Life expectancy at birth at Birth as an Indicator of Human Development and Its Implications for Demographic Growth in Algeria

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Abstract

This study aims to analyse the evolution of life expectancy at birth as one of the most important indicators of human development and to highlight its implications for demographic growth in Algeria. The study adopted a descriptive and analytical approach based on data collected from the Algerian National Office of Statistics and reports issued by the Ministry of Health, in order to examine the evolution of life expectancy at birth at birth, identify the main health-related factors influencing it, and analyse its relationship with mortality and fertility.

The findings revealed that Algeria has experienced a significant improvement in life expectancy at birth at birth since independence, mainly due to the development of the healthcare system, the improvement of medical services, the expansion of health infrastructure, vaccination programmes, and reproductive health policies. The study also demonstrated an inverse relationship between life expectancy at birth and infant mortality, as the decline in infant- -mortality contributed directly to the increase in life expectancy at birth. In addition, the results showed an inverse relationship between life expectancy at birth and the total fertility rate within the context of the demographic transition experienced by Algeria over recent decades.

Keywords: Life expectancy at birth at birth, human development, demographic growth, mortality, fertility.

I.Introduction

The United Nations has paid particular attention to the concept of human development since 1990, when it published the first Human Development Report. This focus emerged following the gradual shift away from prevailing notions of human and social well-being, which had been limited to wealth and material prosperity alone, to encompass the achievement of higher cultural, security, health and environmental standards. As this concept is multifaceted and difficult to measure using a single indicator, the United Nations developed a set of indicators that have appeared in its various Human Development Reports. The first of these indicators was the Human Development Index (HDI), announced in the 1990 report, which is defined by three fundamental dimensions: “living a long and healthy life, measured by life expectancy at birth at birth; acquiring knowledge, measured by an adult’s ability to read and write; and achieving a decent standard of living, measured by per capita real gross domestic product in US dollars at purchasing power parity (PPP)” (محمد، 2000، صفحة 54)

Consequently, countries around the world have sought to achieve high levels of life expectancy at birth at birth, which is considered the most important indicator of health. The continuous rise in life expectancy at birth at birth across the globe, regardless of a country’s level of development, is regarded as one of the most significant achievements of human societies during the last quarter of the twentieth century (Freeman, et al., 2000, p. 202) . However, significant disparities still persist between developed and developing countries., and life expectancy at birth can have significant positive effects on fundamental aspects of a country’s social and economic life, including female fertility, investment

in human capital, health and pension expenditure, and, last but not least, economic growth itself (Shaw, Horrace, & Vogel, 2005, pp. 768–783)

Life expectancy at birth at birth is also influenced by several factors, including rising health expenditure, such that the latter, in conjunction with behavioural and social factors, plays a significant role in improving population living conditions, which is naturally reflected in an increase in life expectancy at birth (Braveman & Gottlieb, 2014, pp. 19–31) . An analysis of the evolution of global health expenditure over the last twenty-one years, expressed as a percentage of gross domestic product (GDP), reveals a steady increase from 8.62% in 2000 to 10.89% in 2020. The trend was similar for life expectancy at birth at birth, which rose by approximately four years, from 68 years in 2000 to 72 years in 2020. (Bilas ،Franc, and Bosnjak, 2014, pp. 1–9)

Improvements to the healthcare system (an increase in the number of primary care doctors and healthcare facilities) also lead to better health outcomes and higher life expectancy at birth; Similar patterns have been observed across several countries worldwide. Since 1980, improvements in the quality of healthcare systems in two European countries, Germany and Poland, have been linked to an increase in life expectancy at birth at birth(Nolte، Scholz، Shkolnikov, and Mckee ،2002) . A joint study by Harvard, Stanford and Boston Universities also highlighted that mortality rates in the United States were lower in areas with a higher number of primary care doctors (Basu, Berkowiz, Philips, Bitton, & Landon, 2019, pp. 506–514) . In Algeria, life expectancy at birth at birth has shown continuous improvement since independence; in 1965, life expectancy at birth was 51.12 years, rising to 79.6 years in 2023 (ONS, 2025) This study therefore seeks to identify the factors that have contributed to this significant increase by addressing two questions: Has Algeria worked to improve its healthcare system in order to raise life expectancy at birth at birth? And how has this increase affected demographic growth in Algeria?

