to an industrial and administrative activity reduces the levels of physical activity, not to mention the pace of production that introduced the world into the era of speed and leisure. Globalization has prepared a suitable ground for a fast lifestyle, speed has become a dominant way of living in homes or at work, as the new life system dictates eating fast food, in a short time, and quick to consume, or even pre-packed and preserved, subject to the system of canning with artificial preservative, cooling, freezing, and packaging, which reduces food nutritional value and quality, therefore, people have resorted to improving the taste of food by methods such as adding artificial flavours, or covering taste defects with fatty substances or even adding other substances such as salt and sugar to affect the brain and in terms of habit and addiction, which helped in raising the amount of food production while reducing the quality in addition to the metal cooking and canning utensils that interact with food. Based on the food system, the state decided to support the prices of materials at the base of the food pyramid, which lies in bread and milk as the fundamental food, population's sufficiency of milk weakened when the activity and housing shifted

from agricultural and farming to industrial in cities and they resorted to buying it instead of providing it at home, and then as a result of insufficiency due to population growth and imbalanced dependence on the agri-food availability, importing it became necessary. Secondly, the bread made outside the home is considered in Algeria as the most consumed food, which is part of the starchy category. With the phenomenon of speed in production with decreasing quality, instead of being subject to time-consuming fermentation, improvements are added to it to speed up its readiness for consumption.

As a result of the marginalization of the agricultural sector, the crisis of self-sufficiency began with resorting to imports, and this opened the doors to a diversity of choices. One of the manifestations of globalization is import and promotion. Here, low-income countries such as Algeria have resorted to cheap, poor-quality options instead of good-quality expensive options, so that consumption indicators indicate Incompatibility of individual income with the necessities of consuming good quality food.

Lately and since the year of 2000 the share of food consumption expenditure among the household income was 44.6% but in 2011 the proportion has decreased to 41.8% and according to the table of consumption, the only rising proportion was the housing and communication with transportation meaning even if the change was slight and in a short amount of time it was at the expense of nutrition.

This dietary change has been linked to some variables that affect certain consumption rates and changes in the pattern of food. These hypotheses lie in the inclusion of women in the labour force, urbanization, individual income and high prices, a personal choice with the influence of globalization and propaganda.

The fourth stage Algerian Diet:

Table 13: Fruits and vegetable consumption frequency per week

	0 part	1 part	2 -4 parts	>5 parts	No response
Fruits	102	1360	2012	118	533
Vegetables	13	876	2475	732	40

(WHO, STEPS Algeria, 2003)

WHO recommends consumption of 400 grams of fruits and vegetables or at least five combined servings of fruits and vegetables per day, but the highly recommended is the average of 4-5 servings of each per day, based on the Stepwise 2003 survey, almost 30% of the population consume a lot less than that and 54% consume an average close to the recommended ratio and only 10% have the healthiest amount of fruit and veggies servings.

In 2015 the average days of fruits consumption frequency per week were 2.5 with a rate of 0.7 servings per day, and 87.1% of Algerians eat less than five combined servings of fruits and vegetables on average per day meaning that consumption habits tend to get worst by time as they decrease from the previous survey

(In the WHO recommendations and surveys Potatoes, sweet potatoes, cassava and other starchy roots are not classified as fruits or vegetables).

Table 14: Protein source Consumption frequency per week

Protein	1 days	%	2-4 days	%	>5 days	%	No response	%	doesn't	%
mutton	675	16.3	318	7.7	56	1.4	257	6.2	2830	68
beef	315	7.6	165	4	31	0.7	276	6.7	3349	81
W meat	1513	36.6	0	0	0	0	1337	32.3	1286	31
fish	1359	32.9	891	21.5	114	2.8	78	1.9	1694	41
eggs	748	18.1	1465	35.4	509	12.3	144	3.5	1270	31
milk	349	8.4	567	13.7	1824	44.1	238	5.8	1158	28

(WHO, STEPS Algeria, 2003)

As for the protein WHO recommend an average amount of 46g for women and 56g for men daily, concerning the Algerians' consumption of protein sources, there is a significant lack in its share, which allows for excessive consumption of other elements like cereals, as the results of the survey for the year 2003 show that a small segment of people consume red meat more than five days a week by 1%, and this percentage escalates every time Reducing the frequency of the number of days until it reaches 74% of those who do not consume it or their consumption maybe not mentioned in the table (less than once a month) according to the nutrition fact chart Red meat contains 26 g of protein per 100 g. Secondly, the white meat nutrition fact chart states an average protein amount of 27 grams per 100 g. The survey showed a result of almost non-existent consumption from 2 to more than five days and the highest proportion was 36.6% and it belongs to the 1 day per week frequency as for the fish the highest proportion is 41% for the non-consumers and the lowest is 2.8 for those who consume it 5< a week.

Lastly, the cheapest segments of the protein sources category are eggs and milk(mostly subsidized) the survey recorded a proportion of 35.4% consume eggs from twice to 4 days a week and 12.3% more than 5 days as for the milk highest

proportion is 44.1% and it belongs to the almost daily consumers , and the lowest proportion 8.4% of the subjects consume it once a week.

Table 15: The proportion of lipid source consumers divided by type of source

oils	vegetable oil	animal fat	smen	margarine	no preference	none	olive oil	no response
number	3950	11	2	4	47	6	81	35
%	96.2	0.3	0.1	0.1	1.1	0.1	2	0.8

(WHO, STEPS Algeria, 2003)

**The sample studied in the 2003 survey is composed of 4136 people from the two pilot wilayas aged 25-64, the structure examination of Algerian population at RGPH 1998.*

There are three main types of fats, the healthiest are unsaturated fats monounsaturated fats that we find in olive oil and nuts is the most recommended as it increases the HDL level (good cholesterol) and decreases the LDL (bad cholesterol) level which prevents arteries clogging and heart diseases. And polyunsaturated which we find in vegetable oil and seafood. The two remaining are saturated fats which are mainly animal fats and Trans-fat which are processed fat hence hydrogenation of vegetable oil which is found in most of the processed food ready for consumption such as fried potatoes, biscuits and household shortening like margarine and smen. (*shortening technically refers to fat that is solid in room temperature*).

Most of the Algerian population consumes vegetable oil with a proportion of 96.2% however 2% consumes olive oil, the remaining unhealthy fats are almost non-existing.

Maternal, infant, and young child nutrition

One of the most important stages of growth and proper nutrition is the stage of breastfeeding, in which mothers must follow a certain diet to provide the infant's food and protect themselves from exposure to anaemia. The breastfeeding period extends to two years, with a specific diet for infants during this period. In Algeria 2019 41.6% of the pregnant women were anaemic in which 25.7% had mild anaemia and 15.8 moderate anaemia but no cases of severe anaemia, 34% of nonpregnant women were anaemic of which 1.7% had severe anaemia, 13.8% moderate and 18.5 % slight anaemia in 2021, 33.3% of women aged 15-49 years suffer from anaemia that mostly related to pregnancy or breastfeeding, analysis shown that the cases had folic acid and iron deficiency which indicates the lack of these nutrients consumption through food, the evolution of anaemia among children aged 6- 59 months was 32% in 2019 although the MSPRH estimated to 26% of severe cases and 38% mild anaemia of school age in 1999 in addition to 7.3% of infants with low birth weight. As for exclusive breastfeeding, its percentage does not exceed 25.4% in infants from 0-5 months. As for children under the age of five, 9.8% suffer from stunting and 2.7% suffer from wasting. And about 12.8% are overweight children. (INSP, 2019) (UNICEF, 2021)

Alcohol consumption

Alcohol consumption is the third-ranking cause of non-communicable disease as it causes heart, liver, and pancreatitis diseases and cancers especially the types related to those organs in addition to injuries. (Poznyak & Rekve, 2018)

In 2003 the world health organization recorded Among the surveyed a proportion of 5.1% alcohol consumers although it is higher in the middle segment (25-34) with a rate of 3.7% than it gradually increases to 7% among 45-54-year-olds and 6.3% among the 55-64-year olds, the most recent survey by the WHO (STEPS

2017) showed that the proportion increased 15 years later with a proportion of 6.5%. and 10.9% of subjects are abstainers for more than a year, for the ones who have never consumed they represent 82.6%. as for the female's consumption rate, it is almost non-existent in all periods.

