Realising the Prospects of the Demographic Dividend in Selected Arab Countries

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ABSTRACT

Background: For most Arab countries, the coming ten years will present a real challenge in terms of their changing age structure. At present, a demographic window of opportunity has been unlocked in many of these countries, with the increase in the proportion of the population of working age. Hence, this study investigates the relationship between population growth and the dependency ratio in terms of demographic indicators and the per capita gross domestic product (GDP).
Methods: A time series analysis model is developed for Egypt and Morocco versus the Republic of Korea, as an economically empowered country that had the same initial conditions in the early 1960s. Data exploited are drawn from the World Bank and OECD databases. We adopt an income per capita growth model to analyse the role of demographic factors, mainly working-age share.
Results: There is a significant relationship between GDP per capita and the proportion of working-age population. A significant long run association between dependency ratio and per capita GDP is confirmed. The reduction of dependency load contributes to GDP per capita growth throughout the study duration by an annual rate of about 9% and 2% in Egypt and Morocco, respectively.
Conclusion: The decline in the dependency ratio, or alternatively, the rise in the working-age population, has a favourable impact on economic growth. The paper presents the interconnections between demographic changes and economic growth, and highlights the need for strategic public policies to scale up the effect of age structure alteration and to realise the demographic dividend in the studied countries.

Key words: Demographic dividend; dependency ratio; economic growth

INTRODUCTION

The demographic transition is the evolution from a crude equilibrium of high levels of mortality and fertility, through a phase in which decreasing mortality coexists with persistent high fertility levels, to an eventual equilibrium of low levels of mortality and fertility [1]. Consequently, the demographic transition is driven by mortality and fertility as

the major demographic components leading to population structure alterations. Arab countries are at present facing challenging conditions, while also in different phases of demographic transition [2].

The majority of Arab countries have seen a surge in life expectancy at birth, attributable to the adoption of policies that improve population health. Maternal and child health programmes, along with vaccination campaigns, have enhanced population health and decreased child and infant mortality [3].

Fertility rates have started to decrease in Arab countries, but at different paces. Until 2015, there were four main groupings of countries in the region according to fertility rates. The first included less developed countries with a fertility rate of 4.5 births per woman, such as Comoros, Djibouti, Mauritania, Sudan and Yemen, in addition to Somalia, which has a rate of 6 births per woman. Oman, Libya and Saudi Arabia form another group of countries that experience a fertility rate of around 3 births per woman, in spite of the availability of family planning and supplementary reproductive health services. The third group of countries are experiencing stagnating fertility and includes Jordan, Egypt and Syria. Countries such as Morocco, Tunisia, and Lebanon are in the fourth grouping, whose members are in the closing stages of demographic transition [3].

The demographic transition helps transform the age structure of the population, whereby the number of individuals of working age exceeds those who are economically dependent. If proper means are made available for socio-economic development and investment in health and education, a demographic dividend will be realised [4].

The demographic dividend refers to the economic opportunity that results from shifts in age structure that reduce the dependent proportion of a population and increase the proportion of the population at labour force age, creating direct and indirect economic opportunities [1].

Shifts in population age structure in populous countries lead to significant developmental consequences, such as the so-called "East Asian miracle." In this case, a change in population age structure created a demographic dividend which had a significant impact on economic growth all over East Asia. Between 1965 and 2005, for example, population and labour force growth accounted for 10%, 16%, 36% and 51% of economic growth in Japan, China, the Republic of Korea, and Singapore, respectively [4]. Following the experience of East and Southeast Asian countries, we can predict a similar path for Arab countries experiencing a demographic dividend. If proper productive employment policies are adopted, a demographic bonus could take Arab countries to new economic heights. However, failing to provide employment to many working-age adults could, by contrast, trigger adverse social, economic, and even political consequences. Translating a demographic dividend into a "demographic gift" is not automatic, therefore. Bloom et al. (2002) prioritised some variables to harness a demographic dividend, namely health, family planning, education and economic policies [5].

The positive effect of age structure on economic growth is tested retrospectively in relation to the Republic of Korea. Such an impact will materialise in Arab countries in the coming years and needs to be studied.

This study aims to provide evidence of the scaling up of the effect of the demographic dividend through investigating the influence of shifting population age structures on economic growth in selected Arab countries versus an economically empowered country.

