Impact of Economic, Environmental and Social Factors on Health Status in Tunisia: Bounds Test to Cointegration Approach

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Abstract: ***The objective of this paper is to examine the effect of socioeconomic and environmental factors on health status in Tunisia. Data used are annual and taken from the database of the World Bank for the period 1995-2012. We employ the Autoregressive Distributed Lag (ARDL) model. In the proposed model, health status is measured by life expectancy at birth and the factors that determine health status are: the unemployment rate, the population growth rate, the Gross Domestic Product per capita, Expenditure on health total as a percentage of GDP, Expenditure on education total as a percentage of GDP, and improved access to water. The results of the long-term relationship estimation between determinants and health status show that health expenditure, education expenditure, Gross Domestic Product and improved access to water are positively related to the state while the population growth rate and the unemployment rate have an adverse effect. Regarding the short-term relationship, the results show a positive effect of population growth rate, improved access to drinking water, education expenditure, health expenditures, gross domestic product and health status. On the other hand, the results indicate the existence of a negative effect of the unemployment rate on the health status.***

Keywords: Health Economics; Health Status; ARDL Model; Cointegration; Tunisia

1. Introduction

Since 1980, Tunisia has embarked on far-reaching economic reforms. This has resulted in important consequences for health and the regulation and financing of the health system. These efforts by Tunisia in favor of the health sector have contributed to the improvement of health indicators. This improvement is also due to the technological evolution and progress of medicine. This leads to a decrease in the specific mortality and primarily the decline in infant mortality which rose from 26.3 per thousand in 2000 to 13 per thousand in 2014. Similarly, the infant mortality rate, less than 5 years is relatively from 31.7 deaths per thousand in 2000 to 15 per thousand in 2014. At the same time, life expectancy at birth has increased from 72.6 years in 2000 to 74 years in 2014. On the other hand, the crude mortality rate per 1,000 people increased from 5.6 per 1,000 people in 2000 to 6 per 1,000 people in 2014.

At the global level also, in recent years, the health situation of individuals has improved [1]. The global maternal mortality rate declined by about 44% between 1990 and 2015. This rate dropped from 385 to 216 per 100,000 live births. Similarly, between 1990 and 2015, the under-five mortality rate decreased by 50%. In 2015, it is 43 deaths per 1,000 live births [1]. This progress is due to socio-economic development, improvement of water supply and sanitation and development of health services. However, this improvement is not uniform across countries [2]. This inequality exists, too, within the same country. These disparities, in terms of health status, are due to the heterogeneity of health systems, policies and also individuals and their behavior. In sum, many countries, particularly in sub-Saharan Africa, have not benefited from progress in the health sector. Indeed, life expectancy has declined, partly because of the AIDS epidemic [3], [4]. The health situation in Africa is fragile and alarming. This is where millions of people suffer from a poor health situation, with 37 of the 41 countries in the world classified as having low human development [5].

Health status is determined by many factors, including socio-economic, environmental, demographic, cultural, and other factors. Several studies have shown relationships between these factors and health status [6], [7]. Thus, the objective of this work is to determine the effect of certain socioeconomic factors and environments on the health status of the Tunisian population.

2. Related work

Health as a basic service is attracting the interest of many economists. From the interest in health by economists came the economy of health. As a result, many reflections have been conducted to examine the relationship between health and its socioeconomic and environmental determinants.

A definition of health proposed by Bonnevie [8] refers to its various determinants. It joins three bio-psycho-social components already presented in the definition of the World Health Organization and the adaptive aspect present in the definition of Dubos [9]. Bonnevie [8] believes that health "results from a behavioral capacity, including biological as well as social components, to perform fundamental functions that can only be done through an adaptation process".

As regards Blum [10], "health consists of the ability of the individual to maintain a state of balance appropriate to his age and social needs, in which he is reasonably free from profound discomfort, dissatisfaction, illness or incapacity, and to behave in a way that ensures the survival of his species as well as his own personal". In [11] the notion of health is seen not only as a "static" state but as a dynamic reality: the definition of health has evolved into a more dynamic conception, perceived as a resource for everyday life. Also according to Amarasinghe and al. [12], the concept of health is relative and multifactorial.