Physical activity

Physical activity refers to all movement. Popular ways to be active include walking, cycling, wheeling, sports, active recreation and play, and can be done at any level of skill and for enjoyment by everybody. (WHO, physical activity, 2022)

Besides its benefits in preventing all types of noncommunicable diseases It promotes psychological well-being, healthy muscles and bones, reduces blood pressure among people with hypertension and improves even healthy habits like drinking water and maintaining a good sleep cycle as for the Physical inactivity it is the fourth leading risk factor for NCDs, Cardiovascular disease is ranking death causes in Algeria Physical activity strengthens the heart and reduces coronary heart disease risk factors by Lowering the blood pressure (hypertension), lessens the risk of developing diabetes, maintain healthy body weight (less accumulated fats), reduce inflammation throughout the body, Improves the muscles' ability to pull oxygen out of the blood, reducing the need for the heart to pump more blood to the muscles, reduces stress hormones that can put an extra burden on the heart, Increases of (HDL) or "good" cholesterol. (Medicine, 2022)

The prevalence of physical inactivity of Algerians was 25.6%, and more frequent among women (30.6%) than men (16.3%) in 2015 this sedentary lifestyle increases with age, going from 23.5% among 25-34-year olds, to 22.6% among 35-44-year olds, to 25.6% among 45-54-year olds, to 23.2% among 55-46-year

olds. The difference in the housing sector affects the rate as it is higher in rural areas about 31.5% against 14% in urban areas. (WHO, STEPS Algeria, 2003)

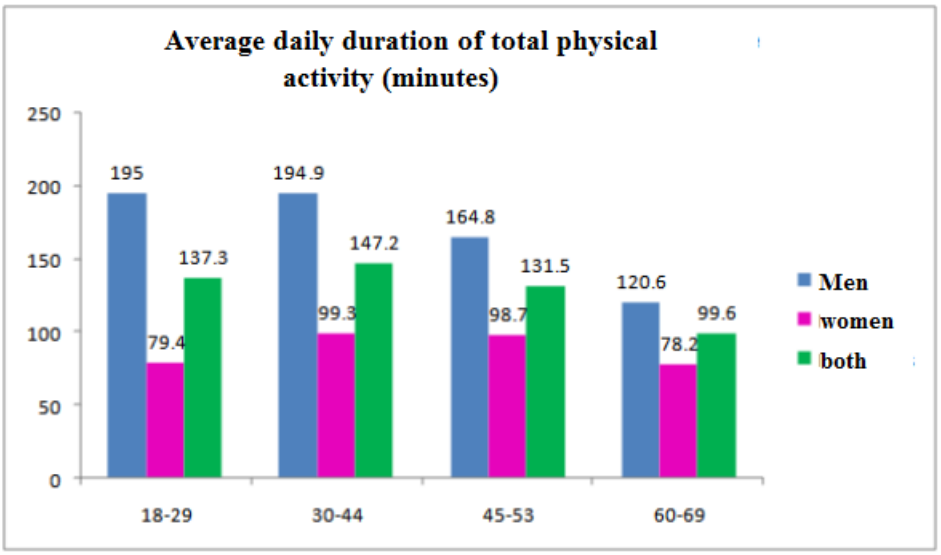
The medium time Algerian population spent in physical activity was around 51.4 minutes per day for women and 90 minutes for men, however, the proportion of the physically inactive subjects was 45.8% females and 32.5% males.

The percentage of students who spent three hours per day during a typical day sitting and watching television, playing computer games, talking with friends, or doing other sedentary activities was 30 % boys 26.1% girls; 27.9 both and those who were physically active for a total of at least 60 minutes per day were 31.5% boys and 11% girls, and 20% total.

The average time spent sitting is 333.68 minutes (about 5 hours) and the average time spent in a moderate activity is 1104.67 minutes per week (about 18 hours accumulated) although it appears that women spent less time sitting than men with almost 5 hours for females and almost 7 hours for males. Against 17 hours per week spent in moderate activity for men and almost 19 hours for women. (WHO, The status of major health risk factors for noncommunicable diseases, 2016)