The study objectives are to:

1. Describe the changes in selected demographic and economic indicators in Egypt and Morocco versus the Republic of Korea;
2. Study the relationship between the demographic indicators and economic growth in Egypt and Morocco versus the Republic of Korea;
3. Develop a projection model to estimate the effects of shifting age structures on economic growth.

METHODS

An observational longitudinal study design using time series analysis was conducted. Retrospective data were extracted from the World Bank and the OECD data files1 and analysed using EViews version 9. Data were presented using appropriate tables and graphs. The correlation test was performed to study the potential relationship between observations over time. The Pearson correlation test measures the strength of association between the variables and the direction of the relationship. The value of the correlation coefficient (r) varies between +1 and -1. A positive sign indicates a positive relationship and a negative sign indicates a negative relationship. Statistical significance is at $P \leq 0.05$. We adapted a growth model to analyse the role of demographic factors, mainly working-age share. The contribution of demographic factors to economic growth is illustrated over the period 1965–1995 in the Republic of Korea. The choice of this country is for referencing purposes, due to its success in harnessing the demographic dividend. However, the study period of the selected Arab countries, namely Egypt and Morocco, extends from 1965 to 2016. This variation in series length is due to the timeframe during which the Republic of Korea captured its demographic dividend1. Due to time variability of the data between countries, we performed time series analysis on annual data representing 31 or 52 observations for the key variables, depending on the studied country. The variables included in the analysis are: GDP per capita (constant 2011 USD$) utilised as the dependent variable that is explained by the dependency ratio, gross domestic savings (as a percentage of GDP),

and annual population growth. The log transformation is applied to the variables in order to interpret the results as elasticities. Data exploration is the first step in any time series econometric modelling. Therefore, the augmented Dickey-Fuller (ADF) unit root test in the time series of each variable is implemented to test for stationarity. Subsequently, an autoregressive distributed lag (ARDL) model is applied due to the substantial compromise it offers in accepting endogenous variables with various order of integration, such as I(0) and I(1), in addition to variable lag orders [7,8]. Furthermore, the short and long run coefficients are estimated simultaneously, consequently eliminating problems related to autocorrelation and omitted variables. In this paper, we make use of the Schwarz-Bayesian criterion (SBC) to choose the variable lag length. To inspect the existence of a long run association between the three explanatory variables, we utilise the bounds testing approach [8]. However, since the sample size at hand varies between 30 to 80 observations, the F-statistic is contrasted to the corresponding critical values proposed by Narayan (2004, 2005) [9,10].

Ethical Approval

Ethical approval was not required for this work as there was no data collection.