II. Objectives of the study:

This study aims to:

- Track the evolution of a key dimension of human development, namely life expectancy at birth at birth, in Algeria.
-Identify the most significant health factors that have led to the rise in life expectancy at birth at birth in Algeria.
- To examine the implications of life expectancy at birth at birth on demographic growth in Algeria

III. Methodology

The study adopted a descriptive and analytical approach in describing one of the dimensions of human development, namely life expectancy at birth at birth, as this approach facilitates a comprehensive and accurate analysis of the phenomenon under study. Data and information were collected from the Algerian National Office of Statistics as well as various reports from the Ministry of Health.

IV. Concepts of the study

1- Human development:

The concept of human development is as old as human thought itself, with roots in Greek philosophy with Aristotle, in Arab-Islamic thought with Ibn Khaldun, and in Western thought with **François** Quesnay. The United Nations Development Programme (UNDP) drew inspiration from this concept and made it the title of its annual report, first published in 1990. According to the Human

Development Reports issued by the UNDP, human development is defined as the process of expanding people's choices, These choices are theoretically unlimited, but in reality they are determined by economic, cultural and political constraints, as well as by the availability of goods, services and knowledge to meet these needs, which range from basic necessities—such as food, shelter, health and a clean environment— to the desire to participate in all aspects of society. (أبو طاحون، 2000، ص ص159-160).

According to the 2003 Arab Human Development Report, it is defined as a process of expanding choices; every day, people exercise multiple choices, some economic, some social, some political and some cultural. Since people are the focus of development efforts, these efforts should be directed towards expanding the range of choices available to every individual in all areas of human endeavour(مصطفى، 2004، صفحة 134). (Human development is defined by three fundamental dimensions: health, education and per capita GDP, and is calculated using the following formula:

The Human Development Index (HDI) is calculated as the average of three components: the Life Expectancy Index, the Education Index, and the GDP per Capita Index.

2-Life expectancy at birth at birth:

Life expectancy at birth is one of the most fundamental indicators of population health and socio-economic development; it serves as a composite measure that reflects both individual well-being and the functionality of publichealthcare systems, social policies and governance structures (Deaton, 2013; Marmot, 2015). According to the World Health Organization (2023), global life expectancy at birth increased from 64.2 years in 1990 to 73.3 years in 2023, largely due to advances in vaccination, maternal and child health, nutrition, and the expansion of primary healthcare

Life expectancy at birth is defined as the average number of years a newborn is expected to live at birth, assuming the prevailing mortality patterns at the time of birth continue, as defined by the World Bank. One of the primary objectives of governments is to improve life expectancy and reduce mortality rates. at birth and that mortality rates are reduced to the lowest possible level (Sufian, 2013)

3- Demographic growth:

Demographic growth is a social phenomenon relating to human societies and their population size; it refers to the upward trend resulting from the natural increase in the number of people on Earth. It is also expressed as demographic transition, which is 'the transition from a state of equilibrium characterised by high fertility and high mortality to a state of equilibrium characterised by low fertility and low mortality over a period of time, which runs parallel to social and economic development (عائشة، 2017)

V. The impact of thehealthcare system on life expectancy at birth at birth in Algeria

1-The evolution of life expectancy at birth at birth in Algeria

Life expectancy at birth at birth in Algeria has improved and developed since independence, as shown in the following table:

Table 1 shows the development of life expectancy at birth in Algeria since independence

Year	Males	Females	Total	Year	Males	Females	Total
1965	51.15	51.17	51.12	2004	73.90	75.80	74.80
1970	52.79	52.80	52.77	2005	73.60	75.60	74.60
1977	53.27	53.48	53.05	2006	74.60	76.70	75.70

