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Interdependencies of Health, Education & Poverty with Policy Implications for Southern Mediterranean Countries

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Résumé Exécutif

L'objectif majeur de cette étude est de montrer l'importance des interdépendances entre les secteurs de la santé, de l'éducation et la performance économique des pays du Sud de la Méditerranée. Ce travail a été motivé par le souci de recherches de gains vraisemblables dans chaque pays si les politiques socio-économiques sont plus transversales et plus intégrées.

Les investigations empiriques menées sur différents types de données internationales qui incluent celles de pays mais aussi sur des informations plus agrégées et plus régionales ont permis de dresser les contours de la question des interdépendances entre la santé, l'éducation et la pauvreté. Les implications de telles interdépendances sur les segments vulnérables notamment sur les femmes et les enfants ont aussi été élucidées. Les politiques économiques et sociales en mesure de mieux valoriser ces interdépendances ont aussi été discutées.

Ainsi, ce travail a pu confirmer le rôle central des femmes, des enfants et des handicapés dans le processus global de développement. Il a aussi souligné l'importance des interdépendances entre la santé, l'éducation de la pauvreté et ce, aussi bien au niveau de pays que de la région entière, malgré l'existence de différences en matière de richesses économique entre les pays. Le milieu rural et la forte urbanisation de la région constituent des facteurs d'accélération du processus de pauvreté avec ses dimensions interdépendantes dont l'économie, la santé et l'éducation. De hauts niveaux d'éducation qui existent souvent en milieu urbain, seraient à l'origine d'une bonne perception du rôle de la santé mais les bas niveaux d'éducation en milieu rural n'ont pas permis de tester les effets sur l'attitude en matière de prévention sanitaire bien qu'une relation positive ait été trouvée en milieu urbain. Les déperditions scolaires paraissent être aussi liées aux conditions de vie des ménages et aux difficultés de prise en charge de la santé. Les tests de causalité au sens de Granger, ont permis de déceler l'effet moteur de la santé et de l'éducation sur le reste des variables, malgré les limitations des données chronologiques. Ces déficits continuent d'exister malgré les engagements des pays étudiés dans des réformes économiques, sociales et politiques et malgré leurs engagements dans la poursuite des objectifs du millénaire et de développement humain. Le renforcement des politiques socio-économiques transversales et plus intégrées seraient en mesure de permettre à la région du Sud de la Méditerranée de changer ces déficits en opportunités de développement. Le rôle des femmes et des enfants dans un tel processus est évidemment porteur pour aujourd'hui mais surtout pour les générations futures.

Le présent rapport est ainsi composé de huit chapitres qui sont aussi interdépendants. Pendant, que le huitième chapitre est entièrement consacré à la synthèse et à la discussion des résultats, le septième est centré sur le renforcement des politiques économiques et sociales d'intégration et de transversalité telles que liées aux interdépendances décelées dans les chapitres antérieurs. Ainsi, les résultats sont respectivement détaillés aux niveaux des chapitres 3, 4, 5 et 6. Le chapitre 3 est basé sur une analyse descriptive des données régionales et aussi des données des pays Européens. En même temps que ces analyses ont permis des comparaisons, elles ont aussi aidé dans le ciblage des investigations qui ont été réalisées dans les chapitres 4, 5 et 6. Ce ciblage a ainsi limité les pays du Sud de la Méditerranée aux pays Arabes et à la Turquie. Le chapitre 4 a été essentiellement centré sur les analyses microéconomiques des interdépendances entre des variables de santé, pauvreté et éducation dans les cas de l'Egypte, du Maroc et de la Turquie, à partir des données DHS. Mais cet exercice s'est aussi continué pour le cas du Maroc avec la disponibilité des bases CMBS. Ces compléments ont aidé à élucider l'ampleur et l'étendue des interdépendances aux niveaux de deux régions pauvres du Maroc. Le chapitre 5 a été centré uniquement sur l'analyse des données régionales. Différents ensembles de données telles que celles de la Banque Mondiale, des Nations Unis mais aussi les bases de données du Ministère Français des Finances « Profils institutionnels ». Ce dernier exercice a permis de confirmer les résultats obtenus à travers les analyses des données quantitatives par les appréciations subjectives contenues dans les « profils institutionnels, 2006 ». Mais, il fallait affiner de tels résultats globaux en prenant en ligne de compte, les femmes, le milieu rural, les enfants et les handicapés. C'est ce qui a été réalisé au niveau du chapitre 6 où la santé et l'éducation sont apparus être déterminants en conformité avec les résultats des tests de causalité de type Granger conduits au niveau du chapitre 5. Ceci a ainsi suscité la prise en ligne de compte de la fuite des cerveaux et des compétences au niveau de la région étudiée. Enfin, les chapitres 1 et 2 ont été centrés sur la revue de la littérature et sur les méthodes et les données utilisées relatives aux interdépendances entre la santé, l'éducation et la pauvreté dans le contexte des pays du Sud de la Méditerranée.

Executive Summary

The major objective of this study is to show the importance of interdependencies between health, education and the performance of the South Mediterranean economies (SMC), a region that covers the Arab countries plus Turkey most of the time in this report. The motivation behind the achievement of such objective is mainly related to the determination of the direction of the likely gains that each country can attain when accounting for more integrated social and economic policies. In this process the interdependencies of health, education, employment and other socio-economic factors are considered as the core of this study.
Before pursuing the empirical assessment of the interdependencies, an extensive literature search has been conducted. It has allowed identifying the importance of the topic and the updating of the related issues addressed both in theory and empirically besides the available evidence accumulated about the region of study. This has revealed the existence of important links between different sources of wealth that are health, knowledge, monetary assets and social capital. Furthermore, the importance of non monetary assets (Health, knowledge and social capital) appeared to be at least as important as the traditional economic and financial wealth.

Within the above context, the situation of South Mediterranean countries (SMC) as analyzed and discussed in different publications has benefited from a special attention in order to assess how the concerned specific interdependencies have been assessed. This has revealed the importance of the topic at hand besides confirming the research avenues pursued. It has appeared that SMC are not fully accounting for the interdependencies of health, education and poverty and that their policy making models are most of the time sector oriented. The SMC economies even though can gain from the knowledge about the interdependencies; they can also reduce the existing constraints to allow further access of the population to basic services. The current study has also shown that interdependencies are not fully valued in this context as cross-access to different components is still limited. Given the extent and magnitude of education, health and socio-economic deficits in the SMCs, the identification of the interdependencies generates new avenues for more integrated economic and social policies that can also gain from the reduction of barriers that reduce access to basic services such as health and education.

The results attained are mainly based on the assessment of different panels of data covering the overall region but also some specific countries. These data have originated from different sources that include international and sometimes national databases. Both descriptive statistics and regression analyzes are used to assess the directions and magnitudes of interdependencies. Both regional and country databases have been used. While the regional databases accounted for different socio-economic variables as issued by the available World Bank and UN data, the microeconomic variables have been varying with the sources used. One specific piece of data related to drop out from different school levels has been added to investigate the link with health and economic variables in the 16 regions of Morocco. Other data include Demographic and Health Surveys (DHS) and Computer Monitoring Based Surveys (CMBS) for the case of Morocco as well as other sources such as Country Profile data (Ministry of Finance, France) have been also analyzed.

The results have shown the extent of the likely gains that can be attained when accounting for more integrated policies. They have also shown the global constraints that limit access and then the expression of full benefits from interdependencies. Furthermore, the limited access to health technologies and related knowledge reduces the level of research and education that could be devoted to enhancing local flows of information for the population to participate to different partial and global programs. The results show also that income poverty is not the major deficit but deficits in health and education are the main reasons for the absence of adequate economic policies capable of generating socio-economic improvements that can create better conditions for access to the basket of the necessary services and goods in the region. Socio-economic factors have appeared to be major drivers of health and mainly the role of education on health behavioral variables. Implicitly limited focus on human development policies has appeared to be among the major factors that affect these economies. This is the expression of limited transversal policies and reduced integration among sectors in the region and in every economy included in this study.

The first chapter focuses on the most important theoretical views that have been underlying the discussion of the interdependencies of health; education and economic performance are still under development. The related empirical applications are also still progressing but are progressively showing the importance of accounting of these

interdependencies in different types of economic and social contexts. The central role of the theory that accounts for the different types of assets such as health, knowledge and social capitals besides the traditional economic wealth appears to be promising. It introduces a framework that helps understand both the theoretical and empirical foundations of poverty definitions and assessments. It also shows how health is a major component in the wealth of individuals and countries and that health can be a major source that ensures economic activities through labor productivity. This relationship can then be enhanced with the additions from the other types of assets such as knowledge and social capital.
Attempts to test empirically for interdependencies have been also discussed. They show that major steps have been made to investigate the magnitude of the likely gains to be attained when accounting for interdependent and integrated policies. While causality has not yet been established, major progress is expected in this area.
The assessments that have been achieved for the South Mediterranean countries (SMC) have been expanded through the works of international organizations as well as with the inputs of some individual pioneers. But, further investigations are needed given the deficit of knowledge existing on series of related issues and given the types of specialists needed to cover the missing dimensions.

The second chapter is mainly based on a description of the general methodological guidelines that are used in different parts of the following chapters. These guidelines include descriptive statistics with focus on principal component and factor analyzes besides the other traditional investigations. The methodologies mobilized do also account for simple regression analysis besides the introduction of simultaneous equations with seemingly unrelated errors. Probit and Chi-squared methods are also used for categorical data when analyzing household surveys.
Different types of variables and sub-variables are used depending on the sources of information used. Data are mainly related to cross-sections of countries in the region as published on alternative sources. They also include partial or total databases issued from country surveys. The Demographic and Health Surveys (DHS) are among the most important country household data that have been analyzed.

The third chapter focused on statistical descriptive analysis using regional data. The regression analysis of different clusters concerning the potential relationships between education, health and income measurements helps to come up with the following conclusions.
First, the use of aggregate data such as the “world cluster” to illustrate relationships, without taking care of the different economic, social, regional, and development specificities, leads to contradictory findings. The example of the regression analysis of the children out of primary school illustrates the ineffectiveness of aggregate data since the results of world countries completely contradicts the results of five sub-clusters. Data from sub-clusters, in contrast, improves the efficiency and helps detect the level of significance existing between the GDP per capita and both health and education.
Second, the GDP per capita impact on improving education is not very significant. In fact, the overall conclusion that could be driven from the regression analysis of the education and income indicators is that the relationship significance of GDP per capita is not considerable. In other words, the improvement of education within different clusters does not necessarily require an economic involvement or an increase in the income of the population. The single argument in favor of the importance of the GDP per capita for ameliorating the level of education concerns the literacy rates in middle income countries (mainly SMC, major oil net exporters, and high and medium human development). In general, other arguments than income should be studied in order to enhance education.
Third, in contrast to education, the interpretations of regression tables for health and income indicators proved that GDP per capita is the key for most of clusters. The enhancement of health in different clusters can only occur if it is accompanied by an amelioration of the income level of the population. Alternatively, low human development countries need to focus on other measures than GDP per capita to determine a significant relationship with health issues. The main point of the low human development countries’ health indicators is that the relationship significance varies from year to year. This “instability” can be explained by the rise of new factors that alter health, more than the GDP per capita would do, within a particular period.

The results attained in the fourth chapter are based on the household data contained in the above surveys show consistently the existence of interdependencies among economic, social, health and education variables. This is a confirmation of the results attained under the macroeconomic analyzes. Interdependencies are therefore established at both household, regions, country levels besides the level of SMC. Comparisons have also been made at different stages to investigate the trends taking place elsewhere. These interdependencies are consequently found to be major sources of social gains at both sector and global levels. Besides that, risks related to the expression of the potential

gains have been investigated at the level of SMC through testing for the likely impact of brain drain in medical human resources. This has allowed discussing further socioeconomic policies that can accelerate access and adoption of more integrated policies that are more human development oriented. Also, international and regional strengthening of cooperation in the areas of education, health and related social areas is likely to enhance the level of services in each South Mediterranean economy has appeared to be crucial.

The fourth chapter is based on micro-level analysis of variables that focuses on health, education, and wealth at the level of Morocco, Egypt, and turkey. The information collected provides an ample idea about the health, education and wealth in response to economic variation, and other factors that affect health, education and wealth.
Education, health and are influenced by a number of socioeconomic factors which include household characteristics, household resource endowments, access to information and availability of formal institutions. Many variables representing health, education, and wealth were considered..
This chapter explored the interdependency among health, education and wealth which is a proxy variable for poverty using household characteristics with different adaptation measures using a Chi-squared hypothesis testing and a multivariate probit model.
The Chi-squared hypothesis testing showed a significant dependency between health versus, education, education versus wealth with many characteristics concerning health, education, and wealth.
The Probit model allows for the simultaneous identification of the interrelationships between health and education, education and wealth, and wealth and health. Different probit equations were estimated and were valid in explaining the behavior of each dependent variable (health, education, or poverty) with respect to the independent variables (health, education, and poverty). The probit estimated models showed a significant likely interdependency among health, education and wealth through a high probability of occurrence between each dependent variable representing either health, education, or wealth and the independent variables representing either health, education, or wealth. The results of the microeconomic analysis undertaken at the level of Morocco, Egypt, and turkey appear to be quite similar. It may be confirmed from this study that the sectors included are determinants for economic development. The results attained with Bouaboud and Essaouira data do also help underline the high level of interdependencies between health, education and poverty. These relationships are also confirmed with the consumption expenditures that have appeared to be highly inter-related.
The above results could have been expected because based on household data that are supposed to reflect the types of inter-relations in decision making at the microeconomic levels. But, it is important to reveal the effects of aggregation over countries on these interdependencies. The direction of answer of this question is important as far as country and regional policies are concerned. The persistence of interdependencies at the regional level can be an important signal of consistency between microeconomic and macroeconomic models. The opposite will be a sign of inadequate policies when based on aggregated views. These matters are analyzed in the following chapter.

In the fifth chapter, regression, correlation and granger-tests have been the main techniques used on different data. The first set of data is mainly that of World Bank and that was described in the previous chapter. The second is the most recent database of the UN. The third set is composed of the composite indices provided by different international organizations. The last set is the 2006 institutional profile data of the French Ministry of Finance.
The overall results attained at every level of the analysis are the high magnitude and extent of interdependencies among all sets of variables related to health, education and poverty. Health and education appear to have an important driving effect for these interdependencies.
This is shown through the World Bank data analyzes as well as with the new UN database. The representative variables of health, education and poverty seem to entertain higher levels of interdependencies meaning that any change in one of the variables affect the others. This is confirmed again through the analysis of some composite indices where clear relationships have been estimated. Furthermore, even the subjective appreciations of achievements in different variables related to health, education and economic activities have appeared to show interdependencies.
The results attained so far at the regional and aggregated levels appear to be referring to the real situations faced by households in different countries. This latter has already been shown through the results shown in the previous chapter with household data analyzes.
But, given the type of data used at both country and regional levels, it has been very hard to account for some the issues that are crucial to this study. Some of these issues are tackled in the following chapter.

The sixth chapter has been focusing on some special topics that are directly related to the magnitude and extent of interdependencies of health, education and poverty. These issues have covered the brain drain, the gender, and the rural/urban besides the topic of handicaps. Further results have been consequently attained from the above concerns. If health were an important matter in the region of study, important risks as that of brain drain may affect the supply of adequate health care under the pressure of limited human resources. These limitations are emphasized when focusing on the role of women and children with their central economic and social roles in different economies. In the context of SMCs further improvements are shown to be needed in relation to the inclusion of women in these economies and societies given the potential gains that each country can attain. Under the pressure of rural versus urban pressures, both men and women suffer relatively from higher levels of deficits in rural areas but urbanization does not reduce the deficits if decent inclusion policies were absent. While handicaps originate not only from genetic concerns, these latter appear to be important and require further identification and communication with the poor segments of the population.

The seventh chapter shows how it is definitely clear that the situation of the poorer segments of the population in SMCs can improve if further policy coordination and integration is pursued. The directions of further coordination appear to have been provided by the international framework that accounts on achieving MDGs by 2015. It is also provided by the orientations focusing on human development. The recent reforms undertaken seem to be mainly focusing on economic and political components while accounting for social components as a residual sector that should be considered with the implementation of reforms. The overall policy schemes that are driven by both international organizations and by the domestic reforms, cannot lead to the needed policy integration if not based on ownership and domestic generalization of these policies to different country locations. Furthermore, specific transversal policies focusing on women, children and older segments of the population need further strengthening. More inclusive health and education policies with gender and rural focus can be promising in the region. Preventing and accounting for the existence of handicapped segments of the population are also dimensions that require inclusion within the socially coordinated policy packages.

The last chapter plays the role of an overall conclusive part. It focuses on the results attained in each chapter with their expansion to include some poverty issues such as risk and missing dimensions. It also discusses the importance of the results in poverty alleviation programs with the central roles of education and health. Besides local development, the role of women is highly stressed with the importance of transversal policies.

Introduction

This study aims at analyzing the interdependencies existing between human development factors with a special focus on health, education and poverty as preliminary steps towards an analytical focus on human development policies and especially those related to health and education. If empirical research has been accumulated globally and on different regions of the world, only limited evidence on the area of interdependencies does exist for the SMC. The Arab human development reports (UNDP, 2002, 2003, 2004 and 2005) have shown large deficits in different aspects of human development in the region. Health and knowledge have appeared to be among the major deficits in the region and occupy key positions in limiting access to better lives.

This leads to considering the following inter-related series of questions that form the core of this research:
What types of interdependencies (if any) do exist between human development variables and what are those that link health, education and poverty in the South Mediterranean region?
How does the existence or absence of these interdependencies compare to the situation in other countries?
What health, education and human development policies can be inferred from these interdependencies and do policies influence these interdependencies?
How the on-going health, education and human development reforms and policies are or are not accounting from the above concerns?
What types of economic and social policy contributions can be made through this research?

Insights into these inter-related issues have been building with the development of both theoretical and empirical studies focusing on interdependencies with the development of new challenges facing policy-makers when accounting for the magnitude and level of sector inter-relations.

