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The impact of population growth on Human Development Index: a comparative analysis of Middle Eastern countries

Philip W. Zgheib

American University of Beirut,
Beirut, Lebanon
E-mail: pz00@aub.edu.lb

Zafar U. Ahmed*

Department of Marketing and Management,
College of Business and Technology,
Texas A&M University at Commerce, Commerce,
Texas 75429-3011, USA
Fax: +1 903 886 5702   E-mail: zafar_ahmed@tamu-commerce.edu
*Corresponding author

Sri Beldona

University of Dallas,
Dallas, TX, USA
E-mail: sbeldona@gsm.udallas.edu

Veronique Gebara

Notre Dame University, Louaize Lebanon

Abstract: This paper tests the growth of population on the determinants of Human Development Index (HDI). The HDI is a composite index constructed from measures of life expectancy, education and per capita income. This paper reviews the literature on population growth and using those arguments tries to find any link between population growth and HDI for Middle Eastern countries. Implications for policy makers are discussed.

Keywords: population growth; HDI; Middle East; health; education; income.

Biographical notes: Philip W. Zgheib is an Assistant Professor of Management and Entrepreneurship in the Suleiman Olayan School Business at the American University of Beirut, Lebanon. He earned his PhD, in Managerial Economics from the Utah State University in 1994. He also served as the Chair,

Department of Business Administration at the Notre Dame University, Lebanon where he launched the MBA program, in addition to establishing BBA program in hospitality management. He has conducted several professional training workshops with public as well as private organisations throughout the Middle East on business topics such as change management, corporate communications, knowledge management, motivation and leadership.

Zafar U. Ahmed is a Tenured Full Professor of Marketing and International Business at the Texas A&M University. He has been an advisor and consultant to numerous governmental organisations such as the Singapore Ministry of Foreign Affairs, United Nations Development Program, Japan International Cooperation Agency, British Commonwealth Secretariat, and MNCs across Africa and Asia. He has more than 100 scholarly publications to his credit, serves as the President, Academy for Global Business Advancement, Editor in Chief, *Journal for Global Business Advancement* and Editor in Chief, *Journal for International Business and Business and Entrepreneurship Development*.

Dr. Sri Beldona is Assistant Professor and Director for Global Business Programs at the Graduate School of Management, University of Dallas, Irving, Texas, USA. Prior to joining University of Dallas he worked as Vice President of Strategic Planning at Marketing Management Inc. His papers on topics related to Global Business and Marketing have appeared in various journals. He received his PhD in Business from Temple University, Philadelphia.

Ms. Veronique Gebara earned her BBA and MBA Degrees from the Notre Dame University, Lebanon and she is currently affiliated with the Eye and Ear Hospitality International S.A.L., Lebanon.

1 Introduction

The purpose of this study was to develop and test a general model explaining the impact of population growth on Human Development Index (HDI), specifically using the Middle Eastern countries as a sample. Lately, these countries have attracted more attention from global policy makers due their impact on international trade and oil supply and are of significant interest due to the current political situation in the region.

This paper attempts to bring new light to the population debate, by segmenting the effects of demographic growth on individual components of the HDI as calculated by the UNDP in its annual reports since the early 1990s. This paper shows that population growth in the Middle East brings with it a decline in economic welfare as measured by per capita income, while its effects on education and health are insignificant.

2 The population debate

With rapid growth in population of nations and the resulting effect it has had on change in wealth of nations, there is a renewed interest in the topic of competitiveness of nations (Ahituv, 2001; Mandle, 2001; Sun and Parikh, 2001). A country's competitiveness in globalisation is very important as it influences employment, wages, standard of living and eventually the quality of life (Aschauer, 1991). Thus, it is very important to understand

how population of the world has expanded in the recent past and what, if any, implications it has for the development of nations.