Indeed, the environment in which the individual lives is fundamental to maintain his state of health. Housing conditions, working conditions, quality of food, air quality, free time, etc. are essential. That is, the determinants of health that affect well-being and that lead to a departure from a conception of health as absence of disease and defines it as a state of well-being. The preconditions for the establishment of health are numerous. In [13], the author defines health as an ecological balance between man and his environment (physical, social) and considers the disease as a break of this balance. It allows to articulate a new understanding of the morbid phenomenon and to take into account new factors related to the environment. In fact, over time, the population was rural and the environment was not an element to be taken into account in the definition of health. The increase in urbanization and the disparities in economic development according to geographical locations have led to a reconsideration of the role of the environment. In [9], the authors propose a definition integrating the eruption of each individual into the environment in which he lives. Health is therefore the ability to adapt and the permanent adjustment of an individual to his environment. The disease corresponds to a "lack of adjustment" [14]. Thus, the state of health of individuals is the result of interactions between different individual factors, economic, environmental and social [15].

In fact, those who are less well off, less educated or have an unattractive job tend to have poorer health. Amarasinghe and al. [12], have shown that for individuals with the highest poverty rates and who are the least educated, they experience higher rates of obesity. And a considerable number of studies have demonstrated the impact of education on health [16]. Adler and al. [17], have also shown that at the highest incomes, a medical service, better housing, nutritional status, etc. are associated. In addition, people with a higher level of education tend to have better health awareness and knowledge related to health.

Studies in European countries have confirmed that the health status of the group with a high socio-economic status is better than that of the group with lower socio-economic status and confirmed the profound impact of socio-economic status on health. Johan and al. [18], compared the extent of inequalities in mortality across 22 countries in all regions of Europe. The authors concluded that mortality rates are significantly higher in lower socio-economic status groups, but the extent of inequality between upper and lower socio-economic status groups was much greater in some countries. Inequalities of mortality were low in some southern European countries and very important in most countries in the eastern and Baltic regions.

These inequities could be reduced by improving educational opportunities, income distribution, health-related behaviors or access to health care.

In the study by Amarasinghe and al. [12], socio-economic factors such as income, education, age are not the only determinants of health status. It is affected by a complex set of observed and unobserved factors and variables. According to the authors, a combination of economic, structural and behavioral changes has had a profound impact on health. Health status is explained by the socio-economic, demographic and environmental variables of the individual. The data are compiled from the microdata files of the Behavioral Risk Factor Surveillance System for the year 2003 on the behavior of adults in health. To address the endogeneity bias, a two-step recursive approach was used for this study. Logit estimates have shown that the level of education attained has a significant negative impact on an obese person. Among ethnic categories, Hispanics are less likely to be obese compared to the core category of other non-Hispanic multicultural groups. For a Hispanic, the odds of being obese are 0.86 units. The results also show that the probability of being obese increases at a decreasing rate with age and per capita income.

In his study, Wang and Geng [19] examined the impact of socioeconomic status on the physical and psychological health of the 986 respondents from the 2015 General Social Survey. The results showed that socioeconomic status has a significant impact on people's physical health, but its impact on psychological health is not significant. Lifestyle has had significant positive effects on physical and psychological health.

In the literature, several models have been constructed that integrate the determinants that affect health. Explanatory models of these determinants are presented by the National Institute of Prevention and Health Education [20] such as the model of Dahlgren and Whitehead [21], the model of Diderichsen and Hallqvist (1998). The latter model was adapted in 2001 by Diderichsen and Whitehead [15]. There are also other models, such as the Mackenbah model (1994), the Brunner model, Marmot and Wilkinson 1999, and the model of the WHO Commission on Social Determinants of Health [22].

In the Dahlgren and Whitehead model [21], the determinants are presented in rainbow and four levels. At the first level, the determinants are the factors related to personal lifestyles: they encompass the lifestyles and behaviors of individuals that can be supportive as a good or adverse diet such as smoking. At the second level, the determinants are social and community networks. These are social conditions that affect health and may be favorable or unfavorable. Its determinants affect health and change its quality and duration. The third level concerns factors related to working conditions and access to health services, education, water, and housing. The fourth level is related to socio-economic, cultural and environmental conditions. This level includes the standard of living and the economic situation.