The importance of health and education has been recognized since the early work of Amartya Sen (1998). This author said that: “Quality of life depends on various physical and social conditions, such as the epidemiological environment in which a person lives. The availability of health care and the nature of medical insurance-both public and private-are among the important influences on life and death”. In a later publication (2005) Siddiq Osmani and Amartya Sen looked at the fetal origins of ill-health through analyzing the hidden penalties of gender issues. Besides that, the international community has embarked since 2000 in achieving Millennium Development Goals (MDG). These goals cover poverty, illiteracy, health, education and environment among others. Furthermore, and since the publication of the first world human development report in 1990, more emphasis has been placed on the monitoring of human development as it is annually covered under world, regional and country reports. These trends imply that most developing countries including those in the South Mediterranean Region have been involved in policies and actions aiming at promoting better livelihoods for their populations. As it is developed in different empirical reports and studies, the human development policies do have important interdependencies that should be better identified. These identifications help in refining the knowledge and the directions of policy actions that could enhance the level of attainment of the MDG’s as well as the enhancement of the living conditions of the populations.

In relation to economic development theories and as shown by earlier works and publications related to human development, individuals own different types of assets that are inter-related in a given environment (economic, political, social and natural). The major assets considered are economic, health, knowledge and social capital. While it is easy to show that economic capital includes assets and liabilities besides the flows of income and returns generated from economic activities, it is more difficult to show how other assets are formed. It can be underlined though that the capital health refers to all the physical and mental characteristics of an individual during the life span. The knowledge capital includes the experience and mainly the level of education. The network or social capital refers to the gains and external effects ensured from being a member of a group that can be family or/and professional and social groups or clubs.
These levels of capitals do change throughout the life span of any individual. Different levels of capitals can be related to different stages of human growth curve. The levels of capitals at different stages of life define also the levels of vulnerability of any individual. While generally economic and knowledge capitals can be lacking at the beginning of life, health and social capitals do determine the level of vulnerability of children. For example, orphans do suffer from absence of parents and thus are socially vulnerable. Bad health during early ages leads also to vulnerable existence with negative impacts on the growth curve. Orphans with health limitations are more vulnerable than orphans with better health. At the other extreme, when older, individuals can suffer mainly from limitations in health and social capital but those that have the knowledge and the economic capital can be less harmed than the poorer segments attaining the highest stages in their growth curve.

This research has three inter-related objectives. The first one is to show how health, education, and income poverty are inter-related in the context of the South Mediterranean Countries (SMC). The second objective is to relate health and education variables to the other economic and social indicators of the region and to identify how other social variables can have further explanatory powers. The last objective is to show how public policies can be improved to account for the interdependencies identified above to better target poverty alleviation.
There is a strong link for example between health and poverty. Individuals born into poor families are more likely to have poor health in adulthood. At the same time this poor health leads to lower earnings and sometimes to poverty, playing a role in the intergenerational perpetuation of poverty. Further, young children with poor health are less likely to reach high levels of education which limits there ability to earn higher income.
The health policies adopted by the SMC in the last decades will influence greatly the above interdependencies. In fact one would expect that the selection bias under which only the ones with above average health will survive to adulthood is strongly affected by the generalization of the vaccination for major diseases. The family planning policies by reducing fertility rates will also affect women health and by reducing the number of children per family will change parents' behavior towards health protection.
While a number of empirical studies have identified the existence of interdependencies between some or most variables that underline human development, major controversies have been identified in relation to the extent of data and their use in the estimations.
These empirical investigations have not concerned the South Mediterranean Region. While it is pervasively known that the region has important deficits in education and health and relatively significant parts of the population living in poverty, no empirical evidence about the

interdependencies between different variables pertaining to human development is presented and tested empirically (UNDP: Arab Human Development Reports, 2002, 2003, 2004 and 2005).
Furthermore, the theoretical socioeconomic models devoted to understanding the channels through which these variables influence each other are new and knowledge about them is limited in scope. Developments on the theoretical front would enhance the likelihood of empirically based investigation. The focus on this region of the world is an opportunity to understand better how these interdependencies operate.
To achieve the above objectives, the most recent theoretical economic models and conceptions are reviewed and used to support the empirical investigations that are pursued in the context of this study.
Different databases from international organizations besides other microeconomic databases covering households and regions of some countries have provided the variables and indices considered in the theory and its implementation. Descriptive analyzes besides regressions are used to test the existence of interdependencies between health, education, earnings and other socio-economic variables. Specific tests are then conducted to reveal the importance of different socioeconomic effects with special attention paid to the role of global public policies. Both macroeconomic and microeconomic data and analyzes have been pursued in order to link both household, locality, country and the South Mediterranean economies as whole with their comparisons with other countries when possible.

The current study is composed of eight chapters. The first one deals with the review of literature on the issue of interdependencies of health, education and poverty. It also deals with the situation of SMC as it has been analyzed through different publications and reports. The second chapter focuses on the methods and data used. The third chapter focuses on an overall descriptive statistics and analyzes of different variables related to the topic of study. While the fourth chapter is devoted to microeconomic analysis as based on the available and accessible disaggregated data and information, the fifth chapter focuses on aggregated data and information as provided by different regional panels. The sixth chapter introduces the risks that can constraint policies and programs devoted to promoting health, education and development with emphasis place on the role of women, children, handicaps with rural urban variations. The seventh chapter is devoted to the economic policies that would accelerate access to further human development in the region with focus placed on the strengthening of integrated and transversal economic and social policies. The eighth chapter constitutes and overall synthesis and concluding framework.

Chapter I: Literature Review on Interdependencies of Health and Wealth

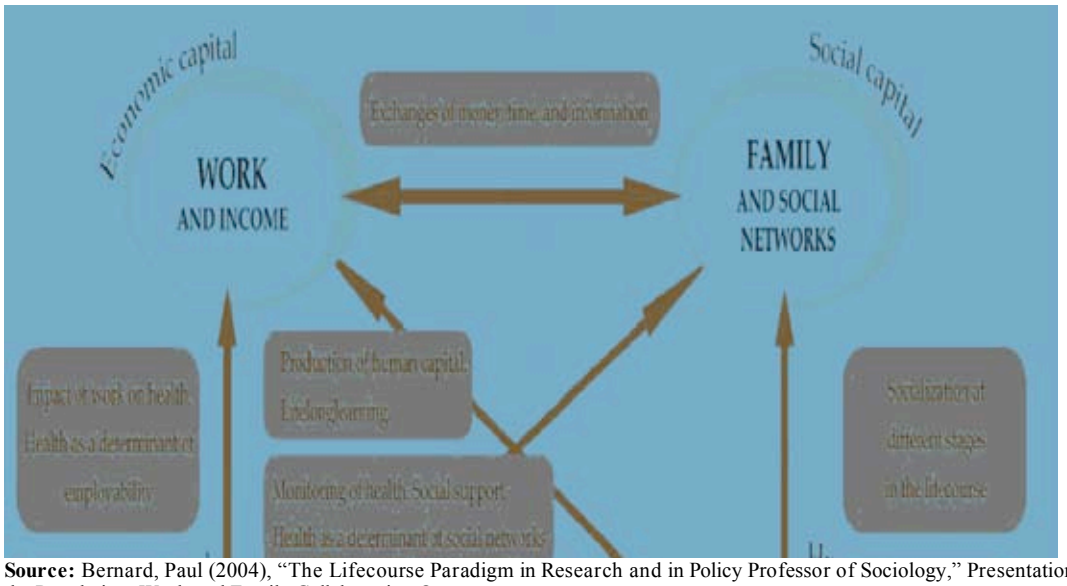
Insights into the likely relationships of health, education and economic performance have been explicitly discussed in series of social science, public health publications and reports. Different approaches have been used to tackle the extent and magnitude of these relationships. It is obvious that these linkages are well known but their magnitude and extent with their utility for economic and social policies are not obvious. Evidence through publications about the magnitude, the extent and the impacts on policy making that account simultaneously for more than one socioeconomic sector has been progressively developing during these last years. This review deals with the importance of interdependencies and the major findings accumulated in the socioeconomic literature

1. Past Studies on Interdependencies of Health, Education and Economic Performance

The main publications that have been reviewed are those that contributed to the assessment of the relationships involving health. Two major types of approaches have been identified in relation to extent and the number of variables affecting health. These relationships are respectively reviewed with emphasis placed on different socioeconomic factors. The first set introduces a more general view about the variables and their levels of interactions. The second is based on few socioeconomic variables and their relationships to health. This refers to the relationships of health and nutrition, health and education, health and governance and health and labor markets.

1.1 Relationships of Health and other socioeconomic variables

Bernard & al. (2006) describe life as multi-faceted. This is explained by the fact that individuals use, gather or loose various interdependent forms of capital throughout their lifespan. Three basic resources (health, education, and economic) can be seen as interdependent causes and consequences of one another over the lifetime of an individual. The social capital could be considered as an important factor because individuals can accumulate other useful resources for themselves, their families and their communities through social networks. The following diagram summarizes the foundation of this approach.



Source: Bernard, Paul (2004), "The Lifecourse Paradigm in Research and in Policy Professor of Sociology," Presentation at the Symposium of the Population, Work and Family Collaboration Ottawa.

The variables presented on the diagram above, have significant inter-relations both in static and dynamic terms. The most relatively complete work integrates not only the economic variables with health but also all the other socioeconomic factors including education (M. Hurd and A. Kapteyn, 2003). These authors have integrated most of the variables that may have relationships to health and explore the causality among all these factors. Adams et al. (2003) identified causal relationships between Socioeconomic Status and health conditions. The results attained have shown some inconsistencies. While empirical evidence was established between socioeconomic factors and health, no clear opposite causality was found.

Lee and Kim (2007) conducted a longitudinal analysis to detect a long-term effect of health shocks on wealth and compared that with its short-term effect on the elderly which goes along with the previous studies including that of Adams et al (2003). New health events have negative impacts on wealth but tend to disappear over time (Lee & Kim, 2007). The results have shown also that severe health conditions (existing and new) significantly influence wealth depletion mainly when shocks happen later in life. Besides, health capital (existing severe chronic conditions) has a persistent negative impact on wealth changes over time. But these results are subject to variation with the level of education, the family status, and other factors.

Longer term effects have been also investigated using panel data by P. Adams et al (2002) and by Cutler et al. (2007) however limited evidences have been proven, the same results found out through the study of Culter, Miller and Norton (2007). Mayer-Foulkes (2004) addressed the long-term impact of health by including the intergenerational and life-long dimensions.

The relationships between health and each of the components that define the wealth of an individual, a group and a country are examined below through different publications.

Cutler David M, Adriana Lleras-Muney, Tom Vogl (2008) show the existence of a clear link between socioeconomic status and health which are identified by a number of studies covering both the United States and European Countries. A number of socio economic variables such as education, income, occupation, race and ethnicity used as measures of socio economic status have been associated with poor health and increased mortality risk. For example mortality risk rises when individuals do not reach upper secondary education in the United States and in some European Countries. Each of the measures of socio economic status would influence health

through different mechanisms. This has important implications for the choice of public policies aiming at improving the health of individuals under specific conditions.
Cutler, Lleras-Muney and Volg (2008) have reviewed research of the last two decades on the SES health gradient by paying particular attention to the mechanisms through which each of the SES measure affects the health status. They have divided the SES into four domains: education, financial resources, rank and race and ethnicity. The studies reviewed have explored and have analyzed the contributions from different fields including not only economics but also sociology, demography, epidemiology, psychology and evolutionary biology and others. The above authors have recognized that the characteristics of the developing countries which are the interest of the present report are such that the "SES health gradient and its underlying mechanisms require further attention in poor countries".
To study the link between SES and health the authors start by looking at some facts using the National Health interviews survey of 1986 through 1995. They use two measures of health: self reported health status (SRHS) and mortality and four measures of SES (education, income, occupation, race and ethnicity). Those with more than 16 years of school have lower mortality rates than those with less than 8 years of school and more education is also associated with better SRHS. When household income is used to replace education as an indicator of SES the results are similar in the sense that as SES improves mortality decreases and there is an amelioration of SRHS. When occupation is used, lower occupational status increases mortality. The race and ethnicity show that blacks experience higher mortality than whites or hispanics.

The literature based on quasi experiments such as the enforcement of compulsory education or the existence of high unemployment forcing individuals to stay at schools reveals that education affects health positively. The reverse effect holds as well. The positive link between education and health is shown to hold in developing countries as well. Randomized experiments in India and Kenya (Bobonis 2006 and Miguel and Kremer 2004) as well as quasi experiments from developing countries (Lucas 2005, Bleakley 2007, and Field 2007) confirm these results. These studies seem to imply that schooling improves health because it reduces morbidity and or improve cognitive development; however, this could be an expectation of longer life that increases human capital investment.
The link between income and health was, in the literature, first perceived as running from income to health. More recent work shows that the relationship is more complex and varies with the population age. Income improves access to health inputs but a better health allows one to earn a better income. Poor health increases spending and reduces wealth through a decline in labor earnings and some factors such as education affects both health and income. The study about the elderly individuals in the developed countries indicates that income is not a factor which is associated with a better. However it is found that family income affects children's health. The early health status of children affects their later health status when older and thus their ability to earn income. If this is true, then children's health plays an important role in the intergenerational transmission of socioeconomic status.
These results hold also in developing countries case study. Exposure to malaria eradication in the Americas (Bleakley 2007), being born during years of good rainfall in rural Indonesia (Maccini and Yang 2007) improves SES in later life.
Low social status through membership in a disadvantaged racial group or through low rank in a hierarchy may also cause poor health in adulthood.

One of the important findings of this literature review is the importance of the lifecycle. Parent resources (education, income) have an effect on health.

1.2 Health, Wealth and Income

The approaches included in this part consider health as the most critical source of wealth. Sommestad (2001) emphasized the role of investment in human capital with health being the major engine of economic growth based on the empirical evidence during "a 5-year gain in life expectancy resulted in 0.3 to 0.5 per cent economic growth". This evidence supports the work of Bloom and Canning (1999) about the effect health status on productivity, education, investment in physical capital and the demographic dividend. Poverty and poor health penalize economic growth (Bloom and Canning, 1999). In *The Health and Wealth of Nations,* Bloom & Canning (2000) acknowledged the relationship between health and income which indicates higher income leads to a longer life expectancy. A healthier population works more efficiently with higher chances of improving its skills, generating and attracting more investments, and benefits from a higher resource allocation. This causality between health and income lead to health improvement and then to further income increase. Various examples of this "Virtual Spiral" are from East Asia and Ireland (Bloom & Canning, 2000). Through another publication, the same authors (2004) have stressed that investing in health leads to higher economic and social performance under sound macroeconomic policies and governance. The same study showed that initial beneficiaries of health improvements are often the most vulnerable groups (children) with healthier children having better school attendance and improved performance. This shows how health and income have been identified to be highly related.

When introducing health in the budget constraint, Hoel (2003) found that the budget should be allocated in such a way that the marginal cost per unit of health improvement in the optimal outcome is equalized across health states.

Haywood & Bridges (2003) provided a detailed analysis of the methodological differences that exist in health economics and the expected changes that have been taking place especially between theoretical and empirical contributions. Hurd & Kapteyn (2005) have also analyzed the relationship between health and income. They found that large variation in wealth in some countries is associated with large variation in health. Further techniques and analyzes have shown the importance of the link between health and expenditures. Xu et al. (2003) demonstrated the existence of an overall positive relation between the proportion of households with catastrophic health expenditures and the share of out-of pocket payments in total health expenditure. The results confirm that countries with a higher share of out-of-pocket payments in total health expenditures are more likely to have a higher proportion of households facing catastrophic expenditures. Gerdtham and Thgren's (2002) tested for co-integration between health expenditure and GDP and found that health expenditure and GDP are co-integrated around linear trends.

Other studies like the one by Doyle et al. (2005) explored the robustness of the presumed effect of parental background, mainly education and income, on child health. Children of poorer households tend to enter adulthood in worse health and with more serious chronic conditions. This is referred to as a "gradient" in health status. The authors however suspect the possibility that unobservable factors might still account for these results.

Other important relationships have been investigated in the literature.

1.3 Health, nutrition, education and labor

Knapp (2007) dealt with the links between nutrition, labor productivity and a health variable that is height. The net role of nutrition on labor productivity was shown to be highly significant. Muysken et al. (1999) showed that when physical capital relative to health is relatively scarce, optimal expenditures for health and consumption are lower (higher) but increase. Also, consumption is no longer likely negatively related to population growth because it enhances the percentage of health workers.

Wichmann (1995) investigated the nutrition- productivity relationship and that at low levels of income, therefore a strong relationship between the state of nutrition or health and labor productivity. The dynamic version did show that better nutrition increases the productivity of the learning by doing process. The empirical evidence gathered confirmed the above findings but revealed that, children with good nutrition and health start school at an earlier age, progress further, and repeat fewer grades (Yamauchi, 2006). However, the analysis of long panel of data (11 years) suggests that good health may discourage further investments in schooling at the stage of transition from primary to secondary school and that better health status may reinforce incentives to go to work..

The relationship between health and education has been also stressed in series of publications such as the one of Freudenberg & Ruglis (2007). The findings show that poor health is a causal effect of poor education and dropout. Also, health professionals and educators would be better off bringing their efforts together in reducing dropout rates and developing health awareness, as both their sectors (health and education) would obtain considerable benefits from such a cooperation.

Regarding the relationship to labor, health is one of the strongest determinants of labor supply (Lambrinos, 1980) and thus the relation between health and labor is clearly important. Arayssi et al. (2006) demonstrates that individuals place a positive value on job risk insurance because they demand higher earnings and work longer hours for riskier jobs. Therefore, insurance companies may charge people with different willingness to pay, particularly those in different income brackets, different premiums. The value of a small reduction in mortality risks is subject to the views of the individual. It is also based on the idea that only a person is able to assign an accurate dollar value to his/her own life. According to Arayssi et al. (2006), the message from this study indicates that there is room for policymakers to provide incentives for voluntary self-protection as well.

Further series of publications have produced major inputs into how interdependencies could be used to support more realistic policies.

Anderson et al (2004) showed how to account for evidence about early childhood socioeconomic conditions that have long-term health consequences on health disparities over the life course in relation to early investments in education. These have lasting effects on health outcomes later in life. Aging populations in the developed world are currently posing a serious threat to the cost of pensions and health care. The authors explain why countries cannot expect to grow themselves out of the problem using measures such as increasing immigration, raising the retirement age, and encouraging households to have more children.

According to Farrell et al (2005), the only effective measures are for households and governments to increase their savings rates and to allocate capital more efficiently in order to earn higher returns on the assets they have.

Grimm and Harttgen (2007) looked at the role of dependency ratio in relation to population growth in relation to health. They also found that a low life expectancy reduces substantially welfare despite the related economic feed-back effects.