The world population increased barely, if at all, during the first millennium. In the year 0 on the Gregorian calendar, the world population totalled 300 million; in 1994, it was 5.6 billion. Estimates indicate that the world population reached 1 billion in 1804, 2 billion in 1927, 3 billion in 1960, 4 billion in 1974 and 5 billion in 1987 (United Nations, 1995). Moreover, by the year 1992, the world population was estimated to be 5.5 billion; projections also indicated that by the end of the twentieth century, population will reach 6.3 billion and it will then reach 8.5 billion by the year 2025 (Todaro, 1995). Between 1950 and 1988, the world experienced an unparalleled population growth: 2.5 billion in 1950 and 5.1 billion in 1988. This increase in 38 years is approximately equal to the population increase that took place from the year 0 to 1950. Moreover, the 5.1 billion population of 1988 is expected to double after 40 years. Less developed countries (LDC) accounted for about 77% of the world's population and it is predicted that the population of less developed countries will increase to 85% in year 2050 (Wennergren, 1989). Between 1990 and 1995, the population of the LDC grew at 1.9% per annum, whereas the more developed regions grew at 0.4% per annum (United Nations, 1995). Every year, almost 93 million people are being added to the world population of over 5.5 billion and over 82 million of these people are being born in Third World countries (Todaro, 1995). From 1950 to 1994, the world population increased by 124% and by 2050 a 75% increase is projected. From 1950 to 2050, the world population is expected to increase by four-fold approximately (United Nations, 1995).

The rapid population expansion is not the primary objective of this research, but how such population growth impacts determinants of human well-being and quality of life, which in turn can have significant impact for attraction of international investments. This question is tested using data for Middle Eastern countries. This region was specifically chosen, as their position in globalisation of business is very uncertain given the unrest in the region. Also, these countries represent a broad spectrum of economic outlook – from no major risk to imminent risk (Economic Intelligence Unit, 2002).

3   Literature review and hypotheses

3.1   *Population growth*

The investigation of the relationship between population growth and Human Development Index is vital as the population debate lies at the core of the current worldwide interest and as human development is often used by foreign aid agencies in determining the distribution of aid (Lucheters and Menkhoff, 2000). The problem of population is not simply one of number, but involves the quality of life or human welfare and material well-being. There is no consensus of opinion about how serious a problem rapid population growth really is. On the one hand, one must recognise that population growth is not the only cause of under-development. On the other hand, it is unwise to think that rapid population growth is not a serious intensifier of under-development in some Third World countries (Todaro, 1989).

Todaro raised many questions on population growth, such as: to what extent does rapid population increase make it more difficult to provide essential social services? How are developing and less developed countries able to cope with the labour supply over the

years? Will it be a cause for a rise in unemployment? Will the population growth ensure adequate health care and basic education? If these were true, then should the low level of living be the single most important factor in limiting population growth? The First World Population Conference held in Bucharest in 1974 tackled the main elements of the population debate. These issues were then reiterated at the second conference in August 1984 held in Mexico city. This debate continues and no consensus has been reached either by policy makers or academicians as to the true impact of population growth on a country's economic growth.

Critics argue that it is not the sheer number of people that is causing population problems but rather their distribution or concentration. The real problem of population arises not from its overall size but from rural urban migration or the concentration of the population in some geographic pockets within the country. To this end, Todaro (1989) argues that governments should strive to bring out spatial distribution of the population in terms of available land and other productive resources, which will significantly balance the distribution of capital among the workers.

Secondly, critics argue that with high population, the consumer is provided with lower product cost due to economies of scale at high technological standards and thereby achieving higher output levels. As a result, there exists a direct relationship between improvement and productivity, which is an essential ingredient in stimulating economic development and fighting under-development (Todaro, 1989).

King (1985) argues that there is merit in the debate that population growth affects economic development; however, such argument holds for traditional question of food supply. He argues that the demand for other non-renewable resources is more of a consequence of rising income and production per person. Even with the issue of food supply, he argues that it is often the result of mismanagement of officials by offering limited technology and weak incentives to producers.

However, empirical work by McNicoll (1984), Kelley (1988) and Kelley and Schmidt (1994) has shown that population growth can affect economic performance if it affects the relationship between supply and demand for savings and capital. Of particular interest is the finding that such hypotheses were stronger for less developed countries than for developed countries.

The above review of work on population growth is by no means comprehensive or complete, but sufficient to drive home the point that there is a divide within policy makers and academicians alike.

3.2 *Human Development Index*

Human Development Index is an overall measurement of a country's basic dimensions of human development (Human Development Report, 2001). It is a summary measure of three basic factors:

- life expectancy

- educational attainment (adult literacy and combined primary, secondary and tertiary enrolment)

- adjusted income per capita measured in US dollars (GDP).

The literature on HDI makes a clear distinction between national performance or national income and 'human development' per se. The UNDP's *Human Development Report*

(2001) argues that human development is about creating and fostering an environment in the countries in which people can develop and realise their full potential – potential to lead productive and thus a good quality of life. In this context, the report further argues that 'people' are the true wealth of nations and it is the development of these people that ultimately leads to national wealth creation.