The Pathway Model of the WHO Commission on Social Determinants of Health is based on the structural determinants of social inequalities and intermediate determinants of health [15]. The structural determinants of health depend on the socio-economic and political context of the country. In fact, governance, macroeconomic policies, social policies, public policies, culture and societal values can influence the socio-economic position of the country.

Intermediate determinants are material conditions such as housing and working conditions and nutrition, psychological such as stress and social support, biological factors, behaviors such as physical activity, tobacco and alcohol and health systems.

In the Robert Wood Johnson Foundation RWJF model [23], the factors that influence health, are medical care, individual behavior, living and working conditions, and more importantly opportunities and economic and social resources.

According to these models, health is affected by many factors, not only health care and expenditure, but also education, income levels, living conditions, and other factors known as determinants of health. Thus, there is a relationship between health status and these factors. As a result, several studies have defined the health production function, [24] [25] [26] as the relationship between determinants and health status.

According to Bichaka [26], this function is written:
$S_t = F(E_t)$, where:
- ***F***: function.
- ***S***: represents a measure of health status.
- ***E***: represents the vector of physical, economic and social environment factors, etc.
- ***t***: represents the year of observation t = 1.2 ..., T

3. Data and Methodology

3.1 Data

The data used in this work are annual and taken from the World Bank database [27] for the period 1995- 2012. Health status is measured by life expectancy at birth (EXP), and the explanatory variables are, per capita gross domestic product (GDP), annual population growth rate (POP), health expenditure, total as a percentage of GDP (DEPH), public expenditure on education as a percentage of GDP (DEPED), improved drinking water as a percentage of the population with access (WTR) and the unemployment rate (UNP).

The descriptive statistics of the variables are presented in Table 1 and indicate that GDP per capita (GDP), drinking water source (WTR) and unemployment rate (UNP) are the variables with the highest standard deviation. Thus, we observe that the null hypothesis of normality is accepted for all variables with the exception of the annual rate of population growth (POP).

In addition, the Philips and Perron (PP) unit root test results indicate that the null hypothesis is rejected for the variables EXP, UNP, DEPED, WTR and POP. These variables are stationary in level and integrated order 0. Thus, the results show that the null hypothesis of unit root is accepted for DEPEH variables and GDP per capita. These last are stationary in first difference and integrated of order 1.

Table 1: Descriptive Statistics of Variables

Variables	EXP	UNP	DEPED	DEPH	WTR	GDP	POP
Average	73.192	14.711	6.370	5.754	91.917	8413.047	1.135
Maximum	74.602	18.300	6.817	7.043	96.900	10609.050	1.937
Minimum	71.354	12.400	5.790	5.138	86.500	6054.804	0.928
Standard Deviation	1.042	1.669	0.239	0.582	3.245	1496.568	0.257
Skewness	-0.279	0.329	-0.227	1.303	-0.103	0.035	1.868
Kurtosis	1.849	2.502	3.468	3.367	1.816	1.662	6.185
J-B Stat	1.228	0.511	0.319	5.193	1.083	1.347	18.081*
Test PP (in level)	-2.315	-2.613	-3.79	0.438	-5.381	-0.696	-6.248
Test PP (in difference)	-	-	-	-3.612	-	-3.624	-
Order of integration	I(0)	I(0)	I(0)	I(1)	I(0)	I(1)	I(0)

Note : Skewness is the asymmetry coefficient, Kurtosis is the flattening coefficient, J-B Stat is the Jarque Bera statistic associated with the null hypothesis test of normality.
* indicates the rejection of the null hypothesis at the 1% threshold. The unit root null hypothesis is rejected if the PP test statistic is less than the critical value at the 5% threshold of -1.95.

3.2 Methodology

3.2.1 The econometric model: the ARDL approach of Pesaran

To evaluate the relationship between health status and its determinants, we use the Autoregressive Distributed Lag model (ARDL) developed by Pesaran, Shin and Smith [28], [29]. The use of this model is justified by its major advantages over the approach of Johansen and Juselius [30] and Engel and Granger [31]. The Pesaran ARDL approach [29] estimates a model whose variables have different integration orders, ie I(1) and I(0). Indeed, to look for a cointegration relation, this model does not require that the series be integrated of the same order. Another advantage is the statistical properties of the estimators in the case of using small samples [32]. In [32], the authors indicate that the obtained estimators are more efficient than those obtained by the Johansen and Juselius approach. Thus, this approach makes it possible to circumvent the statistical problems of asymptotic distributions related to the presence of unit roots in the variables used, [33] . Indeed, Pesaran's approach is the most appropriate in our work. Knowing that in this study the sample is small.