Physical activity

Figure 37: Average daily duration of total physical activity

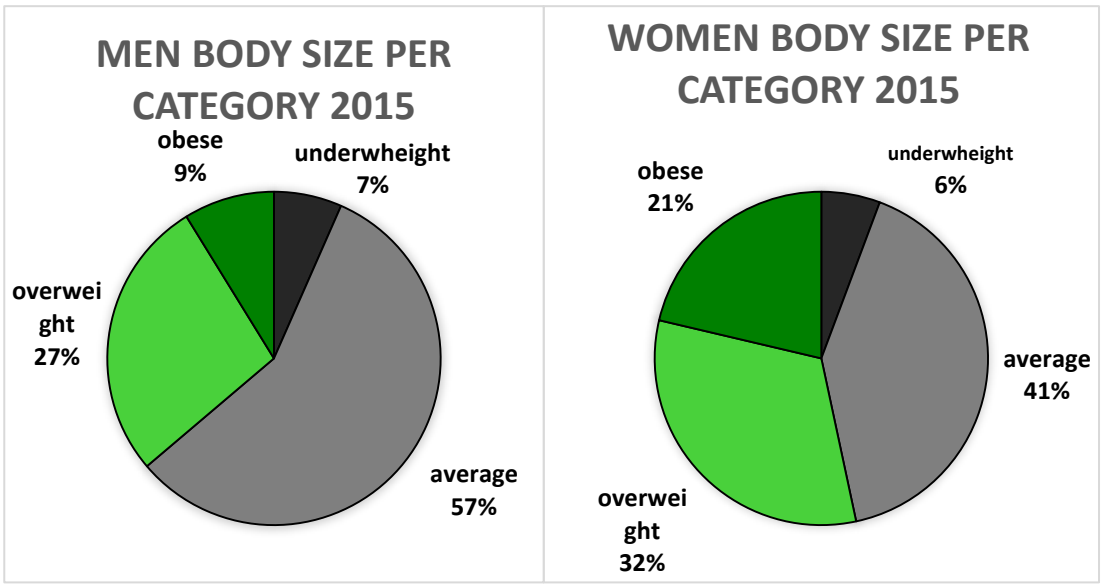


Source: Stepwise/WHO-Algeria 2016-2017

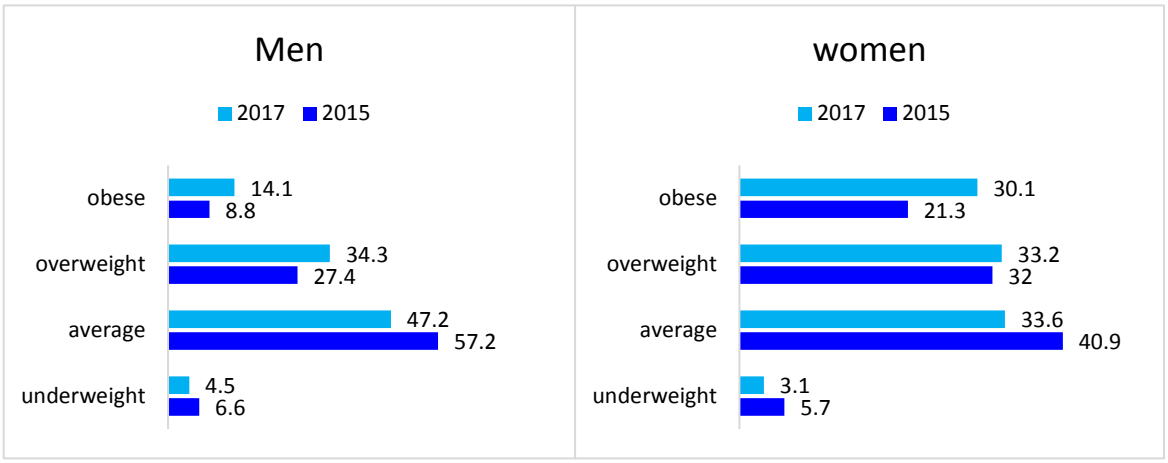
The latest survey shows that the average duration of physical activity based on the WHO recommendations is more than 2 hours per day for males and more than an hour for women among 77.3% of the total sample although the average daily duration of physical inactivity is 182.7 minutes (about 3 hours) seems too high according to 5 hours per week in the previous survey which is not promising, especially since the highest duration was 199.9 minutes for the 18-29-year-olds however, in general, the proportion of physical activity increased to an average of almost 20 hours per week due to awareness. In 2019 10.4% of women practised physical activity meaning almost 90% lived a sedentary lifestyle. The statistics have shown that going to the gym is more encouraged in urban areas than rural although if the rural women are living a traditional lifestyle depending on agricultural activity, they would be having a daily physical effort and activity without frequenting the gym.

Overweight and obesity

Figures 38: overweight and obesity proportions



Source: Stepwise survey 2015



Source: The WHO Stepwise survey 2015-2017

Overweight and obesity are major risk factors for several health outcomes, notably morbidity and mortality related to NCDs and conditions. Besides causing

direct biological anomalies to the body, overweight and obesity may also generate stigmatization and discrimination towards obese and overweight people.

The WHO defines overweight and obesity as an accumulation of excessive body fat, which negatively impacts the health of individuals. These conditions are measured and classified through the body mass index (BMI) (the ratio of the weight [kg] to the square of the height). The population on overweight is classified as those who have a BMI between 25 and 30 kg/m²; obesity is having a BMI of 30 kg/m² or more.

Average waist circumference (cm) is an indicator of an insulin resistance determinant which is body fat-saturated in the waist area and represents a high risk of diabetes as for the average Algerians the survey results show a medium waist circumference of 85.7 cm for women which is slightly higher than the low-risk circumference (80 cm) and 85.3 cm for men which is lower risk (under 90 cm) with an average body mass index of 26.1 kg/m² for females and 24 kg/m² for males which indicates women are on a high risk of obesity than men

The prevalence of overweight adults is 46.7% for both genders, with 53.6% for females and 36.3% for males which is higher than the results of the previous survey, obesity also increased with a prevalence of 21.6% for females and 8.9% for males (WHO, National Measurement Survey the weight of risk factors Non communicable diseases according to WHO stepwise approach, 2018)

In 2021 obesity prevalence leapt as it reached 38.6 % of adult women (over 18 years old) and 23.3% of adult men, it is likely that the percentage raised in this short time for reasons related to the latest epidemic of covid 19, which obliged the population to quarantine for more than a year and not engage in any public places, which raised the rate of consumption and staying indoors and decreased physical activity (GLOBAL,Nutrition,Report, 2021)

Diabetes:

The role of insulin is to allow body cells to take in glucose to be used as fuel or stored as body fat. With a high consumption of carbohydrates source such as (sugar and cereals) the glucose builds up in the blood leading to high blood sugar levels creating high insulin resistance, it tries to cope by producing more insulin this state is known as prediabetes and since blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes. Prediabetes usually occurs in people who already have some insulin resistance or whose beta cells in the pancreas aren't making enough insulin to keep blood glucose in the normal range. Without enough insulin, extra glucose stays in the bloodstream rather than entering cells, over time it turns into diabetes. (NIH, 2018)

Among known diabetics, 38% are on insulin and 62% are not insulin-dependent. The age distribution shows that insulin-dependent diabetes is significantly more frequent in young subjects between 25-34 years old 88.9% than in elderly subjects (46%) on the other hand for non-insulin-dependent diabetes is significantly more frequent in elderly subjects (41.4% for 55-64-year-olds than in young subjects 7.4% but there is no difference between the two genders.

The 2010 Dietary Guidelines for Americans recommends getting 45 to 65% of calories from carbohydrates, 10 to 35% of calories from protein and no more than 20 to 35% of calories from fats. Most foods contain a combination of these nutrients. In 2021 the proportion of diabetics among the adult population reached 14.6% of women and 14.5% of men. (GLOBAL,Nutrition,Report, 2021)

Hypertension and blood pressure

High or raised blood pressure, also known as hypertension, is defined as systolic blood pressure of 140 mmHg or higher, and diastolic blood pressure of 90 mmHg

or higher. Hypertension is a leading public health burden worldwide, with approximately 45% of deaths attributable to heart disease and more than 50% of deaths attributable to stroke. Hypertension is also associated with renal disease and eclampsia in pregnancy it disproportionately affects populations in low- and middle-income countries where health systems are weak.

There are various risk factors associated with hypertension, these include modifiable factors such as dietary intake of sodium, alcohol consumption, physical inactivity, and obesity, as well as non-modifiable factors such as age, gender, and genetic susceptibility. Salt reduction initiatives can contribute significantly to the prevention and control of high blood pressure. However, vertical programs focusing on hypertension control alone are not cost-effective. Therefore, integrated NCD programs implemented through a primary health-care and community-based approach affordable, sustainable ways for countries to tackle hypertension. Adult Algerians have a diastolic blood pressure of 79.3 mmHg and systolic blood pressure, of 128.4 mmHg in 2015 with a rate of 29.3% of the total adults surveyed, 31.7% Females and 25.6% Males. (WHO, The status of major health risk factors for noncommunicable diseases, 2016)

Cardiovascular diseases: Heart disease causes depend on its specific type there are many different types of heart disease, from the most common types that human has control over and can entirely prevent by a healthy lifestyle are coronary artery disease and heart arrhythmia a build-up of fatty plaques in arteries (atherosclerosis) is the most common cause of coronary artery disease. Unhealthy lifestyle habits, such as a poor diet, lack of exercise, being overweight and smoking, can lead to atherosclerosis, and the common causes of arrhythmias or conditions that can lead to it include coronary artery disease, Diabetes, Drug abuse, excessive use of alcohol or caffeine, heart defects that human born with (congenital heart defects), high blood pressure, smoking and stress, in a healthy

person with a normal, healthy heart, it's unlikely for a deadly arrhythmia to develop without some outside trigger, such as an electrical shock or the use of illegal drugs.