1979	55.74	56.33	55.14	2007	74.70	76.80	75.70
1981	58.81	59.59	58.03	2008	74.80	76.40	75.60
1982	59.95	61.38	58.54	2009	74.70	76.30	75.50
1983	62.45	63.32	61.57	2010	75.60	77.00	76.30
1984	62.94	63.76	62.11	2011	75.60	77.40	76.50
1985	63.42	64.19	62.65	2012	75.80	77.10	76.40
1986	64.74	65.27	64.20	2013	76.50	77.60	77.00
1987	66.05	66.34	65.75	2014	76.60	77.80	77.20
1988	66.18	66.41	65.95	2015	76.40	77.80	77.10
1989	66.32	66.48	66.15	2016	77.10	78.20	77.60
1990	66.81	67.14	66.48	2017	76.9	78.20	77.60
2000	71.50	73.40	72.50	2018	77.10	78.40	77.70
2001	71.90	73.60	72.40	2019	77.20	78.60	77.80
2002	72.50	74.20	73.40	2020	74.20	77.90	75.90
2003	72.90	74.90	73.90	2023	78.20	81	79.60

. **Source:** Hamza Chérif A, Population and Essential Needs In Algeria by 2038 www.ons.dz/santé

Life expectancy at birth at birth in Algeria has seen continuous improvement since independence. In 1965, life expectancy at birth was 51.12 years, rising to 61.57 years in 1983 – an increase of 10 years – then to 72.5 years in 2000, reaching 77.80 years in 2019. As for the gender gap, The gender gap was initially very narrow in the early years – 0.2 years in 1965 – before rising to 1.43 years in 1982, then falling again to 0.29 years in 1987 due to the economic crisis Algeria faced as a result of falling oil prices and debt. before widening again and peaking at 2.1 years in 2006 and then 1.4 years in 2019, always in favour of women, “However, a decrease of 1.9 years was recorded overall between 2019 and 2020 due to the COVID-19 pandemic, which affected countries worldwide, including Algeria, and resulted in human losses across all age groups and genders; yet its impact on men was notably greater than on women (74.2 years compared to 77.9 years respectively), and the decline in this indicator continued in 2021 by 0.2 years.

On the other hand, we recorded a notable increase of 1.4 years in 2020, with women reaching the 80-year mark for the first time, and in 2023, this upward trend continued, reaching 79.6 years at the national level, with gender disparities standing at 78.2 years for men and 81 years for women (ONS, démographie algérienne, 2020-2023)

This rise in life expectancy at birth was the result of the development efforts on which the Algerian state has relied since independence, through the strategies and policies it has adopted in various fields, including health and education, which have had a clear impact on improving the living conditions of Algerians in general and women in particular. This has led to a decline in fertility, which has reduced the maternal mortality rate and, consequently, the overall mortality rate. We will now examine Algeria’s healthcare system and its relationship to life expectancy at birth at birth.

2-Thehealthcare system in Algeria

2.1 Structure of Healthcare Institutions

Table 2 shows the health infrastructure in Algeria

	2008	2016	2018	2020

	Number	Number of technical beds	Number	Number of technical beds	Number	Number of technical beds	Number	Number of technical beds
General hospital	190	37,185	20	38,407	206	40,442	210	40503
Hospital	04	400	09	1324	09	1533	09	1533
University hospitals	13	12,115	15	12,910	15	12,671	15	13,758
University Hospital	01	700	01	818	01	1087	01	770
Specialist healthcare institution	57	9932	75	11,725	79	12,426	79	13,914
Public community health institutions	271	---	273	---	273	---	273	---
Multi-service clinic	1419	1988	1684	075	1715	4347	1748	4607
Treatment rooms	077	---	5,875	---	6003	---	6160	---
Public Maternity Ward	419	2812	416	3142	410	3046	403	3000
Pharmacies	8,477	---	11,140	---	11562	---	11825	---
including private ones	7509	---	10260	---	10700	---	10985	---
%	8.58	---	92.10	---	92.54	---	92.90	---
Private facilities								
Specialist clinic	521	---	9042	---	10620	---	11591	---
General practitioner's surgery	6202	---	7298	---	8347	---	8848	---
Dental clinic	4717	---	6514	---	7526	---	8266	---
Practice clinic	301	---	709	---	938	---	1074	---