While not much has been has been written in the literature on HDI, an ABI info search from January 1986 through January 2003 yielded only 12 periodical listings with HDI as a title search and the little that has been written has centred around the refinement or modification of HDI (Agostini and Richardson, 1997; Hicks, 1997; Low and Aw, 1997; McGillivray, 1991; Noorbakhsh, 1998) as opposed to its practicality and applicability in measuring the competitiveness and development of nations, with the exception of the work of Ivanova et al. (1999) and Tilak (1992). A discussion of the suggested modifications in the index is beyond the scope of this paper, but as Tilak (1992) found in her research, HDI adequately captures national development and is significantly correlated to other indexes such as Human Suffering Index and produced no different results from the other popular index called the Physical Quality of Life Index.

4   Research objectives

The main purpose of this paper is to analyse the effects of population growth on each of the main components of the human development as well as on the composite measure of the three components as integrated by the UNDP in its annual reports. Understanding the individual impact on each component within the Middle East context may allow a clearer vision in understanding management as well as marketing implications of policy decision making.

Since the focus of this paper is on the impact of population growth on determinants of HDI, a review of the population growth debate as it pertains to these specific determinants is in order.

4.1   Population growth and GDP

Crucial to the argument of population growth and its impact on GDP is the relationship between supply and demand for savings and the efficiency of capital. McNicoll (1984), Hammer (1986) and Kelley (1998) argued that population growth can adversely affect economic performance and thus GDP, if such growth puts an undue demand to reduce savings and increase consumption. Such a scenario is possible if for a given worker, the demand of the family size imposes a constraint on saving and thus a consequent increase in consumption. Kelley and Schmidt (1994) found that population increase had a negative and significant relationship to GDP, especially for less developed countries. Similarly, Ahituv (2001) in an empirical study of 111 countries found that for each 1% drop in population growth, GDP per capita increased by more than 3% points. The central argument of these papers is that higher population growth lowers income simply because the same capital now needs to be spread more thinly over the now expanded population of workers. Based on the above arguments, we present the first hypothesis:

  H1: Increase in population growth will be negatively related to GDP Index.

4.2   Population growth and education

Thurow (1992) strongly argues that a nation's productivity is dependent upon its skilled workforce. With the advent of rapidly changing technological advances that have literally transformed almost all sectors of the economy, an educated, knowledgeable, competent and skilled workforce is fundamental to a country's progress in this changing dynamic world. Anecdotal evidence abound on how countries like China and India have invested in their workforce and have moved up the value chain from being a source of cheap labour to one of value added – the recent surge in migration of software companies into India is a case in point (Kripalani, 2002). However, these are exceptions and cover only certain sectors of the economy.

Musambachime (1990) argues that the effects of population growth are major and significant concerns to policy makers and governments of all developing countries. The argument is pretty straightforward and uses the notion described above – demand for limited resources. With rapidly growing population, the need to educate its citizens can put a significant constraint on other productive factors. In his study, Musambachime (1990) found that the Government of Zambia invested considerably in education efforts when the revenue from the export of copper was at an all time high; however, rapid increase in population and the corresponding decline in economic performance led to deterioration of the education system. The *World Development Reports* have also consistently shown that the cost of education of a growing population can be substantial, though not empirically tested to determine if such expenses are better utilised for other productive factors (Kelley, 1985).

Thus, by using the arguments presented above, we propose that increase in population would have a negative effect on Education Index – index as measured by the United Nations Development Programme in computing HDI.

   H2: Increase in population growth will be negatively related to Education Index.

4.3   Population growth and life expectancy

There is no theory to support the notion that population growth affects life expectancy unless such growth puts an undue burden on the governments to divert their resources away from the basic health services. However, data from various sources show that life expectancy has been on the rise throughout the world. In a brief released by the National Research Council (2001), it is reported that people aged 65 and over now comprise a greater portion of world population mainly due to life expectancy and advances in basic healthcare. Also, life expectancy at birth has been on the rise even in developing and under-developed countries since World War II. And such a trend has continued despite rapid growth in population and indications are they will continue in that direction. In fact, it is this rise in life expectancy that has researchers and policy makers scrambling for solutions when the world is faced with an aged population. According to UN projections, by the year 2025 only 25% of the world's population will be under 14 years of age, while close to 14% would be over age 60. Thus, it is unlikely that population increase, especially in developing countries, would have an effect on life expectancy. Hence, we propose the following hypotheses.