Household nutrition Consumption and multidimensional poverty index:

Multidimensional Poverty Index

The MPI is an index of acute multidimensional poverty. It assesses the nature and intensity of poverty at the individual level, creating a vivid picture of people living in poverty within and across countries, regions and the world. The MPI has three dimensions: health, education, and living standards, these are measured using 10 indicators, it assesses multidimensional poverty for people across 109 countries (up from 104 in 2010). The first international measure of its kind, offers an essential complement to income poverty because it measures deprivations directly. The MPI can be used as an analytical tool to identify multidimensionally poor people, show aspects in which they are deprived and help to reveal the interconnections among deprivations, it can also identify the poorest among the poor, revealing poverty patterns within countries by province or social group, and track changes over time. This can enable decision-makers to target resources and design policies more effectively. (OPHI, 2011)

Dimensions	Indicators	Deprivations
Living Standards	Overcrowding	Deprived if there are more than 2 people per room used for sleeping
	Housing	Deprived if the household lacks adequate walls, floor, or overall housing condition
	Electricity	Deprived if the household has no electricity connection or has been disconnected in the past 12 months
	Safe Drinking Water	Deprived if the household does not have access to safe drinking water or has been disconnected in the past 12 months
	Crime	Deprived if any household member has experienced a crime in the past 12 months
Health	Undernutrition	Deprived if any household member is malnourished (children 0-5 are underweight, stunted, or wasted; teens have low BMI-by-age, or adults have low BMI)
	Obesity	Deprived if a majority of household members are obese
	Substance use/abuse	Deprived if any household member uses illegal drugs or any household member abuses alcohol
	Teenage pregnancy	Deprived if any girl under the age of 19 gave birth in the past 5 years
Education	School Attendance	Deprived if anyone aged 15-16 is not attending school up to the age at which he/she would complete S5
	Highest level of education attained	Deprived if one household member (aged 18 years) or more has not completed secondary level education
Employment	Unemployment	Deprived if any household member aged 15 years or more is unemployed
	Informal employment	Deprived if any household member is in informal employment
	Youth, Not in Employment, Education or Training (NEET)	Deprived if any household member aged 15-24 is not in employment, education or training

(NBS, 2019)

Table 16: Food annual expenditure by product group and housing sector 2011 (million DZD)

housing sector	urban		rural		Total	
product	Value	%	value	%	value	%
cereals products	209449	16.3	117994	19.9	327443	17.5
red meat	176592	13.8	72454	12.2	249046	13.3
poultry, rabbit and eggs	112022	8.7	43902	7.4	155924	8.3
fish	19783	1.5	6666	1.1	26449	1.4
milk and dairy products	111977	8.7	46058	7.8	158035	8.4
oils and fats	86198	6.7	47240	7.9	133438	7.1
fresh vegetables	170720	13.3	80140	13.5	250860	13.4

dried and canned vegetables	42051	3.3	20509	3.5	62560	3.3
fresh fruits	69150	5.4	25896	4.4	95046	5.1
dried fruits	22924	1.8	13317	2.2	36241	1.9
sugars and sweet	51214	4	23718	4	74932	4
coffee, tea and stimulants	39336	3.1	21798	3.7	61134	3.3
soft drinks	52855	4.1	17183	2.9	70038	3.7
spices, salt and condiments	20108	1.6	11406	1.9	31514	1.7
other food expenses	96715	7.5	45994	7.7	142709	7.6
Total	1281093	100	594275	100	1875368	100

Source: ONS 2015 consumption survey N° 195

in the 2005 health survey, it appeared that the Algerian food consumption was based on 4 main products, cereals and starchy, milk, oils and fats and potatoes, in 2011 the consumption survey showed that cereals products and milk still ranked among all and considering the subsidized prices they're still have a big share of the expenditures 17.5% and 8.4% respectively, the potatoes in the survey were counted as a vegetable hence that it represents a big segment of the expenditure proportion assigned to it meaning consumption too. (*In the table the expenditure assigned to animal protein sources does not reflect the high consumption but the high prices*). To analyse nutrition consumption determinants and how the Algerian population highly consume those four products in which two of them are subsidised and the other two are the cheapest product among their type we should take into consideration the human development index and multidimensional poverty index of hat period was 5.5% Poor population ratio according to the national poverty line. (World Bank, 2011). The determinants of this indicator get updated every year according to some countries gets added and some studies about deprivations of necessities.

We didn't analyse the Human development index (Algeria 0.74) (UNDP, 2020) *because it has been established and considers some of the dimensions of development inequality and gender disparities. Since 2010, the HDRO has published the inequality-adjusted HDI, which corrects the value of a country's HDI according to the inequalities within each component (life expectancy, education and income). We opted though for the multidimensional poverty index, which directly measures the deprivations suffered by individuals we thought that it reflects better what we are trying to analyse by excluding the other none related criteria. GDP 5455.68USD per capita 2011 (income per head in a year)*

Looking at the criteria taken into consideration, we find that the poverty index and the consumption table indicate that 94.5% of the population is not poor, meaning that their adoption of the current food pattern is a choice and is not determined by the poverty rate. This rate reached in 2019 according to the latest amendment of its standards to 1.4% in Algeria among them the rate of severe multidimensional poverty is 0.2% with 5.5% of the population living below the income poverty line and 0.4% below the income poverty line PPP 1.90 USD a day (PPP = purchasing power parity terms) which equals 267 DZD per day meaning 8010 DZD per month in other words above the income poverty line are considered as not poor, but this does not reflect the reality as the purchasing power of foodstuffs changes according to prices and at a very fast pace, and since these data do not consider prices in the evaluation, we can rely on the analysis corresponding to the fact that the majority of the population, which represents middle-income earners, have an income to disqualify them as in need or under poverty line however it is not enough even to cover the simplest needs, such as a healthy diet, to prevent chronic diseases, the segment which was represented in the expenditure consumption table based on a studied sample to represent the total population opted for the High carbohydrates diet due to their socio-economic

level, the household income is divided on many expenditures including food, housing, education, health and clothing which supposed to meet the household member's needs, Algerian GDP per capita is 3310.39 USD in DZD, it is around 465000 DZD per year, to simplify in a comparison way 38700 DZD per month and 1920 DZD per day to dig deep into the household income, we should consider that women participating in the labour force are 20% women in working age which means that 80% are not a participation in the household income, meaning in a nuclear family of 4 members mostly one member is providing this average income of 38700 DZD, to narrow down the analysis we also may claim the deprivations that determine poverty occupy an important share among expenditures, Living standards including, housing, electricity, safe drinking water, and health including Undernutrition, the GDP in Algeria that supposedly covers the needs of a standard family of four is over the poverty threshold which in the empirical reality does not unless we evaluate the pricing changes. We can say that the main dominant in nutrition diet choice is the economic factor. (WorldBank, 2022)

The fifth stage

Stage five is linked to the fifth stage of epidemiological transition, as they mainly focus on the delay of degenerative diseases, cancer treatment, controlling heart disease, diabetes, lifestyle and how to live a better healthier life, reducing the amount of fat, exercising, all that helps to live a better and longer life and as medicine continues to improve, life expectancy increases, targeting a quality life with a lower risk of diseases at late ages, the fifth stage of nutrition transition is the principal key to achieve the aspired fifth stage of epidemiological transition long healthy life. The main nutrition characteristics of the fifth stage are reducing fat, increasing fruits vegetables fibres, and water consumption, reducing caloric intake and replacing sedentariness with a purposeful activity which will result in

nutrition-related NCDs reduction however it starts with societal and behavioural change, and taking action about the fourth stage lifestyle, identifying the cause is half of the solution as we mentioned the country should reach a specific level of finance and economy so that the majority of the population would be the decision-makers when it comes to diet and be able to afford it first, the science community cannot address a healthy lifestyle in the developing countries without addressing the economy since somehow the current lifestyle is not an option it is the only choice to defeat starvation however for those who can or until then we should acknowledge that the current nutrition diet is negatively impacting people's health in general and consumption is not exclusively limited to starchy cereals, milk and oils, but also the habits of sugar and sweets, soft drinks and stimulants like coffee and tea and snacks which all combined represent more than 15% of the food expenditures and that is due to habits not to mention reducing obesity, inactivity and sedentary lifestyle implications.