Source: Compiled by the researcher using data from the National Statistics Office

An analysis of the development of healthcare facilities in Algeria – which constitute the sector's infrastructure – and the workforce reveals that:

- The number of public hospitals stood at 206 in 2018, with 40,442 beds, compared to 190 hospitals in 2008 with 37,185 beds, representing an increase of 16 hospitals over 10 years. Conversely, we observed no increase in the number of university hospitals and centres; We find that the number has remained almost constant over 10 years, with the focus solely on increasing a limited number of beds, which is insufficient and constitutes a shortfall in relation to the demand for health and hospital services. However, the total number of healthcare facilities remains comparable to previous years, standing at 211 in 1985 and 245 in 1995. This development followed several reforms undertaken by the state in the healthcare sector, including the five-year plans (2005–2009) and (2010–2014), "which marked the beginning of the implementation of the contractual system for hospital treatment, which

went through gradual stages until it was finally implemented in late 2009, To improve the quality of healthcare services provided to citizens, the government also worked to implement a new policy on the distribution of medicines, aimed at promoting generic medicines and providing support for essential medicines for chronic and serious illnesses. It has also worked to strengthen the facilities of regional hospitals in order to relieve pressure on university hospitals and open new medical centres, and to enhance the management of thehealthcare system in the areas of prevention and hospital care, in addition to implementing the health map, which has contributed to strengthening health structures of all kinds and brought healthcare closer to citizens" (حوالف، 2017، صفحة 288) Furthermore, the private sector has contributed to improving the level of healthcare coverage: by 2020, there were 11,591 specialist clinics, 8,848 general practitioner clinics and 8,266 dental clinics.

2.2. The workforce

Table 3 shows the workforce in the health sector in Algeria

Year	Doctors		Pharmacists		Dental surgeons	
	Number	Population per doctor	Number	Population per pharmacist	Number	Population per surgeon
1990	23,550	1,063	2,134	11,725	7,199	3,476
2000	32,332	941	4814	6318	8197	3711
2010	56209	640	901	3962	11,633	3093
2018	81,751	521	12,890	3,303	15,008	2837
2020	83,713	---	13,273	---	15745	---

Source: Compiled by the researcher using data from the National Statistics Office

-Table 3 shows that the number of medical staff (doctors, pharmacists, dental surgeons) more than doubled between 2000 and 2018, rising from (32,332, 4,814, 8,197) in 2000 to 81,751, 12,890 and 15,008 respectively in 2018, whilst the number of people per doctor fell over the same period from 941 to 521, and the number of people per pharmacist from 6,318 to 3,303.

2.3. Morbidity rates in Algeria

The following table lists the diseases that the state has designated as notifiable; some of these diseases are detailed in the table below:

Table 4 shows some of the diseases that must be reported

Type of disease	2016	2017	2018
Meningitis	5015	4531	4675
Thyroid	78	121	61
Dysentery	184	244	236
Viral hepatitis A	1719	1292	3841
Viral hepatitis B	2861	3173	3519
Hepatitis C	798	889	1078
Trachoma	834	776	360
Schistosomiasis	04	05	09
Malaria	432	453	1242
Abdominal cyst	329	368	295
Visceral leishmaniasis	68	29	43
Cutaneous leishmaniasis	8811	1172	9702

Brucellosis	8575	10,191	11031
Measles	342	779	26,945
Diphtheria	0	0	0
Whooping cough	24	39	148
Tetanus	09	01	04
Tuberculosis	22226	22357	22680
AIDS	119	82	50
Seropositive for HIV	650	818	765

Source: National Statistics Office

The data presented in the table show that that the number of reported cases has been rising steadily in recent years. This applies to various infectious diseases, including hepatitis A (1,719 cases in 2017–3,841 cases in 2018), malaria (432 cases in 2016–1,242 cases in 2018), measles (342 cases in 2016–26,945 cases in 2018), whooping cough (24 cases in 2016–148 cases in 2018), and tuberculosis (22,226 cases in 2016–22,680 cases in 2018).