In this work, health status is measured by life expectancy at birth (EXP), and the explanatory variables are, per capita gross domestic product (GDP), the annual rate of population growth (POP), Expenditure on health, total as a percentage of GDP (DEPH), expenditure on education as a percentage of GDP (DEPED), improved drinking water as a percentage of the population with access (WTR) and the unemployment rate (UNP). The logarithmic transformation of the relationship between life expectancy at birth and the determinants of health is as follows:

$$\mathrm{LEXP_t} = \mathrm{C} + \alpha_1 \mathrm{LPIB}_t + \alpha_2 \mathrm{LPOP}_t + \alpha_3 L\mathrm{DEPH}_t + \alpha_4 L\mathrm{DEPED}_t + \alpha_5 \mathrm{LWTR}_t + \alpha_6 \mathrm{LUNP}_t + \varepsilon_t \quad (1)$$

- **EXP**: Life expectancy at birth
- **GDP**: Gross domestic product per capita (2011 constant international PPP $).
- **POP**: Annual rate of population growth.
- **DEPH**: Expenditure on health, total (% of GDP).
- **DEPED**: Expenditure on education, total (% of GDP).
- **WTR**: Improved drinking water sources as a percentage of the population with access.
- **UNP**: Total unemployment rate as a percentage of the population.
- **C**: Constant

3.2.2 Cointegration test and error correction model (ECM)

Pesaran's approach is to study the short- and long-term causal relationship that exists between variables within the framework of an autoregressive delay-phased model. First, a cointegration test is performed to examine the existence of a long-term relationship. Pesaran, [29], developed a cointegration test as part of the following ARDL model:

$$\begin{aligned}\Delta\mathrm{LEXP_t} &= c + \beta t + \sum_{i=1}^{p_1} \alpha_i\, \Delta L\mathrm{EXT}_{t-i+1} + \sum_{i=1}^{p_2} a_i\, \Delta\mathrm{LGDP}_{t-i+1} + \sum_{i=1}^{p_3} b_i\, \Delta\mathrm{LPOP}_{t-i+1} + \sum_{i=1}^{p_4} c_i\, \Delta\mathrm{LDEPH}_{t-i+1} \\ &+ \sum_{i=1}^{p_5} d_i\, \Delta\mathrm{LDEPED}_{t-i+1} + \sum_{i=1}^{p_6} e_i\, \Delta\mathrm{LWTR}_{t-i+1} + \sum_{i=1}^{p_7} f_i\, \Delta\mathrm{LUNP}_{t-i+1} + \lambda_1 \mathrm{LEXP}_{t-1} + \lambda_2 \mathrm{LGDP}_{t-1} \\ &+ \lambda_3 \mathrm{LPOP}_{t-1} + \lambda_4 \mathrm{LDEPH}_{t-1} + \lambda_5 \mathrm{LDEPED}_{t-1} + \lambda_6 \mathrm{LWTR}_{t-1} + \lambda_7 \mathrm{LUNP}_{t-1} + \varepsilon_t\end{aligned} \quad (2)$$

In this model $p_1, \ldots, p_7$ denote the optimal lags number, a_i, b_i, c_i, d_i, e_i, f_i denote the coefficients of the short term, $\lambda_1 \ldots \lambda_7$ denote the long-term coefficients, ε_t the error term and L denotes the logarithmic transformation. Since this relation, the null hypothesis of no cointegration relation between the variables is: $H0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$.

The test statistic used to test the null hypothesis of no cointegration is Fisher's statistic. Pesaran and al. [29] have provided two types of critical values. The first type is associated with the assumption that the variables in question are integrated of order 1 (I (1)), called upper bound. The second type is associated with the assumption that the variables in question are integrated of order 0 (I (0)), called lower bound. The comparison between the Fisher test statistic obtained and the critical values makes it possible to know if there is a cointegration relation between the variables. The null hypothesis of no cointegration is rejected once the test statistic exceeds the upper bound while this assumption is accepted if the Fisher statistic is lower than the lower bound. Moreover, it cannot be concluded in the case where the Fisher test statistic is between the lower bound and the upper bound.