A model of a health styles summarizes the shift in lifestyle from classic to modern

Meditation, hiking, and fishing all summarize traditional activities which used to be living beside nature and green areas, walking and carrying heavy collectables such as water, fuelwood, or harvested food resources, and being exposed to the sun increasing self-awareness as its characteristics are closely similar to meditation, including sheep grazing, hunting and fishing, picking, harvesting and gathering food, milking and churning, all this is being in direct contact with nature reduce the areas of anxiety, chronic pain, depression, heart disease and high blood pressure. helps the respiratory system, the body would be healing and repairing itself. Some research supports the fact that meditation as it’s being a state of a tranquil mind and focuses on attention, elimination and discharging of jumbled

thoughts stream, which may be crowding the mind and causing stress. the process results in enhanced physical and emotional well-being. and relaxation that helps with Anxiety, Asthma, Cancer, Chronic diseases, Depression, Heart and vascular diseases, High blood pressure, Irritable bowel syndrome, sleep problems, and tension headaches, fortunately, the Algerian population belongs to the Muslim community which sanctifies the prayer as a meditation on a daily basis, this helps a lot in improving and protecting self and psychological wellbeing. Women on family farms have greater overall workloads than men, as they have to combine farming activities with household responsibilities (cooking, cleaning, collecting fuelwood and water), taking care of children and the elderly, this explains that sedentariness had no place in the traditional lifestyle

Dietary guideline recommended by the health organization

The Dietary Guidelines recommendations, 23 of which are for the general population and 6 for specific population groups (USDA/HHS, 2010).

Balancing Calories to Manage Weight Key Recommendations Prevent and/or reduce overweight and obesity through improved eating and physical activity behaviours.

Control total calorie intake to manage body weight for people who are overweight or obese, this will mean consuming fewer calories from foods and beverages.

Increase physical activity, and reduce time spent in sedentary behaviours.

Maintain appropriate calorie balance during each stage of life—childhood, adolescence, adulthood, pregnancy and breastfeeding, and older age.

Foods and Food Components to Reduce

Reduce daily sodium intake to less than 2,300 mg and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age or have hypertension, diabetes, or chronic kidney disease. The 1,500 mg recommendation applies to population, including children, and the majority of adults.

Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids.

Consume less than 300 mg per day of dietary cholesterol.

Keep trans fatty acid consumption as low as possible by limiting foods that contain synthetic sources of trans fats, such as partially hydrogenated oils, and by limiting other solid fats.

Reduce the intake of calories from solid fats and added sugars.

Limit the consumption of foods that contain refined grains, especially refined grain foods that contain solid fats, added sugars, and sodium.

Foods and Nutrients to Increase

Individuals should meet the following recommendations as part of a healthy eating pattern while staying within their calorie needs.

Increase vegetable and fruit intake.

Eat a variety of vegetables, especially dark-green and red and orange vegetables and beans and peas.

Consume at least half of all grains as whole grains. Increase whole-grain intake by replacing refined grains with whole grains.

Increase intake of fat-free or low-fat milk and milk products, such as milk, yogurt, cheese, or fortified soy beverages.

Choose a variety of protein foods, which include seafood, lean meat and poultry, eggs, beans and peas, soy products, and unsalted nuts and seeds.

Increase the amount and variety of seafood consumed by choosing seafood in place of some meat and poultry.

Replace protein foods that are higher in solid fats with choices that are lower in solid fats and calories and/or are sources of oils.

Use oils to replace solid fats where possible.

Choose foods that provide more potassium, dietary fibre, calcium, and vitamin D, which are nutrients of concern in diets. These foods include vegetables, fruits, whole grains, and milk and milk products.

Key Recommendations for Specific Population Groups

Women capable of becoming pregnant should choose foods that supply heme iron, which is more readily absorbed by the body, additional iron sources, and enhancers of iron absorption such as vitamin C–rich foods.

Women capable of becoming pregnant should consume 400 micrograms (mcg) per day of synthetic folic acid (from fortified foods and/or supplements) in addition to food forms of folate from a varied diet.

Women who are pregnant or breastfeeding should consume 8 to 12 ounces of seafood per week from a variety of seafood types.

Women who are pregnant or breastfeeding should limit white albacore tuna to 6 ounces per week and do not eat the following four types of fish: tilefish, shark, swordfish, and king mackerel due to their high methyl mercury content.

Women, if pregnant, should take an iron supplement, as recommended by an obstetrician or other health provider.

Individuals ages 50 years and older should consume foods fortified with vitamin B12, such as fortified cereals or dietary supplements.

Building Healthy Eating Patterns

Select an eating pattern that meets nutrient needs over time at an appropriate calorie level.

Account for all foods and beverages consumed, and assess how they fit within a total healthy eating pattern.

Follow food safety recommendations when preparing and eating foods to reduce the risk of food-borne illnesses.

Conclusion

Nutrition in Algeria has a theoretical Mediterranean diet pattern however the nutrients deficiency is more related to quantities and lifestyle due to the socio-economic level of the population, Through the study, we conclude that Algeria has gradually moved to a rapid consumption pattern, whether we are talking about wealthy or low income people, and nutritional transition is more related to physical activity, where the body's stock results from consumption more than the need, and since the results showed that Algeria is at the beginning of the fourth stage, especially since obesity is not a comprehensive phenomenon to a large extent, it is possible to link degenerative diseases more to the psychological factor and the almost non-existent activity, which are obviously related to the urbanization and current lifestyle, We cannot be certain that the population will resort to a healthy diet in better social conditions, but with awareness and taking measures, this will be possible, or at least optional, not inevitable.

We can resort to the Asian food pattern as an example, which is somewhat better than the Western pattern in terms of health and cost, and here we call the habits and vulnerability factor, which plays a key role in the selection, taking into account the population's genes, which classify the categories of body types (Hall, Bemis, Brychta, ..., & and Yannai, 2015) and their ability to digest and burn calories faster it is high time to target a sustainable, and agrarian economy more than any time, especially with the current potential in terms of surface, soil, finances and human resources, it seems to be the best solution that can elevate the population social level so they would be able to afford healthy food. The research is providing analysis that proves the link between nutrition and financials, the overconsumption of subsidized bread, milk, and starchy veggies explains the obesity, diabetes, and overweight health implication. Based on the Nutrition

transition model the country is currently in the fourth stage, based on the epidemiologic transition and lifestyle, the determinants of the model show the high urbanization rate, high unhealthy consumption and lack of physical activity, the proportion of non-communicable diseases, which firmly indicates that the nutrition behaviour has to be changed to maintain health and proper ageing.

General Conclusion:

It is clear from this study that the demographic, epidemiological and nutritional transitions have a causal relationship within a major shift, which is the demographic transition, and the analysis of the Algerian from several angles and according to several factors led to the conclusion of this in terms of demographics. The country stage is at the beginning of the fourth stage of the demographic transition, and this is through the level of rates for the demographic determinants of that stage, where the fertility rate is between 2.5 children per woman, but somewhat low growth rate, ranging between 1.4 and 2.1%, in addition to a life expectancy at the age of 77 years all of these indicators point to the beginning of the fourth stage since the year 2000, also, the birth and death rates are low, and this is what led to the prolonged stability of the population growth rate. Especially CDR since it has reached 4.5% since that year and remained constant, and the CBR has also decreased to reach at this stage 19.3‰. Despite its slight increase, it has fallen again to 20‰ and thus the population growth has stabilized. The reproductive behaviour of the population is characterized by a tendency toward low fertility, and this is due to urbanization, which exceeds 70% of the population Where this pattern affected the size of the family because of the cost of living and raising children financially, in addition to not considering them as an economic investment, since the economic activity of the family does not require future labour force as it was in agrarian and farm business, in addition to the high rate of schooling, especially for females, which postponed the age of marriage and childbearing, and the change in the orientation of the female gender in terms of the necessity of childbearing at an early age concept or even having large families, unlike what was prevailing at the previous time, not to mention the woman's participating in the labour and the need for her to contribute to the family's income due to the low economic conditions, which accumulate and multiply her