1.4 Health and governance

Some authors have been pointing the role of political institutions in supplying better health. Rationally, better governance leads to better supplies of both private and public goods and services. But there are paradoxes and dilemmas that have been reported in the literature. Evans (2008) is convinced that the famous drop in the main killer diseases is not the result of medical progress (or has been a little influenced by this progress). To demonstrate this result, McKeown (1979) used the example of Cuba in comparison with the countries studies (WHO, 2006) in the paper "Thomas McKeown, Meet Fidel Castro: Physicians, Population Health and the Cuban Paradox". Cuba has the least GDP per capita among the countries studied – St. Lucia, Uruguay, Argentina, United States, Canada, Mexico and Chile. At the same time, the country registers the highest number of physicians per 1000 people in the sample. Cuban life expectancy at birth (78)[1] is among the highest in the sample, which is similar to the value in the United States and close to the value in Canada (80)[2]. Besides that, the mortality under age 5 is the lowest (7)[3] in the sample after the value for Canada (6)[4]. This Cuban Paradox results from the fact that even though Cuba has poor economic achievements, it realized a good health performance that is comparable to developed countries.

Health indicators and GDP per capita for the Americas countries in the sample

Country	Physicians per 1,000 population	Life expectancy at birth	Mortality under age 5	GDP per capita
Cuba	5.91	78	7	$3,438
St. Lucia	5.17	74	14	$5,880
Uruguay	3.65	75	14	$8,408
Argentina	3.01	75	18	$11,989
United States	2.54	78	8	$37,572
Canada	2.14	80	6	$30,192
Mexico	1.98	74	28	$9,387
Chile	1.09	77	9	$11,590

Source: WHO 2006, Statistical Annex, Tables 1 and 4.

Evans (2008) found out that according to the Cuban experience, increased wealth is not an important factor for health improvement. He explains the Cuban health improvement by a political determination that recognizes the importance of social actions and other health determinants other that medical, for population health. But, the above papers do not how health performance is transferred to education and to other economic factors?

[1] WHO 2006, Statistical Annex, Tables 1 and 4.
[2] Ibid,
[3] Ibid,
[4] Ibid,

2. Interdependencies of Health, Education and Poverty in Southern Mediterranean Economies

This chapter is mainly based on publications and reports related to the South Mediterranean region and that have covered issues related to the topic of this research. The objective of this part is to identify the state of knowledge to date about the interdependencies of health, education and poverty in the context of the region. Besides reviewing the publications of different authors, inputs from different international and regional organizations have been widely used. In this context, interdependencies are analyzed through the relationships between two sets of variables and through the links between several components that relate to health, education and poverty in the region.

2.1 Health, nutrition and population

Based on Demographic and Health Surveys (DHS), important series of reports are produced about the links between health, nutrition and population. Among the SMC, Morocco, Egypt, Jordan, Turkey and Yemen are covered. The related publications (Gwatkin & al, 2007) provide the most important links between health, nutrition and demographic issues.

The comparison of 1992 and 2004 data showed that Morocco suffers from disparities in both health conditions and health service use with a high infant mortality rate especially for children aged 5 or less. Female maternal mortality was found also to be high with other health problems prevalent among children (fever, diarrhea and acute respiratory infection). Education was also found as critical in relation to series of areas among which the disadvantage against women regarding school completion and participation.

For Egypt, children under the age of 5, suffer from mortality with a high prevalence of fever, diarrhea, respiratory infection, bad nutrition, severe stunting, severe underweight, and severe anemia. Large segments of women in rural areas, suffer from malnutrition as well as anemia among others. But major improvements have identified between 1995 and 2000.

The 1997 DHS data for Jordan (Gwatkin & al, 2007) showed higher fertility rate for poor households as compared to those with higher income. Besides that, the poorer segments are in rural areas. Problems related to health, nutrition and other demographic problems are consequently mainly concentrated in rural areas. Women and children are again the highly vulnerable segments.

The comparison of the 1993 and 1998 DHS data for Turkey showed improvements in health, nutrition and other related socioeconomic components. Women and children had benefited from these major improvements but important gaps are still prevailing between rural and urban areas. These changes include reduction of the prevalence of underweight besides the decrease of infant mortality besides increasing health services that can explain the high rate of school completion.

The report about Yemen confirmed the links among poverty, bad health and low education. These links were supported by 1997 data and showed that rural areas suffer more than urban areas with women being those that do not benefit from health, education and economic services (Gwatkin & al, 2007).

The above results have been consistently confirmed by other studies. Akala & Saharti (2006) asserted that while the region benefited from health improvements more effective and structured commitment toward health service was required. The authors suggested that this limited engagement was directly related to the levels of investments devoted to the health area. The population of the region was identified to be suffering from the lack of reforms and changes in the heath care system (Schieber et al., 2007). These issues have been developed earlier by Roudi (2005). To this latter, reforms that would place the reproductive health of women at the center, could help promote further the illiteracy rate and other social obstacles. This is supported also by other studies such as that of Fahimi (2007) who highlighted the considerable lack in women's health awareness. There exist alarming gender disparities in the access to public health services that are usually justified by cultural matters.

2.2 The Relationship between Health and Productivity

There is increased evidence that health has a positive impact on productivity for both developed and developing countries. In her study, Tompa (2002) found that health increases output at both the personal and the aggregate levels. "At the personal level, health can directly increase general output (e.g., through enhanced physical energy and mental acuity), yearly output (e.g., through reduced sickness absence) and career output (e.g., through decreased morbidity or increased longevity, resulting in a longer career)." The sum of individual increases in output translates to an aggregate increase in productivity expressed by an increase in the output per hour and the output per worker[5]. Bloom et al. (2001) confirmed the positive and significant impact of health on economic growth, measured by productivity. They suggested that "a one year improvement in a population's life expectancy contributes to a 4 percent increase in output".6 Studies conducted by Rivera et al., found that "between 21 and 47.5 percent of GDP growth per worker (working-age person) over the last 25 to 30 years can be explained by improvements in the health of populations (defined as health-care expenditures and life expectancy) at the country level." Furthermore, a decrease in child mortality in the recent decades has led to reduced fertility rates, which in turn can cause an increase in workforce participation and productivity (Bloom and Canning, 2000)7.

According to Bloom et al (2001), a healthy workforce is more energetic and robust, thus it is more productive and can earn higher wages. Firms with a healthy workforce have lower absenteeism rates. It could be added that Strauss and Thomas (1998) found that in developing countries, low levels of health have a greater impact on the poor because they are more likely to suffer from serious health problems and they have jobs that require much physical effort. Another finding of their study was that men with higher weights (anthropometric indicator of status of nutrition in adulthood) and heights (anthropometric indicator of status of nutrition in childhood) earned higher wages as their productivity is greater. Indeed, "a 1 percent increase in height is associated with 8 percent increase in wages." [8] Tompa (2002) identified a spillover effect from increased levels of human capital and from health particularly. Higher levels of health can increase not only a worker's own productivity, but also the productivity of co-workers and on society as a whole.

[5] http://www.irpp.org/miscpubs/archive/repsp1202/tompa.pdf
[6] http://www.nber.org/papers/w8587.pdf
[7] http://www.riverpath.com/library/pdf/HEALTH%20AND%20WEALTH%20RPA%20FEB00.PDF
[8] http://www.chass.utoronto.ca/~brandt/ECO2703/papers/Strauss_Thomas_1998_Health_JEL.pdf

Based on Aguayo-Rico et al. (2005) study, investment in health should be included as one of the macroeconomic policy factor. Studies have found that differences in economic growth rates among countries are significantly explained by health levels. Besides, investments in health have proven to increase labor productivity and, thereby, economic growth. However diminishing marginal returns to investment in health are well recognized[9].

The Southern Mediterranean region has accomplished remarkable improvement in the health sector over the last two decades. The average life expectancy has increased by 10 years (from 59 years in 1980 to 69 years in 2003) and infant mortality rate decreased by half (from 90 deaths per 1,000 live births to about 40). Active population policies have been put in place which contributed to great reductions in total fertility rates (from an average of 6 births per women in 1980 to just below 4 births per women in 2003. However, the decline in fertility rates is lagging behind the decline in mortality rates, which causes a rapidly expanding youth population. This "youth bulge" represents both an opportunity and a challenge to social and economic growth in the region (El Naggar, 2007)[10].
Most countries face the problem of inefficient management of the health system. According to the same report, "efficiency gains in health services would translate into improved fiscal sustainability, better labor market incentives and labor productivity, and overall higher social welfare." In fact, inefficient spending on health will negatively affect the economic and human development of the region. "It could act as a drag on labor productivity, add fiscal pressure on a limited government budget, and reduce governments' ability to target public resources for the vulnerable groups" (World Bank, 2006)[11]. Another World Bank report (1999) states that public expenditure in health and education provisions helps improve labor force productivity[12]. Finally, improving health level enhances individual security and capabilities, which leads to improved productivity, national income, and development prospects (Roudi, Fahimi and Ashford, 2005)[13].

In fact, the relationship between health and productivity is a two-way causality relationship. As described by Smith (1999) "a lot of people who otherwise wouldn't be poor are simply because they are sick; however, few people who otherwise would be healthy are sick because they are poor" (Aguayo-Rico et al, 2005)[5]. Strauss and Thomas (1998) suggest that as workers' productivity increases, their earnings increase allowing them to invest more in their health[14]. Smith (1999) believes that the impact of productivity, translated into earnings, on health exists albeit it is lower than the impact of health on productivity/earnings[5]. According to Chatterjee (1990), productivity has a direct positive impact on education which is manifest through an

[9] http://org.elon.edu/ipe/aguayorico%20final.pdf
[10]http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/EXTMNAREGTOPHEALTH/0,,contentMDK:20510402~menuPK:583116~pagePK:34004173~piPK:34003707~theSitePK:583110,00.html
[11] http://siteresources.worldbank.org/INTMNAREGTOPHEALTH/Resources/HEALTH-ENG-2006AM.pdf
[12]http://info.worldbank.org/etools/docs/library/80703/Dc%202002/courses/dc2002/readings/ruppertmena.pdf
[13] http://www.prb.org/pdf06/MENA_Investing_in_Reproductive_Health_Eng.pdf

[14] http://www.chass.utoronto.ca/~brandt/ECO2703/papers/Strauss_Thomas_1998_Health_JEL.pdf

increase in wages and household nutrition. Still, there are many factors that mediate this relationship such as wage, nature, and seasonality of employment[15].

Further research need to investigate which population groups and under what labor market conditions health/productivity relationship is most significant (Strauss and Thomas, 1998)[6]. Aguayo-Rico et al. add that one of the major shortcomings in the empirical studies in this field is the use of life expectancy as a proxy variable of health. They believe that to assess the true value of health, all health dimensions should be included: mortality, morbidity, disability and discomfort[5].

2.3 Relationship between Health and Education

Health conditions are strongly associated with educational achievement of the child. Health is believed to be a factor for better performance in education. At the same time, education is considered to have a significant impact on the level of health of the person or the person's children.

"Much of the relationship between health and education is associated with infancy and early childhood, where health, nutrition, and the environment may have disproportionate effects on cognitive development" (Hoxby, n.d)[16].

Through the study of Ding et al (2007), poor health, represented by obesity and depression, has a substantial impact on academic achievement. First, it may affect the child's physical energy level which determines the time that can be used for learning (attendance and after school educational activities). Indeed, obesity has been found to be the largest determinant of absenteeism. Second, poor health influences the child's mental status which has a direct impact on academic performance. For instance, obesity reduces self esteem which leads to classroom disengagement, thereby reducing academic performance. Also, clinical depression can affect a child's attention span, which negatively impacts her academic achievements. [17]

A student suffering from obesity or depression has a lower GPA than average by 0.45 points, equivalent of one standard deviation. However, the relationship between health and education is significantly influenced by gender. The academic performance of female students is strongly and negatively affected by poor physical and mental health conditions while the academic performance of males is less impacted by health factors [18].

Besides, lower birth weight babies have lower educational attainment and earnings. To examine this relationship, research uses within-twin estimates of the effect of birth weight on long-run outcomes. In fact, birth weight has a great effect on longer-run outcomes such as height, IQ at age 18, earnings, and education. "An increase in birth weight of 10 percent increases the probability of high school completion by a bit less than one percentage point." (Black et al, 2005)[18] .

Using data on monozygotic twins, Behrman and Rosenzweig (2004) suggest that there are real payoffs to increasing body weight at birth. Increasing birth weight increases adult educational

[15] http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/1990/10/01/000009265_3960929224417/Rendered/PDF/multi0page.pdf

[16] http://www.nber.org/programs/ed/

[17] http://post.queensu.ca/~lehrers/genes.pdf

[18] http://www.nber.org/papers/w11796.pdf?new_window=1

performance and adult height but has no effect on adult body mass. The heavier twin is more likely to be taller, achieve higher educational performance, and receive higher wage[19].

Fertig et al (2003) add that children with low birth weight and poorer childhood health indicators have significantly lower educational attainment: "However, it is possible that there is no causal relationship underlying these correlations, as low birth weight may be correlated with many difficult-to-measure socio-economic background and genetic variables."[20]

Evidence also exists that education plays an important role in determining health level of adults as well as the health of their children (Hoxby, n.d). This later relationship is more observed in the case of women. They have a substantial influence on the health of their children both at the pre-natal and post-natal phases.

"As the years of mother's education rise, child mortality falls linearly with no lower educational threshold. Mothers with some secondary education lose half as many infants and a fifth as many toddlers as do women with no education." Although the education of the father has some impact over children's health, this impact does not exceed half of the mother's. Educated mothers prevent accidents or sickness and prevent minor health problems from becoming major ones. Moreover, more educated mothers interact better and easier with modern health services which enables them to optimize their outcomes (Australian Medical Association, 2002)[21].

In the region of the SMC, low levels of education, especially for females, hamper health development. According to Sarbib (2002), girls' education improves family health and nutrition. Their education can also lead to birth spacing, health care seeking behavior, and lower infant mortality and morbidity rates. "A ten-percentage point increase in girls' primary school enrolment has been shown to decrease infant mortality by 4.1 deaths per 1000 live births, and a similar 10 percent rise in secondary enrollment by another 5.6 deaths per 1000 live births." Besides, gender discrimination and inadequate access to education in the region lead to poor mental and family health[22].

Many limitations have been observed in the existing literature about the relationship between health and education. First, due to data limitations, much of the literature focuses on a single measure or proxy of an individual's health such as birth weight. Other measures of physical and mental health include standing heart rate, blood pressure, mental clarity, etc.

Another restriction in the previous studies concerns the categorization of adolescents. Some models exclusively treat adolescents as a "children" whose parents make all their health and education choices while other models treat them as "adults" who make all the decisions by themselves. Future research need to treat teenagers as "teenagers" who make a subset of all the decisions. Examples of decisions that teenagers make independently are smoking and having sex and examples of decisions made by the parents are the number of visits to health care providers (Ding et al, 2007)[23].

Finally, future research needed to focus on why females and not males are so adversely affected by poor health outcomes[23].

2.4 Relationship between Health and Income

[19] http://www.economics.ucr.edu/seminars/spring05/ped/05-18-05JereBehrman2.pdf
[20] http://www.nber.org/papers/w9788
[21] http://www.ama.com.au/web.nsf/doc/SHED-5G7DEH
[22] http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/Beirut-June+2002/$File/Public+Health+Conference+Beirut-6-6-02.pdf
[23] http://post.queensu.ca/~lehrers/genes.pdf

The National Longitudinal Mortality Survey in 1980 indicated that people in the top 5% of income (greater than $50,000) have a life-expectancy, at all ages, 25% longer than that of people in the bottom 5 percent (less than $5,000) (Deaton, 2003)24.

Lynch 2000, found out that there are three interpretations of the relationship between income and health. The Individual Income Interpretation assumes that "determinants of population health are completely specified as attributes of independent individuals and that health effects at the population level are merely sums of individual effects." The second interpretation of the health-income linkage is the Psychosocial Environment Interpretation. It suggests that poor people have a negative perception about their socioeconomic status especially when comparing themselves to the rich.

In the South Mediterranean region, important changes have been recorded in health patterns. Indeed, fertility rates, mortality rates, and communicable diseases have decreased while life expectancy and non-communicable diseases have increased. This increase in non-communicable diseases has been related to changing lifestyles (smoking and decreased levels of physical activity) due to increased income. Although most studies suggest that generally, rich countries have healthier population, there are many countries in the region of study that contradict these findings. For instance, while Oman is an upper-middle-income country, the health conditions of its population (in terms of child malnutrition, low birth-weight, and maternal anemia) are as low as those found in some lower-middle income countries such as Egypt and Morocco (Disease Control Priorities Project, 2006)[25].

In fact, the causality between income and health flows in both directions. Empirical evidence has found that health has an impact on income too. A study done on Britain has shown that 30% of the country's economic growth between 1780 and 1979 is attributed to improved nutrition leading to increased longevity. Better health is also believed to create the optimism needed for long-term economic planning. The impact of health on economy can also be viewed from the following perspective: improved health conditions imply increased savings which leads, relatively, to increased income. Based on a research conducted in USA, health (measured by life expectancy, death rate, infant mortality, medical research) has a significant impact on income level. Hence, government policies need to be directed towards improving the health system and increasing expenditures for health care as a means to increase productivity and income (Brinkley, n.d)[26].

According to Weil (2006) "eliminating health gaps between countries would reduce the variance of log GDP per worker by 9.9%". This finding was reached by using Adult Survival Rate for males as a measure of health. Using historical data, the research found that the drop of the proportion of population that was unable to work, due to its malnutrition, from 20% to zero has led to an increase in labor input by a factor of 1.25. And, for people working, "increased caloric consumption allowed for a 56 percent increase in labor effort". The combination of these two effects show that improved nutrition increased labor input by 1.95.It is also important to note the indirect impact of health on income that is made through education. Better health results in an increased level of education that a person can attain. Also, healthier people have an incentive to get more education since their investment can be amortized over more working years[27].

[24] http://www.nber.org/reporter/spring03/health.html
[25] http://www.dcp2.org/file/56/DCPP-15-MENA.pdf
[26] http://trc.ucdavis.edu/glbrinkley/Docs/Causal.pdf
[27] http://weblamp.princeton.edu/chw/papers/Weil_David_Accounting_for_the_Effect_of_Health_on_Economic_Growth_Oct_2006.pdf

However, one should take into account how improved health can have a negative impact on income. This is actually true if we consider how better health leads to population growth which, in turn, lowers the GDP per capita. Lowering the GDP per capita is done through raising the ratio of children to adults or through reductions in the quantities of physical capital and land per worker (Weil, 2006).
Future research need to study how the relationship between health and income differs among gender.