The existence of a long-term relationship makes it possible to set up an error-correction model reflecting the short and long-term relationship between the variables. The error-correction model is written:

$$\begin{aligned}\Delta\mathrm{LEXP_t} &= c + \beta t + \sum_{i=1}^{p_1} \alpha_i\, \Delta L\mathrm{EXP}_{t-i+1} + \sum_{i=1}^{p_2} a_i\, \Delta\mathrm{LGDP}_{t-i+1} + \sum_{i=1}^{p_3} b_i\, \Delta\mathrm{LPOP}_{t-i+1} + \sum_{i=1}^{p_4} c_i\, \Delta\mathrm{LDEPH}_{t-i+1} \\ &+ \sum_{i=1}^{p_5} d_i\, \Delta\mathrm{LDEPED}_{t-i+1} + \sum_{i=1}^{p_6} e_i\, \Delta\mathrm{LWTR}_{t-i+1} + \sum_{i=1}^{p_7} f_i\, \Delta\mathrm{LUNP}_{t-i+1} + \rho\mathrm{ECM}_{t-1} + \varepsilon_t\end{aligned} \quad (3)$$

ECM indicates the long-run equilibrium relationship, ρ the error correction coefficient and ε_t the residual term. The long term relationship is written as follows:

$$\begin{aligned}\mathrm{ECM_t} = \mathrm{LEXP}_{t-1} &+ \phi_1 \mathrm{LGDP}_{t-1} + \phi_2 \mathrm{LPOP}_{t-1} \\ &+ \phi_3 \mathrm{LDEPH}_{t-1} + \phi_4 \mathrm{LDEPED}_{t-1} \\ &+ \phi_5 \mathrm{LWTR}_{t-1} + \phi_6 \mathrm{LUNP}_{t-1}\end{aligned} \quad (4)$$

The coefficients $\phi_1 .. \phi_6$ are the parameters of the long term relationship.

3.3 Empirical results

In this section we assess the impact of determinants such as socio-economic, demographic and environmental factors on the health status of the population in both the long-term and the short-term. First, we present the characteristics of the data used. Second, we adopt the Pesaran, Shin and Smith PSS approach [29] to test the existence of a cointegration relationship and to analyze the short and long term causality between determinants and state of health within a framework of an error correction model (ECM).

3.3.1 Cointegration test

The relationship between the determinants and the state of health presented in equation 2 makes it possible to test the existence of a long-term equilibrium relationship between the variables. According to Pesaran this test is a joint nullity test of the long term coefficients λ_i. The null hypothesis $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ is the absence of a cointegration relation between the variables.

This test requires the identification of the autoregressive model with staggered delays most appropriate to describe the relationship between the variables. Indeed, the model selected is the model ARDL (1,1,1,0,1,0,1)[1]. The result of the test obtained indicates that the F statistic of the test is 27.159. This statistic is greater than the upper critical value (4.26) at the 1% threshold given in Table 2. This leads to the rejection of the null hypothesis of no cointegration and therefore shows the existence of a long-term relationship between the determinants and the state of health.

Table 2: Critical Values of the Cointegration Test

	Lower bound	Upper bound
1%	2.96	4.26
5%	2.32	3.50
10%	2.03	3.13

3.3.2 Long-term elasticity

The results of the long-term relationship estimate between determinants and health status are presented in Table 3. Based on these results we can see that health expenditures, education expenditures and socio-economic factors are statistically significant. These are determinants of the state of health of the population and expected sign.

Table 3: Estimation of the long-term relationship

Variables	Coefficients	Standard Deviation	T Stat
LGDP	0.0917	0.0280	3.2781
LPOP	-0.0002	0.0093	-0.0201
LDEPH	0.0050	0.0027	1.8808
LDEPED	0.0061	0.0019	3.1721
LWTR	0.0112	0.0116	0.9621
LUNP	-0.0019	0.0006	-3.0135
C	2.5537	0.9560	2.6712
TREND	-0.0082	0.0066	-1.2553

The results show a positive relationship between gross domestic product and life expectancy at birth with a long-term elasticity level of 0.092. This indicates that a 1% increase in GDP leads to a 0.0092% increase in life expectancy at birth. This allows us to see a weak effect of this determinant. Similarly, we find a positive, but less important relationship than GDP, between health expenditures and life expectancy at birth. Thus, an increase in health expenditure per capita of 1% is accompanied by a longer life expectancy of 0.005%. According to an OECD study [34], this correlation tends to be weaker in countries with the highest per capita health expenditure. Also, the results show a positive relationship between education expenditure and life expectancy at birth. Thus, an increase in health expenditure of 1% is accompanied by an increase in life expectancy 0.006%.