responsibilities and make her role as a mother to a large number of children difficult. We tend to believe that the female gender in Algeria has not reached the stage of considering marriage, procreation and children as an obstacle to a career or private freedoms. However, we cannot be certain that women at an early stage of life do not think of that perspective, which may lead to a persistence of belief regarding generations. And this may coincide with the fifth stage, where the fertility rate is less than two children per woman, especially after the last census which has recorded that it had begun to decline, and it is also more important to link the decline in fertility to the economic condition rather than linking it to education because the analysis shows the close relationship between education and delayed fertility, but higher education in Algeria mostly ends at the age of 23 years old which is still early in terms of high fecundity and fertility, especially that the marriage medium age for women is 27 years old, which suggests that the delay is related to mentalities and psychological maturity or socio-economic conditions more than it is related to higher education. One of the most important consequences of low fertility is the threat to the population structure to shrink through the number of children reaching less than the replacement rate, and the low birth rate in the short term, which creates a gap in the demographic structure in terms of the future working group and its incompatibility with the economically dependent group, especially with the high life expectancy of 77 years, which means that the ageing rate will increase over time from its current rate of 7%. Hence the low fertility rate and the incompatibility of the working group with the approved category will reduce the labour force and the savings rate and slow down economic growth, especially in a middle-income developing country.

The study indicates that the population structure of Algeria is close to the population model of Western countries, and we have shed light on this issue

because it reflects more accurately and clearly how the population growth should be exploited in the economy and how the pattern of the Algerian economy and the rate of unemployment and employment, as well as the proportion of dependence and independence, are not compatible with the desired economic growth or its improvement in the future in any way if Algeria continues to rely exclusively on hydrocarbons. The fluctuation in the population structure achieves a kind of long-term balance, which is considered a positive thing in terms of demographic gains, savings, sufficiency and equality of the workforce with the approved segment, so that a reduction occurs in the conflict of periods, in other words, the surplus profitability of the window of opportunity is exploited in the era in which the labour force is shrinking compared to the category of children and the elderly, soon the category of children grows to become a workforce that coincides with a few of the two dependent categories, and the surplus is achieved again as if it is a cycle with a fixed pace, but the defect in the country's economy is the lack of sufficient exploitation of human resources, not even reliance on a sustainable economy such as agriculture Which are considered the most important keys to achieving financial security and the growth of the country’s economy, and this is what must be reconsidered now more than ever, especially as the forecasts are going to exhaust the country’s economic resources, as well as reach a fertility rate below the replacement rate in less than thirty years. On one hand, the country is following the example of the neo-Malthusian tradition, and what hinders this doctrine from total application in the country is the religious determination of the population and the awareness of the necessity of reproduction, even though the financial conditions prevent that. One of the most important approaches to the development and sufficiency of the international economy is the agricultural sector, as the most successful high-income countries have relied on it to transform the economy at a rapid pace or the so-called structural transformation to ensure food security and achieve development goals

and nutrition improvement, including raising the domestic product and average income per capita, by boosting labour productivity, increasing agricultural surplus, hence foreign exchange, and raising humanitarian income, especially in terms of nutrition the country can avoid malnutrition outcomes in addition to improving the workers' performance overall the development in socioeconomic levels leads to more productivity and high-income economy and further investment in agriculture modernization, this sets a fertile platform to more manufacture in the field and properly distinguishes productive urbanization from a productive rural areas.

And since many studies have talked about the demographic transition and its characteristics, the last two stages were not highlighted and this is what they targeted, especially the results and pace of this stage. the demographic fourth stage in Algeria coincides with the third stage of the epidemiological transition, and what we concluded through the study, is that it has now passed the stage of infectious diseases and epidemics, but it still undergoing a double burden, as it has not yet eliminated the causes of death related to the contagious spread, the increase in life expectancy and the current lifestyle has resulted in the emergence of new causes of death, which are chronic diseases, in particular the ones associated with this transformation through the continuous progress in the pattern and transmission of death causality from infectious to chronic age-related diseases. The high life expectancy is the first progress health system indicator in the country, and this level is considered an achievement because it indicates that infectious diseases have greatly declined during the past fifty years, and life expectancy has almost doubled since then, the data also indicates an improvement in the health condition, as the largest percentage of deaths, are caused by degenerative diseases and at a later stage of life. And the epidemiological transformation theory of Abdul Rahman Omran showed that the main

determinant of transformation is the crude death rate curve, as well as other determinants such as life expectancy and causes of death. Infectious diseases occupied a large proportion in the first stage before the transformation, this was due to the French colonization, which contributed on several levels to distinguishing that era by diseases, poverty and famine. Since independence, infectious diseases have witnessed an important decline in the second stage resulting in a rise in life expectancy and an increase in degenerative diseases, with the third stage, the latter became dominant in the causes of death and the epidemiological transition, especially after the year 2000. What distinguishes this stage is that some infectious diseases such as malaria whooping cough, visceral leishmaniasis, human rage, hydatid cyst, measles and typhoid fever were practically eliminated. And the decline of other diseases, such as tuberculosis, despite its occupation of the largest outbreak of infectious diseases, and hepatitis B and C, Brucellosis and Meningitis CS in addition to the emergence of the AIDS epidemic at the end of the twentieth century, which is considered one of the infectious disease whose rate has increased including foodborne illness, but the health system is trying to control its spread and try to prevent it, with the decline of most infectious diseases, the rates of degenerative diseases that are associated with ageing have increased, but it is not necessary for the ageing to be negative in terms of health, because the causation of these diseases is related to lifestyle, food and pressure, where the heart and arterial diseases occupied the largest percentage in the causes of death, and this is linked It is closely related to lifestyle, food, smoking, as well as exposure to various stressors, followed by the rate of tumours. The most important causes of genetic mutations are smoking, dietary patterns and lack of physical activity, radiation, viruses, carcinogenic chemicals and hormonal imbalance, followed by respiratory diseases and type 2 diabetes, and these are two of the most common diseases related to diet and lifestyle, especially that their direct causes lie in pollution, hence attributed to urbanization

and smoking, , concerning type 2 diabetes, excessive consumption of starches and sugars and lack of exercise, all causes have been explained in the epidemiological model of Omran and as they were analysed, most of them are related to the behaviour of the population or as they were classified as diseases caused by humans, especially the dietary pattern or stress. Nutrition has been closely linked to these degenerative diseases. The food pattern of the population in Algeria was characterized by excessive consumption of starches and unhealthy fats, which developed obesity in addition to sedentariness as the activity shifted from agricultural to industrial and administrative. These lifestyle changes, eating behaviours, and activity, were classified within the food transition of Barry POPKIN in which he indicated the link between the demographic and the epidemiological transitions with nutritional transition, which contributed to creating the reasons for the shift of high life expectancy and the pattern of urbanization and activity into determinants of causes of death in the third stage of the epidemiological transition, and his theory included 5 stages set in a model related to characteristics of that transitions, as the first stage was characterized by collecting food, the second was characterized by famine caused by several factors including war, natural disasters, crop failure, and further population imbalance, and the third phase was about receding famine, minimally processed food, starchy, low fat and high fibre nutrition, intensive labour and physical activity, contribution to the slow mortality decline, simultaneously coincides with the industrial revolution, concerning the fourth stage, it included the causes of chronic diseases and the prevailing diet that threatens human health and leads to obesity, in addition to a sedentary lifestyle. The fifth stage is a theoretical ambition and solution aimed at changing nutritional behaviour to a better pattern to achieve healthy ageing and reduce or delay degenerative diseases through this study, it was concluded that the Algerian population pattern is classified within the fourth stage given chronic diseases, but the percentage of obesity and the