   H3: Life expectancy will not be affected by increase in population growth.

4.4   *Population growth and HDI*

As discussed earlier, HDI is a composite measure of Life Expectancy Index, Education Index and GDP per capita. Hypotheses 1 and 2 argued that population growth can have a negative effect on GDP per capita and education. Also, since HDI is a composite measure that uses equal weight of each of the above three dimensions, we argue that population growth would have a negative effect on Human Development Index. Thus, increase in population growth will be negatively related to HDI.

5   Methodology

The sample comprised 16 Middle Eastern countries. These countries are Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates and Yemen. We examined data in two ways. To test the first three hypotheses, we analysed the latest data from the UNCTAD's *Handbook of Statistics* online.

Following the methods used by the United Nations Development Programme in computing the HDI, we first derived our three determinants of HDI, viz., Life Expectancy Index, Education Index and GDP Index (Human Development Report, 2002 pp.252–253).

Life Expectancy Index was computed as follows:

$$\text{Life Expectancy Index} = \frac{\text{Life expectancy of country} - 25 \text{ years (lower goalpost year)}}{85 \text{ years (upper goalpost year)} - 25 \text{ years (lower goalpost year)}}$$

Education Index was computed as follows:

$$\text{Education Index} = 2/3(\text{adult literacy rate in the country}) + 1/3 (\text{gross enrolment in the country}).$$

GDP Index was computed as follows:

$$\text{GDP Index} = \frac{\log (\text{GDP per capita of the country}) - \log (100)}{\log (40{,}000)^{+} - \log (100)}.$$

$40{,}000^{+}$ represent the upper goalpost target.

6   Statistical tools

A regression analysis was undertaken to test our hypothesis. The regression analysis tells how one variable is related to another through an equation that allows to use the known value of one or more variables to estimate the unknown value of the remaining variable. In this case, we define the independent or known variable to be education (or health or income for the different hypotheses) and the dependent or unknown variable to be population growth. In addition, employing the regression equation to make predictions is reasonable only when there is a linear relationship between the variables.

Data were collected from published sources. They are as follows: (a) *2001 Handbook of Statistics*: Life expectancy at birth, adult literacy rate, gross enrolment rate, GDP per capita and GDP and (b) *Human Development Reports* (various issues 1990–2002): Human Development Index. The HDI was captured for all the Middle Eastern countries for years 1990–2000.

7   Results

Table 1 presents the results of the correlation matrix and descriptive statistics between GDP Index, Life Expectancy Index, Education Index and population growth for the 16 Middle Eastern countries. Table 2 presents the results of the three-regression analysis.

Table 1   Descriptive statistics and correlations

	Mean	*S.D.*	*1*	*2*	*3*
GDP Index	0.6557	0.21			
Life Index	0.7519	0.08	0.855*		
Education Index	0.4902	0.06	–0.547	–0.696*	
Population[+]	17945	24267	–0.555**	0.366	0.413

[+]Population is in thousands.

*$p < 0.05$, **$p < 0.01$ implying significance levels of 5% for the independent variables and 1% for population growth as a dependent variable.

Table 2   Regression analysis

	Dependent variable		
Independent variable	*GDP Index* (*model 1*)	*Life Index* (*model 2*)	*Education Index* (*model 3*)
Population	–0.555*	–0.419	0.413
R^2	0.308	0.176	0.170
Adjusted R^2	0.251	0.117	0.111
F	5.348*	2.987	2.876
N	13	15	15

*$p < 0.05$.

**$p < 0.01$.

The results of model 1 indicate that population growth had a negative impact on the GDP Index supporting our first hypothesis. However, the results of regression analysis of model 2 did not provide any support to Hypothesis 2. Hypothesis 2 had argued that growth in population would have a negative impact on education. Finally, results of regression analysis of model 3 support Hypothesis 3, which argued that advances in healthcare and technology have made it possible for most of the countries to maintain and grow their life expectancy rate. In other words, we argued that population growth would not impact life expectancy rates as some of the critics have had argued and we found that to be the case for the countries in our study.

Finally, to test the relationship between Human Development Index and population growth, we ran a regression analysis where HDI was used as the dependent variable and population growth was the independent variable. For this particular test, we collected ten years of HDI and population data (1991–2000) for each of the country being studied. The results of this regression analysis are presented in Table 3.