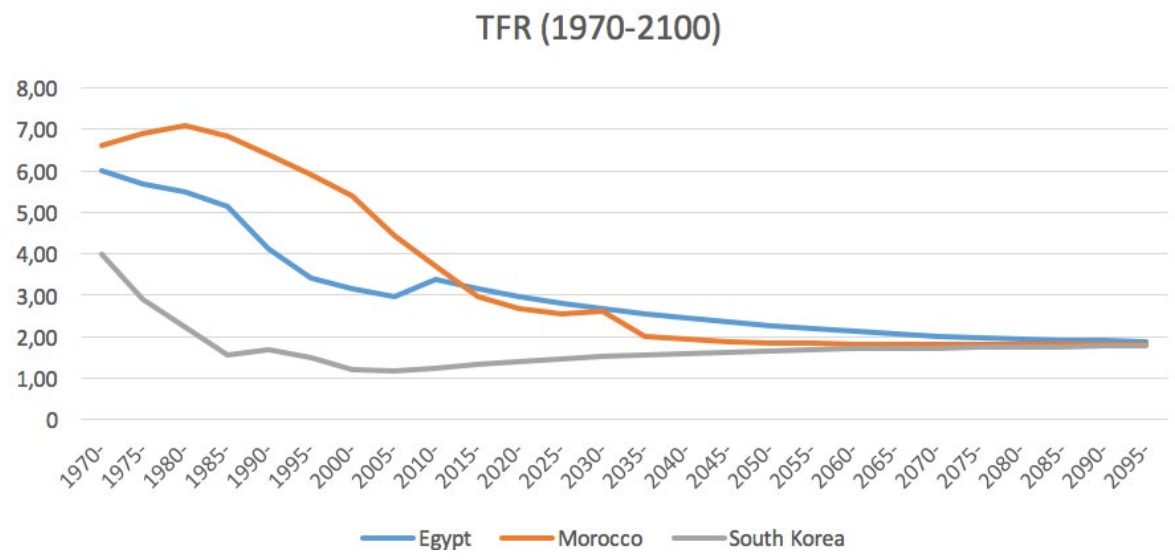
RESULTS

The dependency ratio is expressed as the number of population aged between 0–15 years plus those in the age group 65+ years (young plus old dependents) versus those aged between 15–64 years. Hence, the dependency ratio decreases with fertility decline accompanied by a growing working-age population. The total fertility rate (TFR) is a determinant of population growth, measuring the average number of live births per woman during her reproductive years (15–49). Figure 1 illustrates the total fertility rates as an important indicator of increase in working-age population in the three countries from 1970 to 2100, as projected in the medium scenario. The long-range projections prepared by the United Nations Population Division include several scenarios for population growth for the world and its major areas. The medium scenario assumes that fertility in all major areas stabilises at replacement level; the low scenario assumes that fertility is half a child lower than in the medium scenario; and the high scenario assumes that fertility is half a child higher than in the medium scenario [11].

The Republic of Korea, which is our reference country, had a total fertility rate of 4 children per woman in 1970, compared to Egypt's rate of 6 and Morocco's of 6.6 in the same year. With different decreasing slopes, all countries witnessed a drop in their total fertility rate through 2010. The Republic of Korea continued its stabilised decreasing path, whereas Egypt and Morocco continued with an increase in their total fertility rate levels until 2015. Figure 1 shows that as we are moving towards the year 2100, the rate in the two Arab countries is expected to decrease, starting in 2020, while that of the Republic of Korea is expected to rise during the same period.

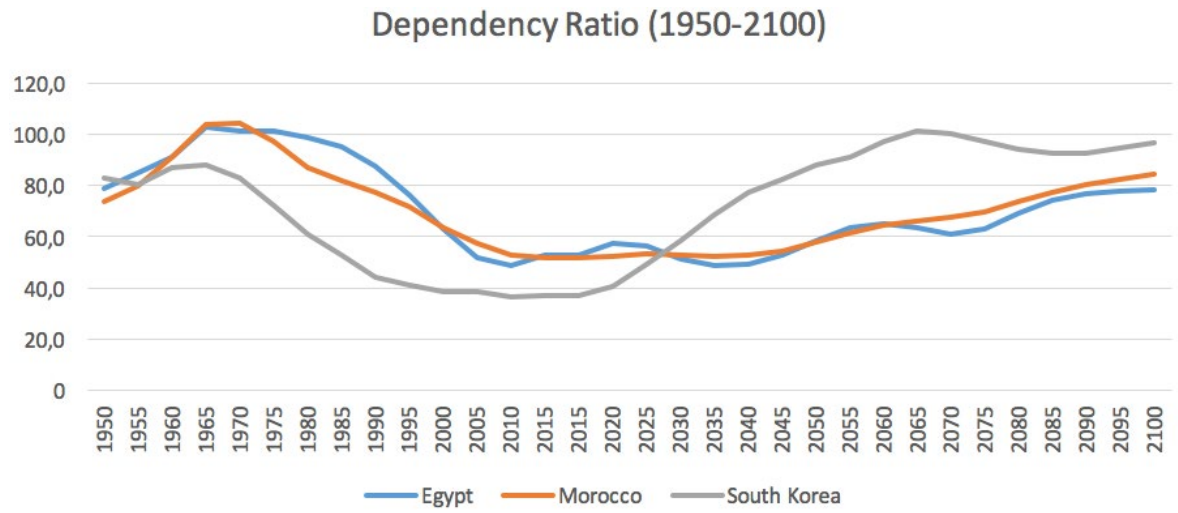
To study the effects of key demographic variables and of population compositions on economic growth, the mixed dependency ratio (young plus old dependents)

FIGURE 1. Total Fertility Rate (1975-2100) medium variant



Source: World Population Prospects, Department of Economic and Social Affairs, United Nations: The 2015 Revision.