2.5 The Relationship between Health and Employment

"Employment and health are positively correlated, but is employment a cause or a consequence?"[28] (Mirowsky and Ross, 1995). The relationship between health and employment is a two-ways relationship. Studies all over the world have proven that employment has an impact on health and health has an impact on employment.
According to London Health Commission (2004) employment is considered to be one of the strongest determinants of health. The nature of the job and its status affect the worker's physical and mental health as well as her life expectancy. In fact, the impact of employment on health is made through income. In other words, it is mainly the generated income through employment that affects a person's health conditions.[29] Other researchers believe that employment affects health through both economic and non-economic rewards. The economic rewards include status, power, and economic independence while the non-economic rewards are mainly social support and recognition. These benefits translate both directly and indirectly to improved health (Mirowsky and Ross, 1995)[1].
Unemployment can be the cause of many health problems but its consequences can be different from males to females. Jobless men tend more to experience serious mental problems or substance abuse while unemployed women are more likely to suffer from higher rates of diagnosed disorders. However, it is important to note that not all employment is good. A study done in UK indicates that "over 2 million people in the UK suffer from illness caused or made worse by their work" (London Health Commission 2004)[2].
A study about "a positive association between job insecurity and adverse psychological changes for a cohort of white-collar British civil servants" indicates that , currently, There is a significant relationship between feelings of job insecurity and stress. This relationship becomes even stronger as the insecurity increases (Burchell et al, 1999)[30]. However, when studying the relationship between individual's mental health and atypical employment (temporary and part-time). Bardasi and Francesconi (2003) failed to prove any relationship. Rodriguez too (2002) could not prove a significant association of poor health status with marginal employment in Britain[31].
On the other hand, good health can be a predictor for getting or keeping a paid-job. There are many instances where individuals cannot get a job because of a disability or a disease. The chances to not get a job become stronger when the disease/disability is visible (Mirowsky and Ross, 1995)[1]. A study done on Jamaica found that poor health has a significant negative impact on employment (both for entry and retirement). This impact seems to be higher for males than for

[28] http://links.jstor.org/sici?sici=0022-1465%28199509%2936%3A3%3C230%3ADEAH%3E2.0.CO%3B2-Q&size=LARGE&origin=JSTOR-enlargePage
[29] http://www.londonshealth.gov.uk/RTF/SLEHP_guidance.doc
[30] http://www.jrf.org.uk/knowledge/findings/socialpolicy/849.asp
[31] http://www.iser.essex.ac.uk/pubs/workpaps/pdf/2003-02.pdf

females although these latter suffer from poorer health conditions. "While any limitation affects the employment behavior of males, only severe limitations affect the behavior of females". In an attempt to explain this differential in the impact of health on employment, the authors fail to relate it to the hypothesis that men's jobs require more health inputs than women's. The remaining, unchecked, hypothesis is that "poor women may have little choice to continue working unless health diminishes to extremely severe levels" (Handa and Neizert, 1997)[32].

Besides, the relationship between health and employment tends to vary depending on the stages of an individual's lifecycle. This relationship is stronger during the very early and late stages of lifecycle. For young adults, poor health limits market work activity while for old workers poor health becomes the main determinant for retirement decisions (Handa and Neizert, 1997)[6]. Schuring (2006) confirms the same trend amongst European workers. "A poor health was a risk factor for remaining unemployed among men, but had less effect among women. A poor health was also a risk factor for becoming unemployed or retiring, especially among highly educated workers"[33]. In fact, workers in poor health retire between one to three years earlier than those in good health with the same economic and demographic characteristics. Moreover, health shocks have a considerable effect on labor supply decisions of workers aged between 50 to 69 years old. A heart attack or a stroke, for example, reduces the number of work hours supplied by a male (female) worker by 1,030 (654) per year and increases the probability of quitting the job by 42% (31%) (Suhrcke, 2005)[34].

Further research must be conducted to investigate how the linkage health-employment is affected by gender, social status, and education level.

The contribution of Farrukh Iqbal strengthens the outcomes attained so far about the region. According to the above study, direct estimates of poverty for the Middle East and North Africa region are mostly available from the mid-1980s onward. For the period before the 1980s, comparable estimates of poverty based on per capita consumption expenditure are only available for Tunisia (in 1965) and Egypt (in 1975). Based on the latter data, the poverty rate was as high as 51.3 percent in Tunisia in 1965 and 82.2 percent in Egypt in 1975 (at the $2 line). Comparing these statistics to those achieved by the mid-1980s showed that considerable poverty reduction was achieved during the early period. Yet, average poverty rates for the Middle East and North Africa have fluctuated since 1987 as they first decreased for about six years and then they increased by the mid-1990s before declining again toward the turn of the decade. It is worth mentioning that although poverty rates were slightly lower on average in 2001 than in 1987 (regardless of whether they are measured at the $1 or $2 level), the general picture is one of stagnation. In effect, after having reached the lowest levels of absolute poverty among developing regions by the late 1980s, the region failed to make further progress in the period thereafter. In addition, when looking at whether the region performed better or worse in poverty reduction than did other comparable developing regions, the patterns suggest that the Middle East and North Africa performed worse than most. While East Asia and South Asia showed clear gains over the 1990s, and Latin America showed modest gains, the Middle East and North Africa stagnation was similar to that of Sub-Saharan Africa.

Concerning the determinants of these poverty patterns, two main factors are to be pointed out. First, the high levels of public sector employment in most of the countries in the region. The report mentions the statistically significant negative relationship between government

[32] http://www.ifpri.org/divs/cd/dp/papers/commdp16.pdf
[33] http://jech.bmj.com/cgi/content/full/61/7/597
[34] http://ec.europa.eu/health/ph_overview/Documents/health_economy_en.pdf

employment (as a share of total employment) and the poverty rate (measured at the $1 line) while controlling for per capita gross domestic product (GDP) and inequality (measured by Gini coefficient). It is also reported that the link between government employment and poverty is stronger in Middle Eastern and North African countries compared to other regions. This finding supports their assertion that "since the early 1970s, a number of SMC...have used public sector employment (including government work) as a kind of blunt policy instrument for providing welfare employment to an ever-increasing proportion of the labor force" (Adams and Page 2003, pp. 2031). The second factor is related to private transfers via remittances as an important source of poverty reduction in the region. The region experienced an economic boom between 1975 and 1985 on the basis of high oil prices. This boom spread throughout the region as workers from countries with large labor forces and/or low oil resources (such as Egypt and Jordan) migrated to work in the oil-producing countries of the Persian Gulf. At the same time, waves of poor workers from the Maghreb countries began migrating to Western Europe in search of jobs. Thus, large volumes of remittances were generated during 1975–90 and these are most likely to have accrued to relatively poor families in the labor-exporting countries.

It could be noticed that the way these factors have evolved over time and especially during the 1990s is consistent with growth and poverty trends in the region during the same period. As a matter of fact, during the 1990s both public sector employment and remittances declined on average in the Middle East and North Africa Region, and may have contributed to the relative stagnation of income growth, for instance, public sector employment declined in the 1990s in four of five Middle Eastern and North African countries for which suitable data are available, namely, Algeria, Jordan, Morocco, and Tunisia (World Bank 2004h, figure 4.6). The involvement of many of the region's countries in structural adjustment programs explains partially this decline. Similarly, there was a decline in the ratio of workers' remittances to GDP in all the main remittance-receiving countries during the 1990s as in Egypt for instance remittances declined from around 15 percent of GDP in 1992 to less than 5 percent by 2003.

Last but not least, household survey data make it possible to investigate the relationship between poverty and other household characteristics for which information is typically available: geographic location of the household and the education, employment, occupation, and gender of the head of household. Three observations may be made with respect to the link between poverty and location on the basis of analysis of Middle East and North Africa data. First, there is a clear pattern of poverty rates being higher in rural areas than in urban areas. Second, there is also a clear pattern of some regions being relatively poorer than other regions. Nevertheless, and third, where sufficient data are available and have been analyzed, more complex patterns may also be detected where pockets of high poverty coexist with low poverty in both urban and rural areas and within geographic regions.

Further, the link between employment and poverty extends across three dimensions: sector of employment, nature of occupation, and status of employment. With regard to the sector of employment, the chance of being poor is typically higher for those in the private sector and much lower if one were employed in the public sector. For occupation or nature of economic activity, the chance of being poor is typically highest for those in agriculture and much lower for those in manufacturing or services. Finally, with regard to work status, unpaid workers are more likely to be poor than are paid or self-employed workers, but being unemployed does not necessarily raise the probability of being poor.

Poverty assessments for several countries in the region show that female-headed households are not likely to be poorer than male-headed households at the national level, yet differences in

gender-specific poverty rates by geographic region (rural/urban) are notable in the case of many countries in the region.

2.6 Poverty and education:

The most recent reports highlight that the region has made improvements in education at a faster rate than other zones; however, the improvements during the period of 1980–2000 have been faster, mainly due to its initial levels of income and education and to its income growth and public spending profile. Primary enrolment data show an increasing trend that provides evidence of improving access to education among the poor. The data concerning education improvements about the countries of the region make it very clear with regard to gross primary enrollment which has risen rapidly since 1970. Precisely, the rate of increase has been above 95 percent since 1990. Further, enrollment rates have been rising steadily for secondary schooling as well. Yet, despite these substantial improvements in access to education over the past four decades, challenges remain with differences from one country to another in the region. The paramount of these differences is mainly due to the nature of geographic pockets of low access in addition to groups who are still excluded, or who drop out before completing primary education, typically the poor and girls in remote rural areas, the disabled in all income groups, and working and street children in urban areas. Other constraints to access of the poor and girls in rural areas include distance to school and the direct and indirect user costs of schooling. Dropping out of school is attributed to increasing opportunity costs for the poor as children get older, to lack of acceptable facilities and security for girls, and to perceived poor quality and low value of the education provided.

With regard to education and income growth among poor people, most poverty assessments find a high correlation between education status and income status. The Middle East and North Africa Region present the same general pattern. In all cases where detailed analysis of household data has been carried out, poverty rates are the highest for households headed by illiterate people and decline with increased education of the household head. Rationally, poverty and education are negatively correlated. But, are well-off people better educated because they can afford to pay for education ?, or are they better off because they are well educated?. By looking more closely at the channels through which education reduces poverty some answers can be reached. In this sense, it is believed that education can help a family overcome poverty directly by increasing household income, through increasing the productivity of self-employed workers, or by enabling access to higher-paid jobs. Yet, the report mentions a recent analysis by the World Bank which provided estimates on the return on education for four countries (Egypt, Jordan, Morocco, and the Republic of Yemen) using a common methodology. Generally, the results reflect low rates of return on education, for example, in Morocco the rates of return for males in public employment were 12.4 percent for primary education in 1991, and fell to 6.1 percent in 1999. By way of comparison, Psacharopoulos and Patrinos (2002) reported average returns on investment in education of 20 percent for Asia, 27 percent for Latin America and the Caribbean, and 38 percent for Sub-Saharan Africa. The general impression from these statistics is that education was not a high-yielding investment in Middle Eastern and North African countries during the 1990s.

Concerning trends in education spending (for all three levels—primary, secondary, and tertiary) in SMC shows a very clear two-part trend since 1965. In the first part, between 1965 and 1980, education spending per capita rose more than fivefold, from less than $50 to more than $250, corresponds roughly to an increase in the ratio of spending to GDP from 4 percent to 6.5 percent. At this level, SMC, 10 countries not only were spending more on education than their middle-income comparators, but also spending more than OECD countries on average. The second part

of the trend, between 1980 and 2000, shows a sharp decline in the 1980s and a slow rise during the 1990s such that the level of spending was just below $200 per capita by the year 2000. The first phase of the trend helps explain the region's strong performance in raising education attainments prior to 1980. The second phase suggests that the region's continued strong performance in education attainment since 1980 must have been due in part to other sources, including improvements in the efficiency of the education delivery system.

More importantly, the poverty impact of public spending on education depends in part on its incidence among income groups. The benefit incidence of expenditure on education in the Middle East and North Africa Region follows the typical pattern of being pro-poor at the basic level, and pro-rich at the tertiary level. Because the poor tend to drop out of the education system earlier than the less poor, and are much less likely to continue to the tertiary level of education, expenditure at the tertiary level inevitably favors those who are better off.

2.7 Poverty and health:

The Middle East and North Africa Region have made significant progress in improving the average health status of its citizens. During the last two decades, the rates of progress have been above and beyond what can be explained by its initial levels of income and health in 1980 and subsequent income growth. Measures such as child mortality life expectancy or infant mortality all converge to show a clear cut and steady health status improvement in most of the region. The question that arises is whether the gains in average health status have also redounded to the benefit of the poor.

Health and wealth are frequently correlated. A sense of the extent of the correlation in this region can be obtained from recent Demographic and Health Survey (DHS) data for Egypt, Jordan, Morocco, and the Republic of Yemen. Across the four countries, on average, health outcomes among the poorest are worse than among the richest, that is, the children of the poorest 20 percent of the population are more than twice as likely to die before they reach their fifth birthday, compared to the children of the richest group; furthermore more four times as many mothers in the poorest group are malnourished with respect to the mothers in the richest group. Thus, while acknowledging the improvements that have occurred to date, it is necessary to pay attention once again to the health inequality challenges that remain. Decision makers in health policies in the region must continue to take into consideration the actions and measures that should be reducing the large disparities that remain between rich and poor people. Through such measures an extension of health insurance coverage to the poor, an allocation of more health resources (such as, hospitals doctors, nurses, and clinics) to rural and poor areas, and implementation of multifaceted community-level interventions to reach the poor.

Fifty percent of health spending in the region accounts for private sector in which insurance accounts only for small fraction. In other words, most private spending represents out-of-pocket outlays. The significant reliance on out-of-pocket spending means that many households have little or no financial protection in the event of a catastrophic illness or injury. Such vulnerability is higher among lower-income households. In general, such households allocate higher proportions of their budgets to health care services. Accordingly, a high priority should be given to the design of sustainable health insurance that schemes to mitigate the risks among the poor and the near-poor .

Future challenges in health are likely to be different partially from those in the past because of an ongoing demographic and epidemiologic transition. In 1980s and early 1990s the Middle East and North Africa had the highest population growth rate world wide. In addition, by 2015 it expected that the number of adults in the region will have increased by 140 percent,

representing the highest adult population growth in the world after Sub-Saharan Africa. Further, over the next two decades, health patterns in the Middle East and North Africa will be profoundly influenced by continued declines in fertility and mortality as countries go through the demographic transition.. The overall effect of the declines in fertility and mortality is a dramatic shift in the age structure and causes of morbidity and mortality.

The challenges of an aging population include a substantial rise in non communicable diseases and increasing demand for costly long-term care. In addition to the impact of the demographic transition, rapid urbanization and changing lifestyles have contributed to an increase in non communicable diseases and injuries in the region. Dealing with these challenges may have implications for the poor. The emerging disease patterns require individual-oriented and technology-intensive treatment regimes that are expensive. Thus an increasing share of health budget resources is likely to be pulled toward the treatment of such cases. This may put the poor at a disadvantage if the needed resources are taken from services that address their needs. Indeed, there is some evidence that such a shift in resources is already occurring. In recent years, governments in the region have been investing in expensive medical technology to cope with the rising demand from urban middle-class populations. Finding a balance between competing demands to address the demographic and epidemiologic transition and improve access to quality health services for poor people represents a major challenge for the countries in the Middle East and North Africa.

Overall, the key conclusions of the report on the issue of poverty and health are (a) despite substantial gains, health disparities continue to exist between the poor and the rich, albeit to different extents in different countries; (b) health spending and outcomes vary among Middle Eastern and North African countries, reflecting different degrees of system efficiency; and (c) coping with the disease patterns emerging from the ongoing demographic transition will require new approaches to health care financing that should aim at protecting budget resources to address the needs of the poor.

An important study about "*Public Policy and Poverty Reduction in the Arab Region*" edited by Ali Abdel Gadir Ali and Shenggen Fan (2007) includes the contribution of several authors in clarifying the link between public policies and poverty reduction. All Arab countries are identified to have strategic plans for poverty alleviation even though not all countries are suffering from this problem but all countries can be concerned with the poverty reduction.

Conclusion

The most important theoretical views that have been underlying the discussion of the interdependencies among health, education and economic performance are still under development. The related empirical applications are also still in progress but they are showing the importance of the magnitude of these interdependencies in different types of economic and social contexts. The central role of the theory that accounts for the different types of assets such as health, knowledge, social capitals and traditional economic wealth appears to be promising. It introduces a framework that helps understand both the theoretical and empirical foundations of poverty definitions and assessments. It also shows how health is a major component in the wealth of individuals and countries as a whole, that is, health can be a major source that ensures economic activities through labor productivity. This relationship can then be enhanced with the additions from the other types of assets such as knowledge and social capital.

Attempts to test empirically for interdependencies have been also discussed. They indicate that major steps have been made to investigate the magnitude of the likely gains to be attained when accounting for interdependent and integrated policies. While causality has not yet been established, major progress is expected in this area.

The assessments that have been achieved for the SMC have been expanded through the works of international organizations as well as through the inputs of some individual pioneers. But further investigations are needed, given the deficit of knowledge existing on series of related issues and the types of specialists needed to cover the missing dimensions. In order to proceed with the following steps, an overview of the methodological strategy is underlined and introduced in the following chapter.