The results indicate a negative relationship between unemployment and life expectancy at birth. A 1% drop in unemployment leads to a 0.002% increase in life expectancy at birth. Unemployment can increase health risks and is a public health problem. The Economic, Social and Environmental Council (CESE 2016) state that "unemployment is now a major public health problem". An unemployed person is subject to suicidal risk as a result of depressive disorders and an increase in the unemployment rate of 10% leads to a significant increase in the suicide rate of 1.5%. The negative coefficient of the trend is not significant.

[1]The criterion of choice of optimal lags is the Bayesian Schwarz information criterion (SBC).

3.3.3 Short term causality and error correction model

The results of the ECM model estimate are presented in Table 4. Regarding the short-term relationship, the results indicate the existence of a positive effect of gross domestic product and health expenditures and a negative effect of unemployment. These effects are not significant. In addition, these results show a positive and significant effect of population growth rate and improved access to drinking water. In addition, the results indicate a positive relationship between education expenditure and life expectancy at birth. Thus, these results may be due to the positive effects of education. Indeed, an educated individual with a sufficiently high level tends to take advantage of the entire system.

Moreover, the results show the existence of a long-term adjustment mechanism in the sense that the error correction coefficient ECM (-1) is negative is statistically significant. In addition, the error correction coefficient is relatively low (-0.2002) which indicates a low speed of long-term equilibrium adjustment.

Table 4: Estimation of the Error Correction Model

Variables	Coefficients	Standard Deviation	T Stat
DLGDP	1.0018	0.6909	1.4500
DLPOP	0.0182	0.0083	2.1955
DLDEPH	0.0250	0.0154	1.6254
DLDEPED	0.0328	0.0180	1.8239
DLWTR	2.5940	0.7588	3.4186
DLUNP	-0.0063	0.0112	-0.5662
C	-6.1149	2.7349	-2.2359
TREND	0.0176	0.0046	3.8747
ECM(-1)	-0.2002	0.0710	-2.8189

4. Conclusion and discussion

Findings reveal long-term causal link between determinants and health status indicating that gross domestic product, health and education expenditures positively and significantly affect life expectancy at birth while unemployment disadvantages the state of health. In the short term, the variations keep the same signs except that gross domestic product and health expenditure are no longer significant. In addition, both variable population growth rates and improved access to water have a positive and significant effect. The negative change in the unemployment rate is no longer significant.

The purpose of this work is to examine the effects of socioeconomic and environmental factors on health status. To achieve our objective we used the Pesaran, Shin and Smith Autoregressive Distribution Lag (ARDL) approach. Long-term estimates show a significant and positive effect of gross domestic product, health and education expenditures. The effect of the unemployment rate is negative and significant. Moreover, the results show the existence of a long-term adjustment mechanism in the sense that the error correction coefficient ECM (-1) is negative is statistically significant. In addition, the error correction coefficient is relatively low (-0.206) which indicates a low speed of long term equilibrium adjustment. In the short term, the results show a positive and significant effect of the rate of population growth, educational expenditure and population growth rate, and improved access to water. We also find that the gross domestic product has a positive effect and that the unemployment rate has a negative effect. But these two relationships are not significant.

We find that it is in logic of long or short term, there is a positive relation between the state of health and the expenses of health. That is to say, an increase in health expenditure generates an improvement in the state of health. Meanwhile, an increase in these expenditures is usually subject to resource scarcity constraints. For this purpose, it is essential to allocate these expenses in an efficient manner. Hence the need for health system efficiency assessment to judge how these expenditures are allocated. Thus, in future work, we plan to study the efficiency of the Tunisian health system in a comparative study compared to the health systems of the MENA countries.

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