FIGURE 2. Dependency ratio (1950-2100) medium variant



is employed. It should be noted that the dependency ratio is an essential variable describing the anticipated socioeconomic load on the working-age population. The dependency ratio is the result of the division of the dependent to the working population. Thus, its decrease could be the result of a decrease in the numerator, an increase in the denominator, or of a combination of changes in both the numerator and the denominator. Comparing the studied countries, Figure 2 clarifies that, after 1965, the percentage of working-age population (15-64 years) increased in the Republic of Korea, marking the demographic dividend phase. The country's dependency ratio was halved during the period 1972–2010, which is considered a demographic advantage. This advantage is predicted to gradually disappear after 2020; thereafter, the Republic of Korea could face new challenges as the result of an ageing population. In the case of Egypt and Morocco, the decrease in the dependency ratio started later, after 1975, and continued its decrease over a longer period, predicted to end in 2060. The decline in the dependency ratio is anticipated to be slower in the two Arab countries.

Taking population growth as another demographic variable, it was found that during the 1960s, Egypt, Morocco and Republic of Korea stood at an equal level in their average annual population growth (>2%) which is demographically described as "explosive" population growth. Table 1 shows that the average annual population growth between 1965 and 1995 decreased in the Republic of Korea and in Morocco by 53% and 36%, respectively; from 2.15% per year to 1.0% in the Republic of Korea and from 2.99% per year to 1.91% in Morocco. This was in contrast to an increase in Egypt by 1.7% (from 2.42% per year in 1965 to 2.46% in 1995). After 1995, the decreasing pace in the three countries diverged. It is expected that a decrease in the dependency ratio would be related to a rising GDP per capita. When the cohort aged between 15 and 64 increases, thus lowering the ratio of dependents to non-dependents, the number of people who would like to work increases, and provided that the labour market can absorb the large numbers of workers, per capita production increases [12,13]. As with population growth in the 1960s, the three countries were at the same level in terms of GDP per capita, all at less than $300. Thereafter, and with the declining dependency ratio in all three countries (at different rates, the highest of which was a 35% decrease in the Republic of Korea), the average GDP per capita increased dramatically in the Republic of Korea (more than 22 times) versus only three times in Egypt and Morocco between the years 1965–1990. The average GDP per capita nearly doubled in Egypt, Morocco and the Republic of Korea between 1995 and 2016; from $1,193 to $2,552 in Egypt, from $1,504 to $2,764 in Morocco, and from $12,220 to $23,349 in the Republic of Korea. From 1965 to 1995, the Republic of Korea and Morocco experienced steep reduction in their age dependency ratio, by 34% and 25%, respectively. The age dependency ratio in Egypt decelerated at a lesser rate, declining by 4% during the same period. Between 1995 and 2016, the age dependency ratio decreased by more than 10% in Egypt and Morocco, versus a decrease of 1.1% in the Republic of Korea during the same period. As described in Table 1, the decrease in the dependency ratio is related to the rise in average gross domestic savings as a percentage of GDP per capita. In Egypt, Morocco and the Republic of Korea, savings (as a percentage of GDP per capita) increased by 5%, 9% and 22%, respectively, from 1965–1995. In the period of 1995 through 2016, the average gross domestic savings (percentage of GDP per capita) decreased in Egypt and the Republic of Korea, while remaining nearly constant in Morocco (Table 1).

The correlation coefficient between dependency ratio,

TABLE 1. Key Economic and demographic indicators of the studies countries (1965-2016)

	AVERAGE DEPENDENCY RATIO	AVERAGE GDP PER CAPITA	AVERAGE GROSS DOMESTIC SAVING (% OF GDP)	AVERAGE POPULATION ANNUAL GROWTH
EGYPT				
1965-1974	85.78	206.95	9.53	2.42
1975-1984	83.22	456.45	15.42	2.43
1985-1994	82.95	716.82	15.57	2.46
1995-2004	71.66	1192.82	13.44	1.87
2005-2016	60.20	2551.79	11.54	1.99
MOROCCO				
1965-1974	103.53	266.82	13.71	2.99
1975-1984	89.01	730.31	16.42	2.35
1985-1994	77.71	1082.85	22.38	1.91
1995-2004	64.65	1504.58	22.88	1.24
2005-2016	53.49	2764.25	22.48	1.30
REPUBLIC OF KOREA				
1965-1974	73.10	271.59	15.58	2.15
1975-1984	67.05	1579.24	27.61	1.52
1985-1994	48.29	6018.28	38.38	1.0
1995-2004	47.10	12219.75	35.73	0.74
2005-2016	45.94	23348.50	34.33	0.53