References

- Adams et al (2003). "Healthy, Wealthy and Wise? Tests for Direct Causal Paths between Health and Socioeconomic Status," Journal of Econometrics, 112: 3-56
- Akala, Francisca Ayodeji & Sameh El-Saharty (2006). "Public-Health Challenges in the Middle East and North Africa," The World Bank, Middle East and North Africa Region, Human Development Sector, Originally Published in "Lancet", Vol 367, March 25, 2006
- Ali Abdel Gadir Ali and Shenggen Fan editors (2007): *Public Policy and Poverty Reduction in the Arab Region",* First published in 2007 by The Arab Planning Institute P.O.Box: 5834 Safat 13059 State of Kuwait
- Anderson, Kathryn, James Foster and David Frisvold (2004). "Investing in Health: The Long-Term Impact of Head Start." Vanderbilt University, December 22, 2004
- Andrés Aguayo-Rico, Iris A. Guerra-Turrubiates, Ricardo Montes de Oca-Hernández (2005). "Empirical Evidence of the Impact of Health on Economic Growth". Issues in Political Economy, Vol. 14 http://org.elon.edu/ipe/aguayorico%20final.pdf
- Angela Fertig et al. "From Cradle to Grave? The Lasting Impact of Childhood Health and Circumstance" June 2003. NBER Working Paper No. 9788. 16 October 2007: <http://www.nber.org/papers/w9788>
- Anne Case, Angela Fertig, Christina Paxson (2003). "From Cradle to Grave? The Lasting Impact of Childhood Health and Circumstance". Working Paper 9788, NBER http://www.nber.org/papers/w9788
- Arayssi, Mahmoud, Sarkis Joseph Khoury and Rania Uwaydah Mardini (2006). "The Value of Life: A New Labor Theory-Based Model." Journal of Business Valuation and Economic Loss Analysis. Volume 1, Issue 1, Article 3
- Ayodeji Akala Francisca; El-Saharty Sameh (2006). "Public-health challenges in the Middle East and North Africa". Lancet ISSN 0140-6736 CODEN LANCAO
- B. J Burchell, et al. (1999) "Job insecurity and work intensification: Flexibility and the changing boundaries of work". Joseph Rowntree Foundation, Ref: 849 http://www.jrf.org.uk/knowledge/findings/socialpolicy/849.asp
- Bernard, Paul, et al, (2006). "Capturing the Lifecourse- The contribution of a Panel Study of Lifecourse Dynamics (PSLD) to public policy analysis in Canada". Conference proceedings- Longitudinal Social and Health Surveys in an International Perspective
- Black. Lesley-Ann, McTear. Michael, Black. Norman, Harper. Roy, Lemon Michelle, (2005). "Evaluating the DI@l-log system on a cohort of elderly, diabetic patients: results from a preliminary study", In INTERSPEECH-2005, 821-824
- Bridges, J. F. P. and P. Haywood, (2003). "Theory Verses Empiricism in Health Economics," The European Journal of Health Economics, Volume 4, Number 2, June 2003: 90-95
- Catherine E.Ross and John Microwsky, (1995). "Does Employment affect Health?" Journal of Health and Social Behavior 1995, Vol. 36 (September): 230-243 http://links.jstor.org/sici?sici=0022-1465%28199509%2936%3A3%3C230%3ADEAH%3E2.0.CO%3B2-Q&size=LARGE&origin=JSTOR-enlargePage
- Carlos Bozzoli, Angus Deaton & Climent Quintana-Domeque, (2007). "Child Mortality, Income and Adult Height". Princeton University
- Caroline M. Hoxby, (2007). "Economics of Education". National Bureau of Economic Research (NBER) http://www.nber.org/programs/ed/
- Case Anne, Angela Fertig and Christina Paxson, (2003). "From cradle to grave? The lasting impact of childhood health and circumstances". NBER Working paper 9788,
- Chatterjee, Meera, (1990). "Indian Women, Health, and Productivity". World Bank, Population and Human Resources Department. Policy Research and External Affairs Working Paper. 24 June 2007: <http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/1990/10/01/000009265_3960929224417/Rendered/PDF/multi0page.pdf>
- Deaton, A.: (2003). "Health, Income, and Inequality". National Bureau of Economic Research NBER

- Deaton, A. (2006). *Global Patterns of Income and Health: Facts, Interpretations and Policies*. Research Program in Development Studies, Center for Health and Wellbeing, Princeton University.
- Sharon Maccini and Dean Yang, (2008). "Under the Weather: Health, Schooling, and Economic Consequences of Early-Life Rainfall", the American Economic Review
- Christian Morrisson, (2002). "Health, Education and Poverty Reduction". OECD Development Centre Policy Briefs No.19
- Cutler, David M., Grant Miller and Douglas M. Norton, (2007). "Evidence on early-life income and late-life health from America's Dust Bowl era." Edited by Ronald W. Jones, University of Rochester, Rochester, NY,
- Cutler David M, Adriana Lleras-Muney, Tom Vogl, (2008). "Socio economic Status and Health: Dimensions and Mechanisms" NBER Working Paper 14333
- Daron Acemoglu & Simon Johnson, (2006). "Disease and Development: the effect of life expectancy on economic growth". Department of Economics, MIT & Sloan School of Management, MIT, Working Paper 12269, National Bureau of Economic Research, Cambridge, MA,
- David Cutler & Adriana Lleras-Muney, (2006). "Education & Health: Evaluating Theories and Evidence". National Poverty Center; Working paper 19, www.npc.umich.edu
- David E .Bloom, and David Canning, (1999). "The Health and Wealth of Nations." http://www.riverpath.com/library/pdf/HEALTH%20AND%20WEALTH%20RPA%20FEB00.PDF
- David E. Bloom, and David Canning, (2000). "The Health and Wealth of Nations," Science; Vol. 287 n° 5456: 1207-1209
- David E. Bloom., David Canning, Jaypee Sevillahttp, (2001). "The Effect of Health on Economic Growth: Theory and Evidence" Working Paper 8587, National Bureau of Economic Research http://www.nber.org/papers/w8587.pdf
- David Mayer-Foulkes, Philippe Aghion & Peter Howitt, (2004). "The Effect of Financial Development on Convergence: Theory and Evidence" NBER Working Papers 10358, National Bureau of Economic Research, Inc
- Dina El Naggar, (2008). "Overview: Health Sector Brief". World Bank http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/EXTMNAREGTOPHEALTH/0,,contentMDK:20510402~menuPK:583116~pagePK:34004173~piPK:34003707~theSitePK:583110,00.html
- David N. Weil, (2006). "Accounting for the effect of Health on Economic Growth" http://weblamp.princeton.edu/chw/papers/Weil_David_Accounting_for_the_Effect_of_Health_on_Economic_Growth_Oct_2006.pdf
- Doyle, Orla, Colm Harmon and Ian Walker, (2005). "The Impact of Parental Income and Education on the Health of their Children." IZA DP No. 1832. Institute for the Study of Labor
- E. Miguel and M. Kremer, (2004). "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities" Econometrica 72: 159 - 217
- Edward Miguel and Michael Kremer, (2004). "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities", Econometria, Vol.72
- Elena Bardasi and Marco Francesconi, (2003). "The impact of atypical employment on individual wellbeing: evidence from a panel of British workers". ISER Working Papers Number 2003-2, Institute for Social and Economic Research http://www.iser.essex.ac.uk/pubs/workpaps/pdf/2003-02.pdf
- Emile Tompa, (2002). "The Impact of Health on Productivity: Empirical Evidence and Policy Implications" The Review of Economic Performance and Social Progress. http://www.irpp.org/miscpubs/archive/repsp1202/tompa.pdf
- Evans, Robert G, (2008). The undisciplined economist. "Thomas McKeown, Meet Fidel Castro: Physicians, Population Health and the Cuban Paradox," Health Policy Vol. 3, N° 4,
- Farrell, Diana, Sacha Ghai and Tim Shavers, (2005). "The Coming Demographic Deficit: How Aging Population Will Reduce Global Wealth." March 2005
- Farzaneh Roudi-Fahimi and Lori Ashford, (2004). "Investing in Reproductive Health to Achieve Development Goals-the Middle East and North Africa". Population Reference Bureau (PRB) http://www.prb.org/pdf06/MENA_Investing_in_Reproductive_Health_Eng.pdf
- Field Manual, (2007). "Reproductive Health in refugee situations", Corrections to the Inter-agency Field Manual 21
- Freudenberg, Nicholas and Jessica Ruglis, (2007). "Reframing School Dropout as a Public Health Issue," Preventing Chronic Disease; 4 (4)
- Garland L. Brinkley. "The Macroeconomic Impact of Improving Health: Investigating the Causal Direction". http://trc.ucdavis.edu/glbrinkley/Docs/Causal.pdf
- Gerdtham, U. -G. and M. Loé Thgren, (2002). "New panel results on co-integration of international health expenditure and GDP." Applied Economics, 34, pp: 1679-1686
- Grimm, Michael and Kenneth Harttgen, (2007). "Longer life, higher welfare?" Oxford University Press 2007, 1 of 19, doi:10.1093/oep/gpm025
- Gustavo J. Bobonis, Edward Miguel and Charu Puri Sharma, (2006). "Anemia and School Participation", Journal of Human Resources, 41(4) (2006), 692-721
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Morocco (1992- 2003/04)," Country Reports on HNP and Poverty, The World Bank.

- Gwatkin, Davidson R., Adam Wagstaff & Abdo S. Yazbeck, ed. (2005). "Reaching the Poor with Health, Nutrition, and Population Services: What Works, What Doesn't, and Why," The International Bank for Reconstruction and Development / The World Bank.
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Morocco (1992- 2003/04)," Country Reports on HNP and Poverty, The World Bank.
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Egypt (1995- 2000)," Country Reports on HNP and Poverty, The World Bank.
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Jordan (1997)," Country Reports on HNP and Poverty, The World Bank.
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Turkey (1993, 1998)," Country Reports on HNP and Poverty, The World Bank.
- Gwatkin, Davidson R., Shea Rutstein, Kiersten Johnson, Eldaw Suliman, Adam Wagstaff & Agbessi Amouzou (2007). "Socio-Economic Differences in Health, Nutrition, and Population, Yemen (1997)," Country Reports on HNP and Poverty, The World Bank.
- Hoel, Michael, (2003). "Efficient Use of Health Care Resources: The Interaction between Improved Health and Reduced Health Related Income Loss." International Journal of Health Care Finance and Economics, 2, 285-296, 2003
- Holmes, CC, Adams, NM, (2002). "A probabilistic nearest neighbor method for statistical pattern recognition", J ROY STAT SOC B, Vol: 64, Pages: 295 - 306, ISSN: 1369-7412
- Hoyt Bleakley, (2007). "Disease and Development: Evidence from Hookworm Eradication in the American South," The Quarterly Journal of Economics, MIT Press, vol. 122(1), pages 73-117, 02
- Hurd, M. and A. Kapteyn, (2005). "Health, Wealth and the Role of Institutions," in Multidisciplinary Economics: 307-332, P.fr Gisjel and H. Schenk editors, Springer, The Netherlands
- J. Lee and H. Kim, (2007). "A longitudinal analysis of the impact of health shocks on the wealth of elders". Journal of Population Economics
- Jere R. Behrman and Mark R. Rosenzweig, (2004). "Returns to Birthweight". The Review of Economics and Statistics, May 2004, 86(2): 586–601 http://www.economics.ucr.edu/seminars/spring05/ped/05-18-05JereBehrman2.pdf
- Jocelyn DeJong, Bonnie Shepard, Farzaneh Roudi-Fahimi and Lori Ashford, (2005). "Young Adolescents' Sexual and Reproductive Health and Rights: Middle East and North Africa "
- John Strauss; Duncan Thomas, (1998). "Health, Nutrition, and Economic Development". Journal of Economic Literature, Vol. 36, No. 2. (Jun., 1998), pp. 766-817 http://www.chass.utoronto.ca/~brandt/ECO2703/papers/Strauss_Thomas_1998_Health_JEL.pdf
- Knapp, David, (2007). "The Influence of Health on Labor Productivity: An Analysis of European Conscription Data." Department of Economics, presented in Partial Fulfillment of the Requirements for graduation with research distinction in Economics in the undergraduate colleges of The Ohio State University.
- Lambrinos, James, (1980). "Health: A Source of Bias in Labor Supply Models." The Review of Economics and Statistics, pp: 206-216.
- Li Gan and Guan Gong, (2007). "Estimating Interdependence between Health and Education in a Dynamic Model", National Bureau of Economic Research,
- Lucas AO, (2005). "International Collaboration in Health Research", Bulletin of the World Health Organization (BLT), 83:482
- M. Hurd and A. Kapteyn, (2003). "Health, Wealth, and the Role of Institutions"
- M. Suhrcke, M. McKee, R. Sauto Arce, S. Tsolova & J. Mortensen (2005). "The contribution of health to the economy in the European Union" Health & Consumer Protection, Directorate-General, European Commission http://ec.europa.eu/health/ph_overview/Documents/health_economy_en.pdf
- Mayer-Foulkes, David, (2004). "The Intergenerational Impact of Health on Economic Growth." CIDE. Written for the Global Forum for Health Research, Forum 8, Mexico City, 16 -20 November.
- Merel Schuring, Lex Burdorf, Anton Kunst, Johan Mackenbach ,(2006). "The effects of ill health on entering and maintaining paid employment: evidence in European countries" Department of Public Health, Erasmus MC, Rotterdam, The Netherlands http://jech.bmj.com/cgi/content/full/61/7/597
- Michael Grimm and Kenneth Harttgen, (2007). "Longer life, higher welfare?". Oxford Economic Papers, doi:10.1093/oep/gpm025, Oxford University Press
- McKeown, T. (1979). "The Role of Medicine: Dream, Mirage or Nemesis?" (2nd ed.) Oxford: Basil Blackwell,
- Muysken, Joan, I. Hakan Yetkiner and Thomas Ziesemer, (1999). "Health, Labour Productivity and Growth." CCSO Working Papers 200015, University of Groningen, CCSO Centre for Economic Research, revised.
- Report (2006) "Investing In Global Health a Regional Spotlight on the Middle East and North Africa Region". Disease Control Priorities Project http://www.dcp2.org/file/56/DCPP-15-MENA.pdf
- Roudi-Fahimi, Farzaneh, (2005). "Achieving the MDGs in the Middle East: Why improved Reproductive Health is Key," Population Reference Bureau,

- Roudi-Fahimi, Farzaneh and Ashford, Lori, (2005) "Investing In Reproductive Health To Achieve Development Goals, The Middle East and North Africa". Population Reference Bureau.
- Roudi-Fahimi, Farzaneh, (2007). "Gender and Equity in Access to Health Care Services in the Middle East and North Africa," Population Reference Bureau,
- Sandra E. Black, Paul J. Devereux, Kjell G. Salvanes, (2005). "From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes". Working Paper 11796 , NBER http://www.nber.org/papers/w11796.pdf?new_window=1
- Sanjeev Gupta, Marjin Verhoeven, and Erwin Tiongson, (1999). "Does Higher Government Spending Buy Better Results in Education and Health Care?". International Monetary Fund, Fiscal Affairs Department, WP/99/21,
- Sarbib, Jean-Louis, (2002). "Meeting the Public Health Challenges in the 21st Century in the MENA/EM Region", World Bank. 22 October 2007
- Schieber, George, Akiko Maeda and N. Klingen, (2007). "Health Reforms in the MENA Region."
- Sen, Amartya, (1998). "Mortality as an Indicator of Economic Success and Failure". Economic Journal, Royal Economic Society, vol. 108(446), pages 1-25
- Setareh Razmara (leader of report team), (1999). "Consumer Food Subsidy Programs in the MENA Region" Report NO. 19561-MNA. Document of the World Bank http://info.worldbank.org/etools/docs/library/80703/Dc%202002/courses/dc2002/readings/ruppertmena.pdf
- Shankha Chakraborty and Mausumi Das, (2004). "Mortality, Human Capital and Persistent Inequality", University of Oregon & Jawaharlal Nehru University
- Sharon L. Maccini and Dean Yang, (2007). "Under the Weather: Health, Schooling, and Socioeconomic Consequences of Early-Life Rainfall." American Economic Review.
- Siddiq Osmani & A.Sen, (2005). "The Hidden Penalties of Gender Inequality: The fetal origin of ill-health", Journal of Economic Biology, Volume 1, 1.
- Smith, E. R, (1999). "Social identity and social cognition (pp. 183-196)". Oxford: Blackwell Publishers
- Sommestad, Lena, (2001). "Health and Wealth: The Contribution of Welfare State Policies to Economic Growth." Institute for Futures Studies. Speech prepared for the Expert Conference" Best Practices in Progressive Governance".
- Sudhanshu Handa and Monica Neitzert, (1997). "Gender and Life-Cycle Differentials in the Impact of Health on Employment in Jamaica". Outreach Division Discussion Paper No.16, International Food Policy Research Institute http://www.ifpri.org/divs/cd/dp/papers/commdp16.pdf
- Sustainable Local Economies for Health Project (2006). Evidence Base and Strategic Planning Tool Introduction and Guidance for Users. London Health Commission http://www.londonshealth.gov.uk/RTF/SLEHP_guidance.doc
- T. Paul Schultz, (2005). "Productive Benefits of Health: Evidence from Low-Income Countries". Yale University, Economic Growth Center & Institute of the Study of Labor, Discussion papers 903 &1482,
- Tompa, Emile, (2002). "The Impact of Health on Productivity: Empirical Evidence and Policy Implications" October 27th, the Review of Economic Performance and Social Progress. 14 June 2007
- UNDP. Arab Human Development Reports (2002, 2003, 2004 & 2005).
- W. Ding, S. F. Lehrer, J. N. Rosenquist and J. Audrain-McGovern, (2007). The Impact of Poor Health on Education: New Evidence using Genetic Markers http://post.queensu.ca/~lehrers/genes.pdf
- Weichun Chen, Merwan Engineer and Ian King, (2006). "Choosing Longevity with Overlapping Generations", Department of Economics, University of Victoria, B.C, & Department of Economics, University of Otago, Dunedin, New Zealand
- Weili Ding et al, (2007). "The Impact of Poor Health on Education: New Evidence Using Genetic Markers" 2007. 7 http://post.queensu.ca/~lehrers/genes.pdf
- Wichmann, Thorsten, (1995). "Food Consumption and Growth in a Two Sector Economy." Technical University Berlin.
- Xu, Ke, David B. Evans, Kei Kawabata, Riadh Zeramdini, Jan Klavus and Christopher J L Murray, (2003). "Household catastrophic health expenditure: a multicountry analysis." Lancet 2003, 362: 111–17
- Yamauchi, Futoshi, (2006). "Early Childhood Nutrition, Schooling, and Sibling Inequality in a Dynamic Context: Evidence from South Africa." Food Consumption and Nutrition Division. FCND Discussion Paper 203

Chapter II: Overview of the Analytical Methods & Data Used

This chapter introduces the major analytical tools used in the report with the description of the most important variables and datasets mobilized. Before providing the directions of the analytical models that have been applied in this study and focusing on the variables, the data sets and the data sources, the underlying theoretical model is introduced. Its purpose is to support the bases for the empirical investigations carried out in the following chapters.