The relationship between life expectancy at birth at birth and the demographic structure in Algeria

1. **The relationship between life expectancy at birth at birth and mortality**

Mortality is one of the fundamental components of natural demographic growth and the most important indicator of the health status of the population. The mortality rate in Algeria has seen a significant decline over the last three decades, as shown in the following table:

Table 5 shows the trend in the crude mortality rate

Years	**1990**	**2000**	**2010**	**2019**	**2020**	**2021**	**2022**	**2023**
Crude death rate (‰)	6.03	4.59	4.37	4.55	5.45	5.75	4.45	4.15

Source: Prepared by the researcher based on data from the National Statistics Office

The table shows that the crude death rate fell from 6.03‰ in 1990 to 4.37‰ in 2010, having previously stood at 16.45‰ and 10.9‰ in 1970 and 1980 respectively. This is attributable to improvements made by the state in the health sector, such as free healthcare introduced in 1974, vaccination against infectious diseases, as well as attention to reproductive health and maternal health, and improved living standards. The rate continued to fall until 2019, when it reached 4.55‰, However, it increased slightly between 2020 and 2021 due to deaths caused by the COVID-19 pandemic, which affected countries worldwide. The rate has continued to fall and has stabilised somewhat at around 4‰ in recent years, owing to improved health standards and a reduction in deaths from chronic and infectious diseases. Furthermore, the decline in the overall mortality rate is largely linked to a reduction in infant mortality, as shown in Table 5.

In this section, we will present the infant mortality rate, as it accounts for the lion's share of total deaths (40% to 45%)

Table 6 shows the relationship between life expectancy at birth and infant mortality rate

Year	**Infant mortality rate**	**Life expectancy at birth**	**Year**	**Infant mortality rate**	**Life expectancy at birth at birth**

1965	171	51.12	2003	37.74	73.90
1970	149	52.77	2004	32.19	74.80
1977	147	53.05	2005	30.40	74.60
1979	115	55.14	2006	26.90	75.70
1981	84.72	58.03	2007	26.20	75.70
1982	83.72	58.54	2008	25.50	75.60
1983	82.73	61.57	2009	24.80	75.50
1984	81.24	62.11	2010	23.70	76.30
1985	78.30	62.65	2011	23.10	76.50
1986	70.71	64.20	2012	22.60	76.40
1987	64.42	65.75	2013	22.40	77.00
1988	60.37	65.95	2014	22.00	77.20
1989	59.00	66.15	2015	22.30	77.10
1990	57.80	66.48	2016	20.90	77.60
2000	51.10	72.5	2017	21.00	77.60
2001	40.56	72.4	2018	21.00	77.70
2002	39.15	73.40	2019	21.00	77.80
			2023	19.90	79.60

-The data presented in the table show that that the infant mortality rate in Algeria has fallen rapidly by 150 points over 54 years, as a result of government programmes to combat infant mortality, including the fight against diarrhoea, vaccination programmes, which can be described as compulsory, as children cannot enrol in school without having received various vaccinations from birth, as well as ensuring proper nutrition for the child to prevent malnutrition. It is worth noting that infant deaths occur during the first six weeks after birth. As the child's health is linked to the mother's health, the state has implemented special programmes to safeguard her health, including birth spacing and combating maternal mortality, in addition to ensuring a clean environment.

-As The data presented in the table show that, a decrease in the infant mortality rate is accompanied by an increase in life expectancy at birth at birth; that is, there is an inverse relationship between the two. This relationship reflects the level of healthcare, nutrition, living and educational conditions, and health services available to the mother and child. Improved vaccination, pre- and post-natal care, better nutrition, and access to clean water and sanitation are all factors that contribute to reducing infant mortality, leading to an increase in life expectancy at birth at birth.