Table 3   Regression analysis

Independent variable	Dependent variable = HDI Index
Population	–0.058
R^2	0.003
Adjusted R^2	–0.003
F	0.535
N	157

$*p < 0.05$, $** p < 0.01$.

As is evident, we did not find any support to the notion that population growth has a significant impact on HDI. It could very well be that since most of the Middle Eastern countries have a high per capita GDP, they are in a better position to build the necessary infrastructure to maintain a higher quality of life for their citizens.

8   Discussion of marketing implications

Many researchers have documented that life expectancy at birth has been on the rise since World War II among all types of countries – developed, developing and less developed countries (Simon, 1994). Such rise in life expectancy has been attributed to increasing use of technology, advances in agriculture, sanitation and above all advances in medical field. Also, as the UNDP 2002 report documents, the Arab and Islamic tradition of giving aid to the poor has clearly elevated some of the poor Arab countries from poverty and on towards a path of progress.

Finally, we did find that population growth had a negative impact on GDP per capita growth indicating that a growing population does impose serious constraints on the use of capital and savings. While these results supported our hypothesis, it still presents one with a conundrum to contend with – how do these countries that have rich oil reserves (overall) face a declining GDP with population growth. The answer to this conundrum can be best explained by the UNDP's *2002 Human Development Report* on Middle East, which notes that the factors that are holding development in these countries are not resources, but are

- lack of freedom and democracy
- poor human capability and knowledge
- inequality in gender.

In most Middle East countries, health and education systems belong to state welfare economics. As such they behave as public goods; therefore, any marketing implications are relevant to public authorities and state centralised planning. However, issues of per capita income relate to purchasing power of the individual consumer. It appears then that

population growth affects negatively the purchasing power of individual consumer units. More demand will be directed to basic necessities and less to processed end products.

Taken together, our results indicate that population growth does not have a significant impact on HDI as measured by the UNDP, but future growth and development in terms of foreign trade and foreign direct investment, which are so critical for regional development and technology diffusion that this region so desperately needs, can come about only through a dramatic change in the education system to close the gap in knowledge skills and democratisation of the states.

The education system needs to incorporate along with the religious learning a sense of economic need – demand and supply and also such system should be more accessible to both genders. This is very critical given the fact that among all regions in the world, the Middle East has the highest percentage of youths, 38% of the population under the age of 14.

With regard to health standards (life expectancy), there are signs that the growing population demand in the Middle East is going to impose a heavy burden on the generous welfare system offered by the states, including guaranteed employment that the citizens have become accustomed to.

9 Conclusions: findings, limitations and recommendations

In order to be able to create a path of development for a country, one has to study the features affecting development. Action is to be taken when disparities occur in specific areas. Our analysis shows that while GDP per capita was affected by population growth, it did not affect the other two determinants of Human Development Index, life expectancy and education. One can argue that the so-called determinants of human development were not affected by population growth in the region that we studied because of the fact that most of the countries are well established and have access to rich natural resources. Thus, some of the countries in the region like Israel, Kuwait, Saudi Arabia and UAE might have acted as outliers (high per capital income) and clouded the issues being faced by countries such as Lebanon and Syria. It seems odd that the regression analysis yielded no causality between population growth and education. However, this supports the arguments advanced by Kelley (1985) that educational expenditures due to increased population growth should not be treated as unproductive investment. Also, even if that is the case, Kelley (1985) argues that one has to show that such expenditures came at the cost of other productive investments that had far greater impact on the economy. Unfortunately, such data are neither tracked nor documented.

The publication of HDI in 1990 sparked a debate in the literature of its accuracy and applicability. Many researchers have called for modifications of the index as it does not accurately capture the nature of well-being of the residents of the countries (Islam, 1995; Lucheters and Menkhoff, 2000). In summary, though we found no significant effect of population growth on determinants of HDI, it is our contention that the heavily state sponsored welfare systems with generous aid from other Arabic countries has minimised any population effect on HDI. Policy makers need to recognise the need to drastically revamp the education system with a need and orientation to fill the demand of the labour market. These policy changes are very critical given the nature of the current youth population in the Middle East.

The primary focus of the governments in these countries should not be of controlling the population but one of educating and training the population, especially the significant number of youths, to meet the current demand of the labour market. Similarly, these countries also need to pay closer attention to human freedom and thus build the quality of life of its residents – a measure that is very likely to attract foreign direct investment.

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