I. The Underlying Theoretical Model

In relation to economic development theories and as shown by earlier works in economics and the publications related to human development, individuals own different types of assets that are inter-related in a given environment (economic, political, social and natural). The major assets considered are economic, health, knowledge and social capital. While it is easy to show that economic capital includes assets and liabilities besides the flows of income and returns generated from economic activities, it is more difficult to show how other assets are formed. It can be underlined though that the capital health refers to all the physical and mental characteristics of an individual during the life span. The knowledge capital includes the experience and mainly the level of education. The network or social capital refers to the gains and external effects ensured from being a member of a group that can be family or/and professional and social groups or clubs. These levels of capitals do change throughout the life span of any individual. Different levels of capitals can be related to different stages of human growth curve. The levels of capitals at different stages of life define also the levels of vulnerability of any individual. While generally economic and knowledge capitals can be lacking at the beginning of life, health and social capitals do determine the level of vulnerability of children. For example, orphans do suffer from absence of parents and thus are socially vulnerable. Bad health during early ages leads also to vulnerable existence with negative impacts on the growth curve. Orphans with health limitations are more vulnerable than orphans with better health. At the other extreme, when older, individuals can suffer mainly from limitations in health and social capital but those that have the knowledge and the economic capital can be less harmed than the poorer segments attaining the highest stages in their growth curve.

Besides the large body of investigations (see literature review), most are empirical and only few theoretical models are recently (2004-2007) provided to support the existence of interdependencies between human development variables and mainly those relating health, education and income. The contributions identified are those of Gan and Gong (2007), S. Chakraboty & M.Das (2004) and W. Chen, M. Engineer & I. King (2006). But, as stated by David Cutler & Adriana Lleras-Muney (2006), not all the existing theories have been tested and most of the empirical work is not supported by theory.

The above theoretical models appear to be converging with regard to the identification of the likely interdependencies between health, education and income, especially in the context of developing economies. Based on these frameworks, a new model is established to unify the above theoretical frameworks and strengthen their validity. This new model follows mainly the assumptions and the most important steps of Chakraborty & Das (2004) but introduces expenditures in education instead of savings.

This is a static framework where individuals live for two periods, a first period as “young” with certainty and a second period as “old” with a given probability that depends on health status. The individual is assumed to work in both periods of life and earn an income (ω). In the first period, the individual also receives as inheritance from the older generation a certain amount of wealth

(W). Out of this income, the agent consumes (c_1), invests in education (e) and in health (h). At the beginning of the second period of life, the individual is faced with a mortality shock with the probability $\left[1-m_s\left(h\right)\right]$. If the agent survives till the next period, he will earn a given gross return on his investment in education (R) in the form of an increase in salary. The agent who survives uses his wealth (wage + return on education) for consumption in the second period (c_2) and as an amount of wealth left for his children as inheritance (I).

Under these assumptions, the budget constraints are:

$$c_1 + e + h = \omega + W \quad (1)$$

$$c_2 + I = \omega + \mathrm{Re} \quad (2)$$

Assuming a zero utility from death and that both u and v are concave utilities, the expected utility of this agent during his lifetime is:

$$U = u\left(c_1\right) + m_s\left(h\right)\left[u\left(c_2\right) + \alpha v\left(I\right)\right] \quad (3)$$

The individual maximizes this utility subject to (1) and (2).

The agent's survival beyond the first period depends on health investment during youth (h) given the following assumed definitions:

$$m_s = m_s\left(h\right) \in \left[0,1\right]$$

$$m_s\left(0\right) = 0,\ m_s^{'} > 0,\ m_s^{''} \le 0 \text{ and } \lim_{h\to\infty} m_s\left(h\right) = \bar{m}_s \le 1$$

$$m_s\left(h\right) = \begin{cases} ah^{\gamma}, \text{ if } h \in \left[0,\hat{h}\right] \\ \bar{m}_s, \text{ otherwise} \end{cases} \text{ where } \hat{h} \equiv \left(\bar{m}_s / a\right)^{1/\gamma} \quad (4)$$

The utility functions are defined as follows for more convenience:

$$u\left(c\right) = \frac{c^{1-\delta}}{1-\delta} \text{ and } v\left(I\right) = \frac{I^{1-\delta}}{1-\delta} \text{ given that } \delta \in \left(0,1\right) \quad (5)$$

An additional assumption is made about the following parametric restriction: $\delta > \gamma$.

The first order necessary conditions linked to e , h and I are (See Appendix):

Therefore, the necessary condition associated with e is the following:

$$\frac{\partial U}{\partial e} = u^{'}\left(c_1\right) + m_s\left(h\right)u^{'}\left(c_2\right) \Rightarrow \left(c_1\right)^{-\delta} = R.m_s\left(h\right).\left(c_2\right)^{-\delta} \quad (6)$$

$$\frac{\partial U}{\partial h} = u^{'}\left(c_1\right) + m_s^{'}\left(h\right)\left[u\left(c_2\right) + \alpha v\left(I\right)\right] \Rightarrow$$

$$\left(1-\delta\right)\left(c_1\right)^{-\delta} = m_s^{'}\left(h\right)\left[\left(c_2\right)^{1-\delta} + \alpha I^{1-\delta}\right] \quad (7)$$

$$\frac{\partial U}{\partial I} = m_s\left(h\right)\left[u^{'}\left(c_2\right) + \alpha v^{'}\left(I\right)\right] \Rightarrow I = \alpha^{1/\delta} c_2 \quad (8)$$

So, $c_2 = \beta R h$ (9)

Where $\beta = \dfrac{\left(1-\delta\right)}{\gamma\left(1+\alpha^{1/\delta}\right)}$ (See Appendix)

Using the two budget constraints (1) and (2), the two-period budget constraint is the following:

$c_1 + h + \frac{c_2}{R} + \frac{I}{R} = y$ (See Appendix)

Where $y = (1 + 1/R)\omega + W$ is the present discounted value of lifetime income.

Using equations (6), (8) and (9), the following expression results:

$$f(h) = h + \beta h \left[1 + \alpha^{1/\delta} + \frac{R^{1-1/\delta}}{[m_s(h)]^{1/\delta}} \right] = y \qquad (10)$$

Where the concavity of $f(h)$ is ensured only when $\delta > \gamma$ meaning that $f(h)$ is increasing.

Equation (10) implicitly defines health expenditure as a function of income, $h = \eta_0(y)$.

When $y > \hat{y}$, (given that $\eta_0(\hat{y}) = \hat{h}$) the survival probability doesn't increase with health investment beyond $\hat{h}$, so health investment is kept at the level $\hat{h}$ for all income levels.

The associated first order conditions, when $\hat{h}$ is considered:

$(c_1)^{-\delta} = \bar{m}_s . R . (c_2)^{-\delta}$

$(c_2)^{-\delta} = \alpha . I^{-\delta}$

This gives the following results (See Appendix):

$$c_1 = \left[\frac{1}{1 + \rho\left(1 + \alpha^{1/\delta}\right)} \right] \left(y - \hat{h}\right), \; c_2 = \left[\frac{\rho}{1 + \rho\left(1 + \alpha^{1/\delta}\right)} \right] R \left(y - \hat{h}\right)$$

$$I = \left[\frac{\alpha^{1/\delta}\rho}{1 + \rho\left(1 + \alpha^{1/\delta}\right)} \right] R \left(y - \hat{h}\right), \; e = \left[\frac{\rho\left(1 + \alpha^{1/\delta}\right)}{1 + \rho\left(1 + \alpha^{1/\delta}\right)} \right] \left(y - \hat{h}\right) - \frac{\omega}{R} \qquad (11)$$

Where $\rho \equiv (\bar{m}_s)^{1/\delta} R^{1/\delta - 1}$

From the results above (11), it is clear that interdependencies exist between health, education and the level of income (poverty) of individuals. While these results are intuitive and show how economic, education and health variables are interconnected, they need to be empirically confirmed in the context of South Mediterranean Countries. These equations show that there are simultaneous equations to be estimated for different variables with specific hypotheses and tests to be conducted both at the country and regional levels. It is obvious that when aggregating the above decision rules on individuals in a given economy and over countries, the simultaneous equations framework is preserved.

II. Empirical Methods Used

The study of interdependencies of health, education and poverty within the theoretical framework underlined above requires empirical evidence based on the available and accessible data. The empirical methods besides the variables and data used are introduced in this chapter.

While the most relatively complete work cited in the literature review, integrates not only the economic variables with health but all the other socioeconomic factors including education (M. Hurd and A. Kapteyn, 2003), similar methods are used in the current report. With attempts of identification of directions of causality were made by M.Hurd and A. Kapteyn (2003), the on-going analysis is only devoted to showing the relationships between different sets of variables as in Bernard (2004). The procedure set in Adams et al. (2003) between Socioeconomic Status and health conditions is also adopted herein.

As in Cutler David M, Adriana Lleras-Muney (2006), linear models are specified as
$H_i = c + \beta E_i + \delta X_i + \varepsilon$where H_i measures individual's i's health or health behavior, E_i measures individual's i's education achievement, X_i is a vector of individual characteristics that includes race, gender and age, c is a constant term and ε is the error term. β is the education gradient and measures the impact of one more year of education on health. In the above contribution, the first estimation evaluates the relationship between the years of schooling and the five year morbidity (that is whether an individual died within five years of the interview) and between the years of schooling and self reported health status. Following the above authors, the relationships between education and health applies to developed and developing countries taken individually. It applies also across countries.

Grossman Michael (2005), analyses the impact of education on non market outcome. The outcomes he discusses include general consumption, saving, the rate of growth of consumption overtime, own health and inputs into the production of own health, fertility, child health and cognitive development.
Clearly there are higher earnings and wages to be gained by higher education but the non market outcomes that the author considers are those associated with the time that the consumer spends outside the labor market.
The author presents several conceptual frameworks that generate effects of education on non market outcome and summarizes and criticizes empirical evidence related to these effects. He focuses on health outcome.
He considers models in which education has productive and allocative efficiency effects. The models are modified to take into account the fact that the nature of schooling decisions is endogenous. The schooling effect can be attributed to omitted variables. One possible variable here is the orientation toward the future. This is complicated by the fact that education affects this orientation.

In an earlier effort, Strauss J. and Duncan T. (1998) looked at the relationship between health, nutrition and development. In this study, the authors focused on education and health as both related to labor market successes. While the link between education and labor market was largely studied, that between health and labor market successes received lesser attention. This latter link is particularly important for developing economies.
For the above authors, various models related nutrition, productivity and wage with marginal productivity of health higher in the developing countries because the health levels were lower and the nature and prevalence of diseases such as malnutrition higher. Children in developing countries are more likely to be ill and that the health of adults is more likely to depend on early life conditions. Thus in the context of the developing world the consequences of the lower health will be more pronounced for the poor.

In the developing countries the credit constraints imply that the health investment might be below efficient levels in poor households. Also the allocation of health related inputs within the household is likely to depend on the activity.
The authors review in the paper present correlations between health and labor outcomes. If better health is associated with better productivity and income then more income will be invested in health. As productivity increases, income increases and that additional income can be invested in health. The direction of causality here will need to be identified.
Health has to be distinguished from other human capital measures; it is multidimensional and difficult to measure.
Studying the stature of individuals in the United States, Brazil, Vietnam and Ivory Cost the author finds that changes overtime in the stature of individual men and women gives information on health and development over the long term. In all four populations the gains in heights have been substantial. These gains were important for the countries except for Vietnam during the war. There are differences between men and women. Within countries there are also differences by regions. Using household data there is evidence that income and health are related.
The authors present non parametric estimates of the bivariate relationship between height and log hourly wages. There is a strong association between height and wages in Brazil and the United States, the effect being higher in Brazil.

The authors also show that health and education are related. Here height is used as an indicator of investment in health during childhood. The correlation between adult stature and years of schooling indicates that taller men tend to be better educated in both countries. This correlation is substantially larger in Brazil.
The authors describe in detail the theoretical developments allowing a better understanding of the behaviors that underlie associations between health and labor market decisions. They also review the efforts made by physicians and epidemiologist in measuring health. They point out that there health is difficult to measure because health is multidimensional. Also different measures of health will have different impact on labor outcome.
The different measures of health they discuss are: self reported health status, self reported morbidities, limitations to normal activities, measures of physical functioning, nutritional based health measures. They present the nature of the information imbedded in each measure and the measurement error it may include.
One point that seems important given the results of the study is that self-evaluations reflect perceptions of health. These perceptions are related to values background, beliefs and information that all related to socio economic status including income and wages. The information of health status is necessarily linked to the use of health care system. If health facilities are not available and since most people assume that they are in good health unless informed of the contrary it is likely that those with lower access to the health system are more likely to report better health. Various experiments show evidence of this phenomenon.
The authors conclude that there substantial progress has been made to document the link between health and productivity and wages in low income economies using both experimental and non experimental methods. A small number of studies show that health has a larger return at very low levels of health and for specific type of jobs. Health and income are clearly linked one to the other but also to other factors and the relationship is ambiguous.

Based on the above modeling efforts and on types of data available, two approaches have been pursued. The first one is based on the analysis of country data as supported by existing international data and local information. The second approach is achieved using regional data that uses panels covering some or all countries included in the study. The results related to each approach are respectively introduced in chapters 3 and 4.

The methods used for the analyzes and testing of interdependencies of health, education and economic performance of the economies of the SMC include mainly descriptive statistics, regression analysis, probit and logit estimations and simultaneous equation models.

Descriptive analysis accounts for principal component analysis and factor determination used when dealing with panels of data covering several countries. The aim of this analysis is to identify the most important variables among those covered under health, education and socio-economic variables. It is also used to compare countries in relation to their performance in relation to the variables considered. Grouping of countries is then achieved through this analysis that is completed with correlation and regression analyzes. The correlation analysis of the different clusters is mainly used to complete the regression analysis in the evaluation of the relationships. Since correlation does not necessarily imply the causation between two variables (health and income, education and income); the assessment of a potential relationship can only be concluded with the regression analysis of the clusters.
Also, the correlation is likely to show the strength and direction of a linear relationship. Regression analysis consisted in running ordinary linear least square estimation on different sets of dependent and explanatory variables. This technique has been used in different sections of this report where variables are logarithmic most of the time to ensure a better interpretation of the results.

Simultaneous equation estimation have been used on systems of independent relationships where ordinary linear least square estimation has been useful to assess the parameters related to each single equation. The underlying approach here is that the aggregate economy of the region is under the effects of a system of relationships that relate health, education and socio-economic variables. Given that each sub-set of variables includes series of variables, different dependent and explanatory variables have been selected to ensure the independency of the error related to each equation in the system.
The probit and logit models have been estimated in relation to situations where categorical and qualitative data have encountered. This is in the case of country analysis when using Demographic and Health Surveys (DHS) but also with the Moroccan CMBS Household data covering Essaouira and Bouaboud.
The methods for analysis of categorical data have been extensively developed under the assumption of multinomial or product multinomial sample. The Pearson Chi-squared test statistics for testing goodness of fit and independence in two way contingency tables are well known. The log-likelihood ration and Wald statistic which are asymptotically equivalent to the Pearson statistic are also used. The theory associated with Pearson and log-likelihood ratio statistics is given in Bishop, Fienberg and Holland (1975). Many illustrations of the use of the Chi-squared statistics are given by Holt, Scott and Ewings (JRSS, Vol.143,No.3 19980) – Chi-squared Test with Survey Data-; Dietrich Eherler, Thomas Lehmann (2007) using CHAID (Ch-Squared Automatic Interaction Detector); K.Habbani, W.Groot and jeovac (EMHJ, Vol. 13 No.

4, 2007); Cochran-Mantel-Haenszel Chi-Squared Test for Count Data.; Andrija Tomovic and Edward J.Oakeley (Oxford Journals, Life sciences, Bioinformatics, Vol. 23, Pp.933-941, 2007); R.P. Chakrabarty U.S Bureau of the Census 1989. The research studies conducted above by different researchers in different areas dealt with categorical data analysis using Chi-squared, Logit, and Probit regression methods of analysis. Similarly, the chi-squared test of independence and probit regression model will be used in the case of the interdependency among health, education and poverty.

The above methods have help to conduct dependency analysis of health, education and poverty. The microeconomic analysis concerns the households of the three countries (Morocco, Egypt, and Turkey) from the study region. The analysis will use the primary data collected through surveys of large samples at the level of each country mentioned above. These data were obtained from (DHS). A large number of variables were included in the surveys. The variables are all categorical and related to the households and concern health, education and poverty. Given the objectives of the research, many statistical methods of survey analysis exist, among them we may mention Logit, Probit, CHi-Squared methods.

The conceptual framework encompasses the Chi-squared test, and the probit regression model.

i) Chi-Squared Test of Independence

The hypothesis to be test is the following:

Ho: Health, education and poverty are independents?

Ha: Health, education and poverty are dependents?

The usual Chi-squared test of impendence:

$$\sum_{i=1}^{r}\sum_{j=1}^{k}[n_i(P_{ij}-f_j)^2/(f_j)]$$

Where $fj = \sum f_{ij}/\sum n_i$, this has $\chi^2_{(r-1)(k-1)}$ distribution under Ho with independent multinomial sampling in each population.

Pij represents the probably from the theoretical probability density function (pdf)

ni represents the absolute frequency

(r-1)(k-1) represent the chi-squared degrees of freedom.

In terms of the data processing, the SPSS package will be used with the specification of the appropriate Chi-squared model displayed above.

Cross-Cluster correlation Analysis:

The regression results in the form of graphs representing interdependent relationships between education and income and health and income.

III. Variables:

a. Education

Education indicators used relate to three main fields: education outcomes, participation in education, and education inputs.

The education outcomes variables are assessed by the total adult literacy rate (age 15 and above), the total youth literacy rate (from age 15 to age 24). The two measures of education outcomes only cover the year 2004. The total adult literacy rate is the percentage rate of people, aged from 15 years, who can understand while reading and writing sentences from their everyday life, while the total youth literacy rate only differs from the adult literacy rate by the age range (15 years to 24 years).

Concerning measures of participation in education, they include the number of children out of school in primary education in 2000, the mean years of schooling (age 15 and above) in 2000, the pre-primary school life expectancy in years (from 1999 to 2004), and the primary to tertiary school life expectancy in years (from 1999 to 2004). The children out of school indicator concern the number of children who are out of primary school education while they are primary-school-age. The mean years of schooling provides an indication of skills acquired during an estimated average period of schooling. The pre-primary school life expectancy represents the numbers of years that a pre-primary-age child should expect to spend in his/her pre-primary school. The primary to tertiary school life expectancy predicts the expected numbers of years that an enrolled student should spent from primary to tertiary education.