pattern of consumption is due to socio-economic reasons and the excessive consumption of carbohydrates, subsidized bread, potatoes, and milk this is self-evident given the average income and the weak economic conditions of the population so that the consumption of these materials is not extra, but rather exclusive in most cases compared to the quantities recommended by the Health Organization, in addition to the high rate of urbanization and administrative and industrial activity, which contributed to the stagnation of activity and economy in parallel with the high rate of pollution and social scourges such as smoking, examining the aforementioned circumstances and their causes, we can go to the idea that the population's dietary pattern is not determined by their choice of this behaviour more than it is inevitable, depending on income and purchasing power, as shown in the surveys population living in the cities have more access to the gym if we relate sedentariness to the modern or urban lifestyle we tend to think that this population, in particular, is aware of the importance of diet and physical activity it's only a matter of slight change in lifestyle concerning allocating time, especially since the traditional nutrition pattern is totally healthy, if we talk about the fifth stage of this model based on the country's condition, which states Behavioural change it can hang the action till the current economic situation improves because the nutritional behaviour, in this case, is more related to income, and Popkin talked about this by highlighting the differences between nutrition in high and low-income countries, by explaining the overconsumption and undernutrition in both. It is important to take into account the goals that must be reviewed to achieve food and economic security, which in turn ensures the transition in the field of health to the next level while targeting economic security in the long term and avoiding any negative consequences at all levels, especially the demographic, by exploiting human power and avoiding the focus on lowering population growth, because human power is the surest source of security and economic progress this is due to its link to sustainable development and the

agricultural economy, especially since the area and quality of Algeria are very suitable. Improving the economic level is necessary to improve the health system, by controlling chronic diseases and deteriorating elderly health, as well as eliminating the double burden by strengthening programs to combat infectious diseases and developing health policy that includes nutrition and consumer behaviour in coordination with social and economic sectors related to this issue.

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Algerian total population 1967

age	MEN	% male	WOMEN	%female	RatioW/M
0-4	1292220	19.4	1242273	18.78	0.97
5-9 y o	1031444	15.48	989672	14.97	0.97
10-14yo	883972	13.27	848468	12.83	0.97
15-19	664468	9.97	637102	9.63	0.97
20-24	488561	7.33	480143	7.26	0.99
25-29	421098	6.32	426751	6.45	1.02
30-34	387084	5.81	383288	5.8	1.00
35-39	323367	4.85	332851	5.03	1.04
40-44	244236	3.67	261460	3.95	1.08
45-49	211167	3.17	229204	3.47	1.09
50-54	182236	2.74	203003	3.07	1.12
55-59	164490	2.47	186446	2.82	1.14
60-64	135446	2.03	146507	2.22	1.09
65-69	108640	1.63	118000	1.78	1.09
70-74	70089	1.05	73282	1.11	1.06
75-79	33811	0.51	33586	0.51	1.00
80 + <	19498	0.29	21157	0.32	1.10
Totals	6661827	100	6613193	100	1.00

Algerian total population 2018

age	MEN	% male	WOMEN	%female	RatioW/M
0-4	2528374	11.85	2422460	11.59	0.98
5-9 y o	2232390	10.46	2141362	10.25	0.98
10-14yo	1737659	8.15	1669066	7.99	0.98
15-19	1447710	6.79	1387891	6.64	0.98
20-24	1647962	7.73	1586719	7.59	0.98
25-29	1874848	8.79	1832099	8.77	1.00
30-34	1867302	8.75	1843554	8.82	1.01
35-39	1696317	7.95	1680517	8.04	1.01
40-44	1392969	6.53	1390003	6.65	1.02
45-49	1135501	5.32	1143309	5.47	1.03
50-54	972522	4.56	978418	4.68	1.03
55-59	811401	3.8	802775	3.84	1.01
60-64	673471	3.16	645034	3.09	0.98
65-69	514843	2.41	495868	2.37	0.98
70-74	318190	1.49	332188	1.59	1.07
75-79	228442	1.07	260923	1.25	1.17
80 + <	252092	1.18	284236	1.36	1.15
Totals	21331993	100	20896422	100	1.00

Population Projection 2030-2040

Algérie 2030			2040	
age	MEN	WOMEN		MEN
0-4	2175000	2067000	-2175000	2291000
5-9 y o	2370000	2245000	-2370000	2137000
10-14 y o	2583000	2436000	-2583000	2170000

15-19	2395000	2261000	-2395000	2365000
20-24	1940000	1830000	-1940000	2575000
25-29	1548000	1473000	-1548000	2384000
30-34	1569000	1508000	-1569000	1931000
35-39	1787000	1725000	-1787000	1539000
40-44	1890000	1857000	-1890000	1558000
45-49	1804000	1776000	-1804000	1768000
50-54	1484000	1463000	-1484000	1860000
55-59	1188000	1201000	-1188000	1758000
60-64	999000	1026000	-999000	1422000
65-69	790000	818000	-790000	1107000
70-74	598000	625000	-598000	889000
75-79	435000	456000	-435000	652000
80 -84	246000	276000	-246000	435000
85 + <	208000	259000	-208000	381000
Total	26009000	25302000		29222000

Table : Infant mortality in Algeria 1960-2019

année	taux	année	taux
1960	14.55	1990	4.18
1961	14.57	1991	4.07
1962	14.62	1992	3.98
1963	14.68	1993	3.9
1964	14.72	1994	3.8

1965	14.77	1995	3.71
1966	14.82	1996	3.63
1967	14.84	1997	3.55
1968	14.81	1998	3.49
1969	14.71	1999	3.44
1970	14.54	2000	3.39
1971	14.3	2001	3.32
1972	14	2002	3.24
1973	13.65	2003	3.13
1974	13.25	2004	3.01
1975	12.81	2005	2.88
1976	12.35	2006	2.76
1977	11.86	2007	2.64
1978	11.35	2008	2.53
1979	10.8	2009	2.44
1980	10.18	2010	2.36
1981	9.45	2011	2.29
1982	8.63	2012	2.25
1983	7.7	2013	2.21
1984	6.77	2014	2.19
1985	5.95	2015	2.16
1986	5.32	2016	2.13
1987	4.86	2017	2.09
1988	4.53	2018	2.04
1989	4.32	2019	2

Total Fertility Rate in Algeria 1960-2021

year	TFR	year	TFR
1960	7.524	1991	4.479
1961	7.573	1992	4.223
1962	7.614	1993	3.962
1963	7.646	1994	3.702
1964	7.665	1995	3.448
1965	7.675	1996	3.208
1966	7.676	1997	2.988
1967	7.672	1998	2.796
1968	7.666	1999	2.635
1969	7.656	2000	2.514
1970	7.643	2001	2.438
1971	7.624	2002	2.403
1972	7.597	2003	2.405
1973	7.558	2004	2.438
1974	7.505	2005	2.496
1975	7.434	2006	2.569
1976	7.344	2007	2.649
1977	7.234	2008	2.728
1978	7.105	2009	2.799
1979	6.957	2010	2.86
1980	6.794	2011	2.909
1981	6.617	2012	2.952
1982	6.43	2013	2.99
1983	6.237	2014	3.022
1984	6.038	2015	3.043
1985	5.835	2016	3.052
1986	5.627	2017	3.045
1987	5.412	2018	3.023
1988	5.191	2019	2.988
1989	4.962	2020	2.946
1990	4.726	2021	2.893