TABLE 2. Correlation between demographic variables and GDP per capita, Egypt (1965-2016)

	EGYPT	MOROCCO	REPUBLIC OF KOREA
Dependency ratio and GDP per capita	-0.79*	-0.96*	-0.92*
Population growth and GDP per capita	-0.64*	-0.79*	-0.91*
Savings and GDP per capita	0.10	0.76	0.86

*Note: * imply significance at the 10% level.*

population growth, gross domestic savings (as a percentage of GDP per capita) and GDP per capita is presented in Table 2. There is a significant negative association between dependency ratio and GDP per capita in Egypt, Morocco and the Republic of Korea, implying that a low dependency ratio is associated with a high GDP per capita, and vice versa. Similarly, there is an inverse association between population growth and GDP per capita in the three countries. Moreover, no significant association between savings and GDP per capita is detected. A correlation between variables, however, does not automatically mean that the change in one variable is the cause of the change in the values of the other variable [14].

We investigated the relationship between dependency ratios, average annual population growth, savings as a percentage of GDP and GDP per capita using time series econometric analysis. The computed F-statistic for the three countries is found as follows: Egypt (F=1318.575), Morocco (F=423.0689) and the Republic of Korea (F=2692.160), which is larger than the corresponding critical values. This result suggests the rejection of the null hypothesis of no levels relation. Table 4 reports the long and short run coefficients. In Egypt, a significant negative long run relationship between dependency ratio and GDP per capita is found, as well as a significant positive long run relationship between saving percentage and GDP per capita. Similarly, the Republic of Korea had a similar long run relationship in the period between 1965 and 1995. In the case of Morocco, the

TABLE 3. Augmented Dickey-Fuller test for unit root, 1965-2016†

	EGYPT	MOROCCO	REPUBLIC OF KOREA
Log of GDP per capita	-3.540**	-1.656	-3.54**
first difference of log GDP per capita	-5.180***	-5.450***	-5.18*
Log dependence ratio to GDP ratio	-3.224**	-3.547**	-1.36
Log population growth	-1.577	-1.113	-1.53
second difference population growth	-6.051***	-3.483**	-9.41***
Log *Savings* to GDP ratio	-1.494	-2.263	-2.24
First difference of log *Savings* to GDP ratio	-7.583***	-8.246***	-6.02***

*Notes: † The study period of the model concerning the Republic of Korea is 1965 to 1995. ***, **, * entail significance level at 1%, 5%, 10% , respectively. The models include an intercept. The lag length is determined by the Schwarz-Bayesian Criterion (SBC).*

TABLE 4. ADRL (1,0,0) long and short run coefficients, 1965-2016†

	EGYPT		MOROCCO		REPUBLIC OF KOREA	
	Coeff	StE	Coeff	StE	Coeff	StE
LONG RUN COEFFICIENT(DEPENDENT VARIABLE: LOG OF PER CAPITA GDP)						
Log of dependency ratio	-9.101**	4.320	-2.169**	0.312	-2.094*	0.990
Log of population growth	5.302	4.952	0.853**	0.218	1.324	1.335
Log of *Savings* to GDP ratio	1.810**	0.867	0.419	0.188	3.374**	0.883
Constant	40.552**	15.577	13.711**	1.696	5.324	4.432
SHORT RUN COEFFICIENT (DEPENDENT VARIABLE: FIRST DIFFERENCE OF LOG OF PER CAPITA GDP)						
Log of dependency ratio	-0.520**	0.320	-0.883**	0.257	-0.303	0.169
Log of population growth	-7.604**	2.537	0.1706*	0.092	0.192	0.184
Log of *Savings*	0.103	0.055	0.164**	0.078	0.489**	0.144

*Notes: † The study period of the model concerning the Republic of Korea is 1965 to 1995. ***, **, and * entail significance level at 1%, 5%, and 10%, respectively. Lag length selection is implemented through SBC.*

GDP per capita is influenced by a significant positive long run relationship with population growth. The dependency ratio in Morocco had a negative significant impact on GDP per capita. The estimation of the long run coefficient of the autoregressive model suggests that a 1% reduction in the dependency ratio gives rise to a 9.1% increase in the GDP per capita in Egypt. Moreover, a reduction of 1% in the dependency ratio in Morocco is accompanied by an increase of 2.2% in the per capita GDP.