Education inputs were only illustrated by the pupil-teacher ratio from 1999 to 2004. It represents the number of students enrolled within primary schools over the number of primary education teachers.

Education Indicators:

1 Adult Literacy Rate

From the correlation analysis table, we can observe the variability of the results from cluster to cluster. The high as well as the low human development countries show a complete independence from the adult literacy rate and the GDP per capita. The European Union obtains a small negative correlation, while both the medium human development and major oil net exporters have average positive correlations. By exceeding 50%, world and SMC clusters prove that there is a large positive linear dependency between their respective adult literacy rates and their GDP per capita.

2 Children out of Primary School

Concerning the children out of primary school and their potential linear dependence with GDP per capita, it generally displays reverse correlations. Both oil exporting countries and the EU clusters show great disparity in their results. The oil exporters' correlation moved from no dependence from 1999-2001, to small positive dependence in 2002 and 2003. In 2004, the oil exporting cluster even got a correlation that equals 30%. European Union countries also moved from a small positive linear dependence in 1999 to medium negative correlation in 2004. For the high human development countries, the correlation table indicates a regular, positive and small linear dependence between the number of children out of primary school and the GDP per capita. All the remaining clusters demonstrate a reverse linear dependency between the two variables; the difference consists of their respective degree of dependence. The world cluster tends to present a decreasing correlation that changed from -24% in 1999 to -16% in 2004. The SMC region keeps the range of the correlations between 30% and 40%. Regarding the low human development countries, they have very high linear dependencies since their correlations exceed 70% in all the covered years.

3 Mean Years of Schooling

The correlations of the mean years of schooling and the GDP per capita can be divided among three main groups. The first group includes the European Union, which almost proved independence between the two variables, with its score of 8%. The second group comprises the low and medium human development countries, with 36% and 47% respectively. The last group contains world, SMC, oil exporters, and high human development countries that demonstrated a strong linear dependence between the mean years of schooling and the GDP per capita.

4 Pre-Primary School Life Expectancy

The correlation analysis of the pre-primary school life expectancy reveals various inconsistencies, especially for the low human development and EU clusters. The European Union had correlations displaying no linear dependence, except for 2004. In that year, the correlation equals -16%, implying a relatively small linear dependence. In 1999 and 2000, the correlation results of low human development countries were nearly equal to zero. Starting from 2001, the correlation jumped to 22% and remained approximately stable at 15%. Both high and medium human development countries had relatively stabilized correlations from 1999 to 2002. Starting from 2003, their degrees of linear dependence started to drastically drop. The three remaining clusters (world, SMC, and oil exporting countries) have strong positive linear dependence.

5 Primary to Tertiary School Life Expectancy

While observing the correlations obtained from primary to tertiary school life expectancy and the GDP per capita variables, we notice that a large majority of clusters display a positive linear dependence. The disparity between those positive dependencies relies on their strength. Besides the low human development countries that show large negative correlations, the remaining clusters' correlations are all positive. The medium human development countries illustrate irregular trends in their correlations. From 1999 to 2003, the correlations of medium human development countries dropped by 9% and in 2004, it returns back to the 1999's rate. For the European Union, there is a clear decreasing trend with a correlation that moves from 42% in 1999 to 17% in 2004. The remaining clusters (SMC, oil exporters, world and high human development countries) obtained significant degrees of linear dependence between primary to tertiary school life expectancy and the GDP per capita.

6 Pupil-Teacher Ratio

The correlation analysis of the pupil-teacher ratio shows a more uniform set of results than the other education indicators. The European Union made the exception, compared to the rest of clusters, by showing independence of its pupil-teacher ratio and the GDP per capita. The remaining clusters have medium to large negative correlations that vary from -39% to -70%.

7 Youth Literacy Rate

From the correlations of the different clusters that concern the youth literacy rate and the income indicator, we can identify three sets. The first set comprises the low human development countries, with a small negative correlation (-20%). The second group is composed of the European Union. The latter has a small correlation percentage of 22%. The last group includes SMC, world, major oil net exporters, and high and medium human development countries.

b. Health

Health measurements presented in the database cover three major topics: population dynamics, mortality, and reproductive health. The population dynamics is drawn from the crude death rate per 1,000 people. Due to the lack of continuous death rate data across countries, only years 1995,

1997, 2000, 2002, 2003, and 2004 are registered. The death rate gives the estimated number of deaths per 1,000 people in a country at mid-year.
Mortality is illustrated with the following indicators: infant mortality rate per 1,000 live births, under-five mortality rate per 1,000, and total life expectancy at birth in terms of years. Both infant and under-5 mortality rates have available statistics in 1995, 2000, and 2004. The life expectancy at birth covers the same years as the death rate. The infant mortality rate represents the number of dying children before their first year among 1,000 live births within a year. The under-five mortality rate is the probability that a child would die before reaching his/her fifth year, knowing that the child is subject to the actual age-specific mortality rates. Life expectancy at birth embodies the probability that a born infant would live, giving that the mortality conditions stay the same from the day of the child's birth to his/her death.
Reproductive health is shown by the maternal mortality ratio per 100,000 live births. This latter only covers 1995 and 2000 and it shows the number of mothers who die because of pregnancy and childbirth over 100,000 live births.

Health Indicators:

1 Death Rate

While analyzing the correlations between the death rate and the income per capita, we notice that the human development clusters have distinguishing characteristics. High, medium, and low human development countries have correlations approximately equaling zero, with few exceptions. Those exceptions concern the medium human development that had a zero correlation starting from 2000, while the low human development had zero correlation starting from 2002. In other words, human development clusters' death rate is independent of the GDP per capita. Distinguished by their degree of independence, regional and oil-related clusters have negative correlations. For the major oil net exporters, they show a stable and small negative linear dependence that ranges from -20% to -23%. The world cluster displays, in general, a trend that departs from linear dependence. Only the two regional clusters (SMC and EU) got large correlations, implying a significant linear dependence between death rate and GDP per capita.

2 Infant Mortality Rate

The results obtained from the correlation of the infant mortality rate and GDP per capita illustrate some kind of homogeneity. Besides the irregularity that can be observed with low human development countries' correlations (declining from -0.4 in 1995 to -0.13%), the remaining clusters have significant degrees of dependence. In fact, their correlations are larger than 40% for the three covered years (1995, 2000, and 2004). In addition, for all the clusters, we can notice negative correlations between the rate of infant mortality and the GDP per capita.

3 Life Expectancy at Birth

Two main remarks can be raised from the analysis of the clusters' correlations. First, the low as well as the medium human development countries have clear downward trends. Actually, low and medium human development clusters displayed positive medium linear dependence between the two studied variables in 1995, but it started to decline until reaching nearly zero. Similarly, the dependence between life expectancy at birth and GDP per capita shrinks from 1995 to 2004. The second remark relates to the large correlations (more than 62% in all the covered years) demonstrated by the regional (SMC and EU), oil-related and high human development clusters.

4 Maternal Mortality Ratio

The followings illustrate the different observations that could be obtained from the analysis of the different correlations. In general, the clusters show medium to large linear dependence between the ratio of maternal mortality and the GDP per capita. The only exception concerns the 2000 medium human development countries' correlation of -15%. Also, in 2000, the European Union demonstrates a noteworthy drop in its correlations compared the 1995 results. SMC, major oil net exporters, world and high human development countries, with downsizing tendencies, have proved significant departure of the two variables from independence.

5 Under-Five Mortality Rate

Regarding the under-five mortality rate and GDP per capita's correlations, we drew the following observations. First, the low human development countries demonstrate a decreasing trend with correlations that decline from -49% in 1995 (large correlation) to -22% in 2004 (small correlation). The remaining clusters present large correlations, except for medium human development countries that got -40% in 2004.

c. Income

Due to the inconsistency and unavailability of income indicators for a period of eleven years and for 216 countries, only the GDP per capita was taken into account as a measurement of income. It covers a range of 11 years from 1995 to 2005. The GDP per capita indicator is based on the purchasing power parity rates converted to current international dollar.

Categorical variables: For three countries, Morocco, Egypt and Turkey, some of the categorical variables related to health, education and economic performance have been used. Different variables or characteristics representing wealth, education, and health such as levels of education, state of health and ownership of different assets are considered. Education is represented by the different level of education, no education, incomplete primary, complete primary, secondary, and higher. Wealth is represented by all the capital goods such as transportation, equipments, factories, housing, and businesses. Health is represented by individual weight and height, illnesses, and his/her state of health. Similar variables are taken into account in the analysis of the household data pertaining to Essaouira and Bouaboud.

Subjective variables: These are mainly obtained from the 2001 and 2006 institutional profiles. They include variables that relate to the perception of economic, social and institutional dimensions as considered in the database. Appreciations of equity in accessing school, health, water and electricity besides the assessments of matters related to training, openness, migration and social mobility are considered within the framework of analysis.

Other variables: The other variables that have been considered are those related to consumption expenditures as retrieved from 1999 household consumption survey. Variables related to drop-out rates from school besides epidemics; poverty and unemployment have been also included. The variables include besides household size and gender composition, the expenditures on food, clothing, housing and energy, household equipment, health care, transportation and communication, education and leisure besides administrative expenditures.

IV. Data

1. Sources

The databases comprise three main axes: political, socio-economic, and technological indicators. Each axis includes data from major indices, surveys, rates, ratios, percentages, and total amounts from various research centers, institutions, statistical divisions and organizations. The World Bank Indicators, the World Economic Outlook from International Monetary Fund, the Common Database of the United Nations Statistics Division, Human Development Reports, the Worldwide Governance Indicators, the Energy Information Administration of the United States Department of Energy, the Organization of the Petroleum Exporting Countries, the United Nations Organization for Education, Science and Culture Institute for Statistics, the United Nations Children's Fund Global Database, the International Labor Organization Statistics, the World Health Organization Statistical Information System, the "*Centres d'Etudes Prospectives et d'Informations Internationales"*, the International Country Risk Guide, the Greater Zurich Area AG, the Heritage Foundation, the Environmental Performance Index Centers, the Transparency International Indices, and the Reporters Without Borders are the sources of the different indicators used for elaborating the databases.

2. Clusters and Years Range

The databases used cover a range of 216 countries. These set of countries are classified in three different clusters: geographical, human development, and oil export. The geographical cluster includes the European Union and the Middle East and North Africa. The studies based on the databases give a particular attention on the two cited regions. In addition, all countries, with available data, are part of the World cluster. For the human development cluster, it is based on the 2006 Human Development Index. In other words, only countries categorized within the high human development, medium human development, and low human development countries are part of the three human development clusters. The final group of cluster includes the major oil net exporting countries, mainly nations that have net oil exports of more than 100,000 barrels per day.

The range of years that is used within the three databases is from 1995 to 2006. For those indicators that lack continuity in terms of countries and years, they are considered null and they are not included within the different clusters cited above.

2.1 Subsets of Countries:

Three subsets were made in order to identify and compare major differences and relationships among human development, oil exporting, and geographical clusters. The human development cluster is based on the 2006 Human Development Index rank, which identifies three groups of countries. The first group of countries represents the high human development countries with 63 countries. The medium human development countries include 83 countries. The third subset of countries is the low human development countries that cover 31 countries. For countries that are not categorized by the 2006 Human Development Report, they are included within the World category of the geographical cluster.

The second cluster concerns the major oil net exporting countries. The list of countries is based on the current OPEC membership. In addition, major non-OPEC oil exporters are provided by the Energy Information Administration of the United States Department of Energy. Only net exporters of more than 100,000 barrels per day are considered. Because the reporting system differs from a country, the only the most recent data is taken into account in oil exporters' cluster.

The final cluster is related to geographical location. The focus is given on Middle East and North Africa (SMC), the European Union (EU), and the World. The list of SMC countries is based on the World Bank regional categories. Only West Bank and Gaza (Palestinian Occupied

Territories) was not included in the cluster because of the inexistence of statistical indications in any of the health, education and income indicators used. For the EU region, the 27 member countries are grouped within the second geographical cluster. The World cluster includes all the 216 countries that are part of the database.

2.2 Country Data

Country data include the inputs from DHS for Morocco, Egypt and Turkey. This accounts also for the Community Based Monitoring System (CMBS) for the two regions of Bouaboud and Essaouira in Morocco (respectively 656 and 465 households). A sub-sample from the Moroccan Consumption Survey of 1999 (301 households).

- **The first database is Demographic and Health Survey** (DHS). DHS is conducted to collect, analyze and disseminate accurate and representative data on population, health and nutrition over 75 countries. These surveys are conducted by the ORC Macro, a professional services firm engaged in providing professional and technical information to national and international government and private sector clients including monitoring, evaluation, research, communications and social marketing. The Demographic and Health Research Division, one of the ORC seven groups, has assisted more than 170 household DHS in about 70 countries during the last 20 years throughout Africa, Asia, the Near East, Latin America, and the Caribbean. DHS surveys are divided into two main categories: Standards DHS surveys are conducted every 5 years to allow comparison over time and are characterized by a large sample sizes (between 5000 and 30000 household). The second category called Interim DHS surveys has smaller samples than DHS surveys (between 2,000 and 3,000 households) and focus on the collection of information on key performance monitoring indicators). DHS survey topics focus on indicator for several and different topics such as fertility, reproductive health, maternal and child health and nutrition, knowledge and practice related to HIV/AIDS.

  Survey data is processed and presented in the final survey report containing a number of tables that provide information on specific indicators in a country. These tables are designed to be comparable between surveys and across countries.
  The data are presented in terms of national level statistics and for population subgroups such as those defined by age, education, marital status, economic status, urban/rural residence and region of the country. Further data desegregations could be added when appropriate to a topic. Those surveys are conducted on behalf of many national organizations and they are part of the worldwide MEASURE DHS project which is funded by the United States Agency for International Development (USAID). Final reports are produced for most DHS surveys. Comprehensive survey results are published in the DHS Final Reports approximately 8-12 months after the completion of fieldwork.

- **Community Based Monitoring System** (CMBS): This is a survey that is also conducted internationally in relation to poverty alleviation programs. It is developed under the MIMAP « Micro Impacts of Macroeconomic and Adjustment Policies » and supported the Center of International Research and Development. The Essaouira and Bouaboud surveys were conducted within the above framework.
  Data on drop-out and health (Morocco, sources: Ministry of Education and Ministry of Health): These are the most recent data (2006) issued respectively by the Moroccan Ministry of Education (2006) and by the Ministry of Health (Statistical yearbooks, 2004, 2005 and 2006).

The study uses a new data set, the community based monitoring survey (CBMS) produced by the Ministry of Finance in cooperation with UNIFEM. It is conducted as of today only in two localities chosen based on data of the population census of 2004 and on the poverty map of Morocco. The first locality is urban (Essaouira) and the second is rural (Bouaboud). The survey questionnaire addresses the following theme: demographic characteristics, culture and education, economic activities, employment and unemployment, poverty, micro-credit, health, housing, violence, environment, governance and gender.

- **Partial consumption survey data** (Morocco, HCP): These data are based on the 1999 household consumption survey with the random extraction of around 300 households out of 7200 with respective consumption expenditures. The study uses a new data set, the community based monitoring survey (CBMS) produced by the Ministry of Finance in cooperation with UNIFEM. It is conducted as of today only in two localities chosen based on data of the population census of 2004 and on the poverty map of Morocco. The first locality is urban (Essaouira) and the second is rural (Bouaboud). The survey questionnaire addresses the following theme: demographic characteristics, culture and education, economic activities, employment and unemployment, poverty, micro-credit, health, housing, violence, environment, governance and gender.

- **Institutional profile data:** Institutional Profile Database is a relatively new database issued in 2001 and 2006 by the French Ministry of Finance. The next survey is scheduled on 2009. The institutional profile database focuses on institutional evaluations of countries through the assessment of perceptions about the education, health, and training of elites, professional training, openness, migration and social mobility besides the quality of institutions. This database is composed by 356 elementary variables (132 indicators, 110indicators of the state of institutions and 22 indicators of reforms). The 2001 survey covered 51 countries while the 2006 survey expanded coverage to 85 countries. The scale used in these surveys is from 1 to 4 with 4 being the highest appreciation.

Conclusion

The above chapter is mainly based on a description of the general methodological guidelines that are used in different parts of the following chapters. These guidelines include descriptive statistics with focus on principal component and factor analyzes besides the other traditional investigations. The methodologies mobilized do also account for simple regression analysis besides the introduction of simultaneous equations with seemingly unrelated errors. Probit and Chi-squared methods are also used for categorical data when analyzing household surveys.

Different types of variables and sub-variables are used depending on the sources of information used. Data are mainly related to cross-sections of countries in the region as published on alternative sources. They also include partial or total databases issued from country surveys. The Demographic and Health Surveys (DHS) are among the most important country household data that have been analyzed.