The estimated rates of Birth, Mortality and population growth since 1900

Période	TBN ‰	TBM ‰	TAN %	Période	TBN ‰	TBM ‰	TAN %
				1987	34.6	6.97	2.8
1901-1905	37.8	32.8	0.5	1988	33.91	6.61	2.7
1906-1910	35.5	30.5	0.5	1989	31	6.00	2.5
1911-1915	35.3	27.4	0.79	1990	30.94	6.03	2.4
1916-1920	34.9	31.4	0.35	1991	30.14	6.04	2.4
1921-1925	37.2	29.4	0.78	1992	30.41	6.09	2.4
1926-1930	42.3	26.6	1.57	1993	28.22	6.25	2.2
1931-1935	43.4	25.3	1.81	1994	28.24	6.56	2.1
1936-1940	42.1	25.1	1.7	1995	25.33	6.43	1.8
1941-1945	42.9	43.1	-0.02	1996	22.91	6.03	1.6
1946-1950	42.2	32.2	1	1997	22.51	6.12	1.6
1951-1955	47.4	20.6	2.68	1998	20.58	4.87	1.5
1956-1960	45.6	20.3	2.5	1999	19.82	4.72	1.5
1961-1965	48.5	14.6	3.39	2000	19.36	4.59	1.4
1966-1969	47.8	14.9	3.29	2001	20.03	4.56	1.5
1969	49.81	17.01	3.2	2002	19.68	4.41	1.5
1970	50.16	16.45	3.3	2003	20.36	4.55	1.5
1971	48.44	17.00	3.1	2004	20.67	4.36	1.6
1972	47.73	15.68	3.2	2005	21.36	4.47	1.6
1973	47.62	16.25	3.1	2006	22.07	4.30	1.7
1974	46.5	15.07	3.1	2007	22.98	4.38	1.8
1975	46.05	15.54	3.1	2008	23.62	4.42	1.9
1976	45.44	15.64	2.9	2009	24.07	4.51	1.9
1977	45.02	14.36	3.0	2010	24.68	4.37	2.0
1978	46.36	13.48	3.2	2011	24.78	4.41	2.0
1979	42.8	11.70	3.1	2012	26.1	4.50	2.1
1980	42.7	10.90	3.1	2013	25.1	4.40	2.0
1981*	41.04	9.44	3.1	2014	25.9	4.40	2.1
1982	40.6	9.10	3.1	2015	26	4.60	2.1
1983	40.4	8.80	3.2	2016	26.1	4.50	2.2
1984	40.18	8.60	3.2	2017	25.4	4.60	2.1
1985	39.5	8.40	3.1	2018	24.4	4.50	1.9
1986	34.73	7.34	2.7	2019	23.8	4.60	1.9

Life expectancy in Algeria 1901-2021

year	Life expectancy	year	Life expectancy
1901-1905	29.98	1981	58.92
1906-1910	29.02	1982	60.25
1911-1915	30.32	1983	61.58
1916-1920	31.8	1984	62.44
1921-1925	28.72	1985	63.29
1926-1930	31.58	1986	64.15
1931-1935	32.1	1987	65
1936-1940	33.68	1988	65.86
1941-1945	35.94	1989	66.21
1946-1950	33.74	1990	66.57
1950	41.62	1991	66.92
1951	42.05	1992	67.28
1952	42.47	1993	67.63
1953	42.89	1994	68.01
1954	43.31	1995	68.39
1955	43.73	1996	68.76
1956	44.16	1997	69.14
1957	44.58	1998	69.52
1958	45	1999	69.98
1959	45.46	2000	70.44
1960	45.92	2001	70.91
1961	46.37	2002	71.37
1962	46.83	2003	71.83
1963	47.29	2004	72.3
1964	47.73	2005	72.77
1965	48.16	2006	73.23
1966	48.6	2007	73.7
1967	49.03	2008	74.17

1968	49.47	2009	74.44
1969	49.87	2010	74.71
1970	50.28	2011	74.97
1971	50.68	2012	75.24
1972	51.09	2013	75.51
1973	51.49	2014	75.73
1974	52.18	2015	75.94
1975	52.87	2016	76.16
1976	53.56	2017	76.37
1977	54.25	2018	76.59
1978	54.94	2019	76.77
1979	56.27	2020	76.95
1980	57.6	2021	77.14

Algerian Age Pyramid 1960-2020

Age/ Year	0-14	15-64	> 64	year	0-14	15-64	> 64
1960	44.58%	52.18%	3.24%				
1961	45.07%	51.60%	3.33%	1991	42.78%	53.83%	3.39%
1962	45.70%	50.88%	3.42%	1992	42.15%	54.42%	3.43%
1963	46.34%	50.14%	3.51%	1993	41.44%	55.07%	3.49%
1964	46.83%	49.59%	3.58%	1994	40.64%	55.81%	3.55%
1965	47.10%	49.29%	3.61%	1995	39.75%	56.63%	3.62%
1966	47.36%	49.02%	3.62%	1996	38.81%	57.45%	3.74%
1967	47.37%	49.03%	3.60%	1997	37.77%	58.37%	3.86%
1968	47.21%	49.22%	3.57%	1998	36.64%	59.35%	4.01%
1969	47.03%	49.43%	3.55%	1999	35.49%	60.35%	4.15%
1970	46.88%	49.59%	3.53%	2000	3436%	61.33%	4.31%
1971	46.87%	49.57%	3.56%	2001	33.16%	62.40%	4.44%
1972	46.88%	49.53%	3.59%	2002	32.05%	63.39%	4.56%
1973	46.89%	49.49%	3.61%	2003	31.01%	64.30%	4.68%
1974	46.87%	49.51%	3.62%	2004	30.05%	65.14%	4.80%

1975	46.78%	49.61%	3.61%	2005	29.19%	65.89%	4.92%
1976	46.79%	49.62%	3.59%	2006	28.52%	66,45%	5.03%
1977	46.72%	49.72%	3.56%	2007	28.00%	66,86%	5.14%
1978	46.60%	49.88%	3.52%	2008	27.62%	67,13%	5.24%
1979	46.46%	50.06%	3.48%	2009	27.39%	67,26%	5.35%
1980	46.32%	50.23%	3.45%	2010	27.28%	67,26%	5.46%
1981	46.23%	50.33%	3.44%	2011	27.47%	67,02%	5.51%
1982	46.09%	50.48%	3.43%	2012	27.67%	66,77%	5.57%
1983	45.90%	50.68%	3.42%	2013	27.92%	66,45%	5.64%
1984	45.67%	50.92%	3.41%	2014	28.26%	66,00%	5.73%
1985	45.39%	51.23%	3.38%	2015	28.71%	65,43%	5.86%
1986	45.11%	51.51%	3.37%	2016	29.13%	64,86%	6.01%
1987	44.77%	51.87%	3.36%	2017	29.64%	64,18%	6.18%
1988	44.37%	52.29%	3.35%	2018	30.15%	63.49%	6.36%
1989	43.89%	52.76%	3.34%	2019	30.55%	62.90%	6.55%
1990	43.35%	53.29%	3.36%	2020	30.78%	62.47%	6.74%

The Algerian Dependency Ratio compared with the United Nations' (15-60) & (19-65)

	1967	**1977**	**1987**	**1998**	**2008**	**2020**	**2030**
dependent	7048065	9165347	11836447	12885638	12165214	19495000	23243000
working	6226955	8417552	11937840	17307112	22565390	24731000	28068000
D Ratio	113.2	108.9	99.2	74.5	53.9	78.8	82.8
UN 19	159.1	155.6	137.4	103.1	75	79.1	83
UN 15	101.6	99.1	87.6	63.1	48.7	60.1	56.7