DISCUSSION

The current study illustrates the interconnections between demographic changes and economic growth, and highlights the need for strategic public policies to achieve growth. The study investigates the relationship between demographic and economic indicators during the period 1965–2016 through the development of a model that quantifies the rise in GDP depending on the change in the demographic variables during this period. The results show that an expanded working-age population has a favourable impact on economic growth. The influence of a diminished dependency burden on GDP growth per capita is about 9% and 2% per annum in Egypt and Morocco, respectively, during the analysis period.

The concept of demographic transition was discussed by Frank W. Notestein in the 1945 article "Population: The Long View." He formulated the concept of the demographic transition in a three-stage model of population change [15,16]. According to that three-stage model, every country in the world should encounter a transition from high to low death and birth rates. Mortality drops before fertility. Consequently, demographic transition heads primarily to a demographic "burden," whereby total population growth is quicker than working-age population growth. Later, with the continuous decline in fertility rates and mortality rates, the demographic transition reaches a demographic "dividend" whereby the working-age population growth becomes greater than total population growth [17,18].

Developing countries are at varying stages of demographic transition. Transitions are typically triggered

by improvements in infant and child health, and accelerated by the provision of family planning and reproductive health supplies and services, and the expansion of education for girls and job opportunities for women. This results at first in an increase in the size of the younger cohorts of the population. If the relatively large working-age cohort is productively employed and has incentives and opportunities to save, a country can undergo rapid economic growth–the demographic dividend. Scientists have studied the influence of population change on economic growth; population growth may restrict, promote or be independent of economic growth. The focus on population size and growth has shifted recently to a critical dimension of population dynamics, the age structure of the population, because individuals' economic behaviour varies at different stages of life. Countries with a high proportion of children are likely to devote a high proportion of resources to their care, which may depress the pace of growth. However, if most of a nation's population falls in the working-age group, the added productivity of this group can form a demographic bonus, a demographic dividend of economic growth, assuming that proper health, family, labour, financial and human capital policies are in place. In addition, if a large proportion of a nation's population is made up of elderly people, similar effects may be seen as in those states with a high proportion of children. A large share of resources is needed by a less productive proportion of the population, which likewise can inhibit economic growth [13].

In the Arab world, improvements in health services have decreased mortality; however, social inequalities coexist, as the poorest still suffer from limited access to health care [19,20,21]. A fall in mortality rates started in Egypt in the 1920s; declining mortality, especially among infants and children, marked a substantial rise in life expectancy at birth [22].

Looking at the Moroccan population, in spite of considerable improvement in health indicators over the past 50 years, including an increase in life expectancy to 68 years, the maternal mortality rate has remained stagnant (227 per 100,000 live births) and under-five mortality has risen from 37 to 40 per 1000 in the period between 1997 and 2003, with a major problem in particular in neonatal mortality [23].

The Arab world is experiencing explosive population growth; after sub-Saharan Africa, North Africa and the Middle East is the region with the fastest growing population in the world [20, 22]. In the Arab world, decreasing fertility is causing the natural increase rate to slow down. In most countries of the region, the rates of natural population growth are currently less than 1.5% [23]. In Lebanon, it is less than 1%. Conversely, in Egypt, which is the most populated country of the region with over 96 million inhabitants, the rate of natural increase in 2017 is still more than 2.5% [24]. While population growth has a statistically negative effect on per capita income growth, this effect is counteracted by a statistically positive effect from growth in the share of the population that is economically active [13].

In Arab countries like Morocco and Egypt, high fertility and total population growth rates have been identified as detrimental to development. Accordingly, family planning programmes were launched in the 1960s and 1970s [25]. It is evident that until 1965, no fundamental decrease in fertility was seen in the Arab region, apart from in Lebanon. Towards the end of the 1960s, more countries, such as Bahrain, Egypt, Morocco and Tunisia, started experiencing an alteration in fertility patterns.