Furthermore, from a demographic perspective, the two indicators are used together to measure a country's level of health and social progress, as developed countries are characterised by low infant mortality and high life expectancy at birth, whilst less developed countries suffer from high infant mortality and low life expectancy at birth.

2. The relationship between life expectancy at birth at birth and fertility

Table 7 shows the relationship between life expectancy at birth at birth and the total fertility rate

Year	Composite Fertility Index	Life expectancy at birth	Year	Total fertility rate	Life expectancy at birth at birth
1966	7.4	51.12	1990	4.50	66.48
1970	8.1	52.77	1992	4.4	
1977	7.4	53.05	2000	2.4	72.5
1981	6.40	58.03	2002	2.5	73.40
1982	6.37	58.54	2005	2.6	74.60
1983	6.33	61.57	2006	2.3	75.70
1984	6.07	62.11	2008	2.8	75.60
1985	6.24	62.65	2012	3.02	76.40
1986	5.50	64.20	2014	3.03	77.20
1987	4.84	65.75	2016	3.1	77.60
1988	4.73	65.95	2019	3.0	77.80
1989	4.61	66.15	2023	2.7	79.60

The table showing the trend in the total fertility rate and life expectancy at birth at birth in Algeria reveals that:

- The total fertility rate rose significantly in the early years following independence, standing at 7.4 children per woman in 1966 and reaching 8 children per woman in 1970, before falling markedly to 4.84 in 1987 and then to 2.4 children per woman in 2000. This is the result of several factors, including the widespread use by couples of various types of contraception, both traditional and modern, with the use of contraception by couples estimated at 65% in 2018, up from 8% in 1970. Furthermore, women's entry into education and the workforce has influenced reproductive behaviour by delaying the age of marriage and leading to a preference for fewer children, However, the rate has risen again in recent years, reaching 3.1 children per woman in 2016 and 2.7 in 2023. This trend may be attributed to changes in the demographic structure, with a decline in the number of people in the 20–34 age group, where the highest proportion of marriages (80%) occurs. Consequently, women who marry after this age tend to have children closer together and have a larger number of children before reaching menopause.

We therefore observe an inverse relationship between life expectancy at birth at birth and the total fertility rate; that is, as the total fertility rate decreases, life expectancy at birth at birth increases. This inverse relationship between the two indicators is explained by several demographic and developmental factors, the most important of which are:

- High fertility is often associated with poor health, education and economic conditions, particularly in developing countries, where frequent and closely spaced births increase health risks for both mother and child and lead to higher infant mortality, which negatively impacts life expectancy at birth at birth.
- Societies with high fertility rates typically have less access to healthcare, nutrition and education services, which affects the general health of the population and limits life expectancy at birth.
- Low fertility is often associated with higher levels of development, improved healthcare, widespread education (particularly for women), and greater health awareness; these factors contribute to improved survival rates and higher life expectancy at birth at birth.

The theory of demographic transition explains this relationship as follows: as societies transition from a traditional to a modern system, mortality first declines as a result of improved health, and fertility subsequently falls due to economic, social and cultural changes; at this stage, life expectancy at birth rises significantly.

Studying the relationship between the total fertility rate and life expectancy at birth at birth helps to understand the dynamics of demographic growth and the level of human development, and serves as an important tool for analysing demographic and health transitions within societies.

Conclusion

The study concluded that life expectancy at birth at birth is a key indicator for measuring the level of human development. In Algeria, this indicator has seen a marked improvement since independence as a result of better health and social services and a decline in mortality rates, particularly infant mortality. The study also revealed a close relationship between rising life expectancy at birth and the demographic shifts experienced by Algerian society, chief among them a decline in fertility and an improvement in the population's health status. Despite the positive results recorded, sustaining this progress requires continued support for the health sector and improvements in the quality of health services to address future demographic challenges.

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