Morocco suffered from very high mortality and fertility levels in the early 1970s, with the average Moroccan woman bearing 7.4 children. Moving to the 1980s, a fertility decline had been spreading in the Maghreb [26]. The sharp decline in Moroccan fertility rates during this decade was associated with delayed marriage, increasing access to contraception, a rise in female education, urbanisation, and migration abroad [27]. Unfortunately, the beginning of fertility transition in Morocco was accompanied by an economic crisis. Due to the country's loss of phosphate revenues [25,28], half the value was wiped off prices, accompanied by an increase in individual income taxes of more than 50%. At the same time, there was high military spending as a result of the war in the Sahara.

There is a link between the demographic transition and international migration. Migrants serve as channels for the transmission of the norms and behaviours that determine low fertility to non-migrants in their origin countries. Increased connectivity between people allows knowledge sharing, which is a major factor in explaining demographic transition. Migrants remain in contact with their friends and thus transfer values and behaviours to them [29]. Fargues in his study discussed the impact of international migration on demographic transition in three countries: Egypt, Morocco and Turkey [30]. Migrants from Morocco to Europe transferred back to their country of origin values and practices that they found in the host countries, such as birth control, female education and high rates of economic participation by women. On the other hand, Egyptian migrants transferred to their country of origin the model of high fertility and the conservative views on girls' education that they found in the Gulf states. The relationship between migration and the changes in the fertility rates in migrants' countries of origin has been statistically confirmed [31]. Girls' education has also been found to be an important determinant of the demographic transition [29].

Conversely, at the start of 1960s, national development programmes targeting the deceleration of population growth were adopted in several East Asian developing countries. Pregnancy rates and population growth rates decreased quicker than in the developed world, accompanied by unprecedented economic

achievements. Over the span of three decades, from 1960 to 1990, population changes in East Asia proved to have important effects on economic development [32]. Around 22% of variations in income growth was driven by mortality and fertility transformations between 1965 and 1990 [33, 34]. Demographic dynamics explained about 28% of per capita income growth in Taiwan during 1965 to 1990 [32, 34].

The Republic of Korea was one among the initial group of developing countries to attain low fertility through an increase in life expectancy, a swift decline in fertility rates, a change in age structure and rapid economic growth. The government increased the availability of contraceptive services, encouraged the concept of small families, and improved education programmes [32, 34]. The government did not adopt coercive policies, however, as was the case in India and China. In the course of the second half of the twentieth century, specifically from 1960 to 2000, the Republic of Korea experienced an annual rate of growth in real per capita GDP of about 5.8%. Its per capita income increased by around tenfold, from $1,570 in 1960 to $15,880 in 2000 [35]. The growth in per capita income is merely one of several characteristics of the region's economic achievement.

The study is a time series analysis of extracted data, so it could be easily replicated, updated or refined at any time. The total fertility rates were used to compare the fertility rate among the selected countries, because it is an age/sex adjusted birth rate that is independent of the age structure of the population. The decrease in the fertility rates and dependency ratio was studied over a long period of time. However, the study had some limitations. We could not include all the demographic indicators in the growth model. There are many other factors to consider when determining population trends, such as the crude birth rate, death rates, the number of women of reproductive age, and migration patterns. In addition, accurate forecasting of a financial series is challenging. Regardless of the statistical prediction method, the passage of time will inevitably introduce new variables. An increase in the dependency ratio could happen later on as a result of a fall in the size of the labour force due to migration, or an increase in the number of elderly people.

The results suggest that economic growth could be explained by demographic factors, particularly the dependency ratio. The potential benefits of the demographic opportunity brought on by changes in the age structure, leading to a demographic dividend that results in improved economic development, are possible. Yet it is necessary to implement a desegregated set of policies to ensure that Arab countries maximise the first demographic dividend. A policy focus on fertility decline is critical to ensure a low dependency burden. There is a need for a proactive approach that guarantees equitable access to quality health and education services, in order to enhance the effectiveness of the investment in human capital. Policy reforms should continue to improve the investment climate, ensure employment generation and absorb the increasing workforce. It is imperative that increased female labour force participation be encouraged, which can further boost economic development. Female education is also essential to maintain the decline in fertility rates. A woman with a high average of schooling years will probably have a smaller family, healthier and more educated children, and a higher probability of participation in the labour market.

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Contributions

All the authors formulated the research idea.They were all involved in drafting the paper. The final manuscript has been approved by all the authors

Competing interest

The authors have no competing or conflicting interests

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