References

- Adams et al (2003). "Healthy, Wealthy and Wise? Tests for Direct Causal Paths between Health and Socioeconomic Status," Journal of Econometrics, 112: 3-56.
- Andrija Tomovic and Edward J. Oakeley (2007) "Position dependencies in transcription factor binding sites" Oxford Journals, Life sciences, Bioinformatics Vol. 23, No 8 PP. 933-941
- Bishop, Y. M. M., Fienberg, E. F. & Holland, P. W (1975). "Discrete multivariate analysis. Theory and practice", Cambridge, Mass.: MIT Press
- Chakrabarty R.P (1989) "Multivariate analysis by users of SIPP micro-data files", SIPP Working paper series No 8915. Washington, D.C. U.S. Bureau of Census.
- David M.Cutler & Adriana Lleras-Muney (2006). "Education and Health: Evaluating Theories and Evidence", NBERworking Paper N°W12352
- Dietrich Eherle, Thomas Lehmann (2007) "Responder profiling with CHAID and dependency analysis " lehrstuhl fur Wirtschafts-und Sozialstatistik Friederich—Schriller- Universitat Jena.
- Habbani K., Groot W., and Jelovac I. (2007) "Do free-of-charge public health services impede cost recovery policies in Khartoum state, Soudan?" Eastern Mediterranean Health
- Holt**,** Scott **&** Ewings **(**1980). "Adjusted chi-squared tests for cross-classified tables of survey data", Department of Mathematics and *Statistics*, University of New Mexico Albuquerque, New Mexico, U.S.A..
- Li ***Gan*** & Guan ***Gong*****,** ***2007***. "Estimating Interdependence Between Health and Education in a Dynamic Model," NBER Working Papers 12830, National Bureau of
- ***Michael Grossman*** **(*2005). "Education*** and Nonmarket Outcomes", NBER Working Paper 11582, National Bureau of Economic Research, Inc
- Michael Hurd, and Arie Kapteyn (2003). "Health, Wealth, and the Role of Institutions", *Journal of Human Resources* 38(2):386-415
- Shankha, Chakraborty & Mausumi Das (2004). "Mortality, Human Capital and Persistent Inequality", Econometric Society 2004 North American Summer Meetings
- Strauss John and Duncan Thomas (1998), "Health Nutrition and Economic Development" Journal of Economic Literature Vol. XXXVI pp.766-817

Appendix to chapter 2:

$U = u(c_1) + m_s(h)\left[u(c_2) + \alpha v(I)\right]$

The first order necessary conditions related to e , h *and* I *:*

- For e , we have: $\frac{\partial U}{\partial e} = u'(c_1) + m_s(h)u'(c_2)$

Given that: $u'_e(c_1) = u'_e(\omega + W - e - h)$ and $u'(c_1) = (c_1)'.(c_1)^{-\delta} \Rightarrow u'_e(c_1) = -(c_1)^{-\delta}$

$u'_e(c_2) = u'_e(\omega + R.e - I)$ and $u'(c_2) = (c_2)'.(c_2)^{-\delta} \Rightarrow u'_e(c_2) = R.(c_2)^{-\delta}$

So, $\frac{\partial U}{\partial e} = -(c_1)^{-\delta} + m_s(h).R(c_2)^{-\delta} = 0 \Rightarrow (c_1)^{-\delta} = R.m_s(h)(c_2)^{-\delta}$

- For h : $\frac{\partial U}{\partial h} = u'(c_1) + m'_s(h)\left[u(c_2) + \alpha v(I)\right]$

$u'_h(c_1) = u'_h(\omega + W - e - h) = -(c_1)^{-\delta}$ then: $\frac{\partial U}{\partial h} = -(c_1)^{-\delta} + m'_s(h)\left[\frac{(c_2)^{1-\delta} + \alpha.I^{1-\delta}}{(1-\delta)}\right] = 0$

$\Rightarrow (1-\delta)(c_1)^{-\delta} = m'_s(h)\left[(c_2)^{1-\delta} + \alpha.I^{1-\delta}\right]$

- For I : $\frac{\partial U}{\partial I} = m_s(h)\left[u'(c_2) + \alpha v'(I)\right]$

$u_I'(c_2) = u_I'(\omega + R.e - I) = -(c_2)^{-\delta}$ and $v_I'(I) = I^{-\delta}$, then:

$\frac{\partial U}{\partial I} = m_s(h)\left[-(c_2)^{-\delta} + \alpha.I^{-\delta}\right] = 0 \Rightarrow I = \alpha^{1/\delta}.c_2$

Definition of c_2 *:*

$(1-\delta)(c_1)^{-\delta} = m_s'(h)\left[(c_2)^{1-\delta} + \alpha.I^{1-\delta}\right]$ and $I = \alpha^{1/\delta}.c_2$

So, $m_s'(h) = \frac{(1-\delta)(c_1)^{-\delta}}{(c_2)^{1-\delta}\left(1+\alpha^{1/\delta}\right)} = \frac{(1-\delta)}{\left(1+\alpha^{1/\delta}\right)c_2}.\left(\frac{c_1}{c_2}\right)^{-\delta}$

Since $\left(\frac{c_1}{c_2}\right)^{-\delta} = R.m_s(h)$, then: $\frac{m_s'(h)}{m_s(h)} = \frac{(1-\delta)}{\left(1+\alpha^{1/\delta}\right)}.\frac{R}{c_2}$

$m_s'(h) = \gamma.a.h^{\gamma-1}$ and $m_s(h) = a.h^{\gamma}$, so: $c_2 = \frac{(1-\delta)}{\gamma\left(1+\alpha^{1/\delta}\right)}Rh$

Given that $\beta = \frac{(1-\delta)}{\gamma\left(1+\alpha^{1/\delta}\right)} \Rightarrow c_2 = \beta R h$

Definition of $f(h)$:

From the budget constraints (1) and (2), $e = \frac{c_2}{R} + \frac{I}{R} - \frac{\omega}{R} \Rightarrow$

$c_1 + h + \frac{c_2}{R} + \frac{I}{R} = \left(1 + \frac{1}{R}\right)\omega + W = y$, where $y = (1 + 1/R)\omega + W$

Then, by introducing the values of c_1 and c_2, the following equation results:

$y = \frac{R^{1-1/\delta}}{\left[m_s(h)\right]^{1/\delta}}\beta h + h + \beta h + \alpha^{1/\delta}\beta h$

So, $y = h + \beta h\left[1 + \alpha^{1/\delta} + \frac{R^{1-1/\delta}}{\left[m_s(h)\right]^{1/\delta}}\right]$

Definition of the variables c_1, c_2, I *and* e *as function of* y *and* $\hat{h}$:

Given that $c_1 = (\bar{m}_s)^{-1/\delta}.R^{-1/\delta}.c_2$ and $c_2 = \beta R\hat{h} \Rightarrow c_1 = \beta\hat{h}\frac{R^{1-1/\delta}}{(\bar{m}_s)^{1/\delta}}$

$$y = \hat{h} + \beta\hat{h}\left[1 + \alpha^{1/\delta} + \frac{R^{1-1/\delta}}{(\bar{m}_s)^{1/\delta}}\right] = \hat{h} + \beta\hat{h}\left(1 + \alpha^{1/\delta}\right) + \beta\hat{h}\,\frac{R^{1-1/\delta}}{(\bar{m}_s)^{1/\delta}}$$

$$y - \hat{h} = \frac{c_2}{R}\left(1 + \alpha^{1/\delta}\right) + c_1 = c_1(\bar{m}_s)^{1/\delta}.R^{1/\delta - 1}\left(1 + \alpha^{1/\delta}\right) + c_1$$

So, $c_1 = \left[\frac{1}{1 + (\bar{m}_s)^{1/\delta} R^{1/\delta - 1}\left(1 + \alpha^{1/\delta}\right)}\right]\left(y - \hat{h}\right)$

Or, $c_1 = \left[\frac{1}{1 + \rho\left(1 + \alpha^{1/\delta}\right)}\right]\left(y - \hat{h}\right)$ where $\rho = (\bar{m}_s)^{1/\delta}.R^{1/\delta - 1}$

Also, $y - \hat{h} = \frac{c_2}{R}\left(1 + \alpha^{1/\delta}\right) + \frac{c_2}{R^{1/\delta}(\bar{m}_s)^{1/\delta}} = \frac{c_2}{R}\left[1 + \alpha^{1/\delta} + \frac{1}{R^{1/\delta - 1}(\bar{m}_s)^{1/\delta}}\right]$

So, $c_2 = \left[\frac{\rho}{1 + \rho\left(1 + \alpha^{1/\delta}\right)}\right] R\left(y - \hat{h}\right)$ where $\rho = (\bar{m}_s)^{1/\delta}.R^{1/\delta - 1}$

Given that $\beta\hat{h} = \frac{I}{\alpha^{1/\delta} R}$ and $I = \alpha^{1/\delta}(\bar{m}_s)^{1/\delta} R^{1/\delta}.c_1$ =>

$$y - \hat{h} = \frac{I}{R}\left[\frac{\left(1 + \alpha^{1/\delta}\right)}{\alpha^{1/\delta}} + \frac{1}{\alpha^{1/\delta}(\bar{m}_s)^{1/\delta} R^{1/\delta - 1}}\right]$$

Thus, $I = \left[\frac{\rho\alpha^{1/\delta}}{1 + \rho\left(1 + \alpha^{1/\delta}\right)}\right] R\left(y - \hat{h}\right)$

Replacing $I = \alpha^{1/\delta}.c_2$ in (1) => $e + \frac{\omega}{R} = \left(1 + \alpha^{1/\delta}\right)\frac{c_2}{R}$

Since $y - \hat{h} = \frac{c_2}{R}\left(1 + \alpha^{1/\delta}\right) + \frac{c_2}{R^{1/\delta}(\bar{m}_s)^{1/\delta}} = \frac{c_2}{R}\left(1 + \alpha^{1/\delta}\right)\left[1 + \frac{1}{\rho\left(1 + \alpha^{1/\delta}\right)}\right]$

$$y - \hat{h} = \left(e + \frac{\omega}{R}\right)\left[\frac{1+\rho\left(1+\alpha^{1/\delta}\right)}{\rho\left(1+\alpha^{1/\delta}\right)}\right]$$

Hence, $e = \left[\frac{\rho\left(1+\alpha^{1/\delta}\right)}{1+\rho\left(1+\alpha^{1/\delta}\right)}\right]\left(y - \hat{h}\right) - \frac{\omega}{R}$

Chapter III: The importance of wealth patterns and relationships with health and education

Introduction

The main objective of this chapter is to check the interdependencies between different sources of wealth (education, health and economic wealth). The analysis is based on datasets made of World Bank and United Nations.
The paper is organized as follows. First section uses descriptive statistics methods and simple regressions to make a comparative analysis between South Mediterranean countries and countries of the European Union about the levels of education, health and economic wealth, taking also into consideration the evolutions during the last 10 years, the classification of countries (developed, developing, underdeveloped countries) or the membership of different organizations (OPEC or Oil exporters).The second section uses factorial methods to detect the interdependencies between the selected indicators of education, health and economic development (GDP per capita, literacy rate, school life expectancy, life expectancy and infant mortality rate).
Using these variables, three wealth patterns are observed and are analyzed for SMC and EU countries.
The last section is an econometric analysis of the relation between education, health and economic development. To obtain better results a dummy variable is introduced to account for country wealth (if a country is rich or with medium wealth dummy=1 or if it is poor dummy=0).
The main conclusion is that all the components of human welfare are strongly interdependent. For SMC countries, the impact of any change in the level of education or health on the level of economic development depends on the wealth patterns. There are some differences between SMC and EU countries. No direct relationship between the level of education and economic development could be seen for EU countries and the relationship between health and economic development is different from South Mediterranean countries.

1. Descriptive statistics

1.1: Economic development

Per capita economic development in the SMC region in the past 20 years has been relatively low, partly because of high population growth rates and partly because many countries still depend on oil exports and oil prices remained relatively low during this period. Under this situation, human capital (health and education) and economic development are not expected to show meaningful relationships.

Gross domestic product (GDP) per capita shows that the SMC region is of medium wealth. The GDP per capita in 2004 was 10881.22 (PPP) current international $ compared to the overall mean of 10390.66 (PPP) current international $. The GDP growth during the period 1995-2004 for MENA countries was 34%, much lower than the growth of 57% for EU countries during the same period. (Table 1)

1.2: Health and education

Many scientist consider that literate people have a better health and a higher socio-economic status. The general measure used to describe the educational level of a country is literacy rate calculated as the percentage of the population 15 years and older who are literate (can read and write). The variation of literacy rate across countries is very high, from 52% for underdeveloped countries to 94% for developed ones.
The region has invested heavily in education over the past few decades. As a consequence, the mean of the literacy rate increased from 68% in 1995 to 79% in 2004. But, disparities between countries are very high. For example, in Arab Republic of Egypt, the literacy rate increases from 51% in 1995 to 71% in 2005, while in other countries it remains stable (in Bahrain literacy rate remains stable at 85%-86% during the analyzed period) (table 2).

Life expectancy at birth is one of the most important indicators of health. For much of human history, life expectancy was between 20 to 35 years (Preston, 1995). In 2004, it was 72 years for the region under study, compared to 66 years worldwide. Life expectancy at birth has increased with the level of development, from 47 years for the underdeveloped countries to 77 years for the developed countries. While the variations of life expectancy across regions and level of development are significant, the variation across organization (oil exporters, OPEC) is not significant. For oil exporters countries and OPEC countries it has been 68 years (table 2).

The impact of health on literacy rate is much higher for SMC countries than for the other regions. An increase of 1 year in life expectancy corresponds to an increase of 2.44% in literacy rate. 63% of the variation of literacy rate is explained by the variation of life expectancy. (Table 3)

Recent studies argue that correlations of education with health and socio-economic status may have more to do with the effects of schooling rather than literacy in general.
School life expectancy shows the overall level of development of an educational system in terms of the number of years of education that a child can expect to achieve. Special attention is required in the interpretation, as long as relatively higher school life expectancy indicates greater probability for children to spend more years in education but also higher overall retention within the education system. The overall mean of school life expectancy is 12 years, much higher in developed countries than in developing or underdeveloped ones (15 years in developed countries versus 7 years in underdeveloped countries). In the region, school life expectancy increased from 11 years in 1995 to 12 years in 2004. Between countries there are large disparities. For example, school life expectancy in Djibouti has been 4 years in 2004 compared to Israel where it has been 15 years in 2004. (Table 2)

2. Factor analysis of wealth patterns

2.1: How education, health and economic development are interrelated?

In order to have a suggestive representation of the interrelations between education, health and economic development, Principal Component Analyze (PCA) is applied. It is a technique used to reduce multidimensional data sets to lower dimensions for analysis. PCA is mathematically defined as an orthogonal linear transformation that projects the data to a new coordinate system (which are called principal components) in order to obtain the greatest variance by any projection of the data.

The variables used in this analysis are: GDP per capita PPP (current international dollars), Life expectancy at birth (years), Adult literacy rate, Mortality rate, infant (per 1000 live births) and School life expectancy (Years) - Primary to tertiary, for SMC and EU countries, for three years 1995, 2000 and 2004. As long as Adult literacy rate is available only for the year 2004, we have considered it constant all these years. Most of the information is preserved (92%) by the projection of the variables on the plan determined by the first two principal components.

On the first axis, the best represented variables are on one side School life expectancy (Years) - Primary to tertiary and Adult literacy rate and on the other side Mortality rate, infant (per 1000 live births). So, the first axis summarizes the educational and health components of wealth. School life expectancy (Years) - Primary to tertiary and Adult literacy rate are strongly positively correlated and negatively correlated with Infant mortality rate. The countries on the positive side of the first axis have the values of educational indicators higher than the average and the values of Infant Mortality rate lower then the average. Farther is the country from the center of the axis on the positive side, wealthier in education and healthier is the country. Farther is the country from the center of the axis on the negative side, poorer in education and with lower health is the country. The SMC countries with the highest levels of education and lowest levels of Infant mortality rates are Israel and Jordan and the countries with the lowest levels of education and highest levels of Infant mortality rates are Yemen and Morocco. Countries like Morocco, Yemen, Jordan and Tunisia became richer in education and health during the last ten years and Israel, Saudi Arabia, Iran, Oman and Kuwait became poorer in education and healthier during the last ten years.

On the second axis the best represented variables are on one side GDP per capita, PPP (current international $) and Life expectancy at birth, total (years) and on the other side Mortality rate, infant (per 1000 live births). So, the second axis summarizes the economic and health components of wealth. School GDP per capita and Life expectancy at birth are strongly positive correlated and negative correlated with Infant mortality rate. The countries on the positive side of the second axis have the values of GDP per capita and Life expectancy at birth higher then the average and the values of Infant Mortality rate lower then the average. Farther is the country from the center of the axis on the positive side, richer and healthier is the country. Farther is the country from the center of the axis on the negative side, poorer is the country. The richest and healthiest SMC countries are Israel and United Arab Emirates and the poorest is Yemen. During the last ten years all the countries became richer and healthier.

Taking into consideration all the variables, the wealthiest countries in health, in education and economically will be represented in the first dial, far from the axis center and the poorest will be represented in the third dial, far from the axis center. So, the richest SMC country from all points of view is Israel and the poorest SMC country from all points of view is YEMEN.
The main differences between SMC countries and EU countries are in education. Almost all SMC countries are on negative side of the first axis, and almost all EU countries are on positive side of the first axis, which is determined by educational wealth and Infant mortality rate. The general time trend is the translation of countries to higher values of education, health and GDP. As long as for many of SMC countries the improvement in education is more visible, for most of EU countries the improvement in GDP per capita and health is more important. The homogeneity

on first axis is much higher for EU countries than for SMC countries, so EU countries are much more homogenous in Education and Infant mortality rate than SMC countries.

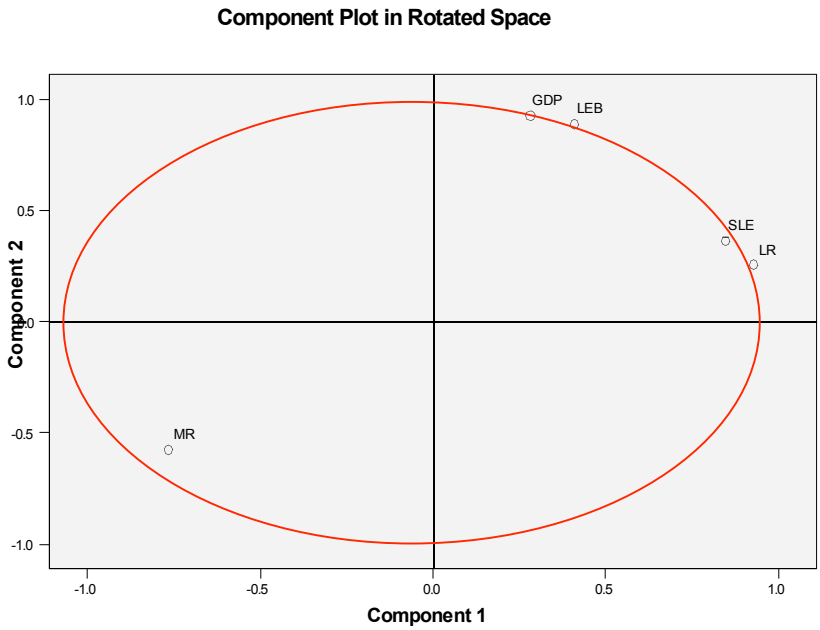


Figure 1 – Variable representation on factorial plan

2.2: Wealth patterns by education, health and economic development

To determine the wealth patterns by education, health and economic development for SMC countries (and compare them with wealth patterns for EU countries) data clustering methods are used. Data clustering means the classification of objects into different groups (clusters), so that the data in each cluster share some common attributes - often proximity according to some defined distance measure. In our case, the distance measure is the Euclidean distance and the methods used are "Ward method and k-means clustering".

Three groups are identified having the following characteristics.

Cluster 1 includes countries with medium wealth:

- *SMC countries:* Bahrain, 1995; Kuwait, 1995; Saudi Arabia, 1995, 2000, 2004; Oman, 2000, 2004;
- *EU countries:* Cyprus, 1995; Greece, 1995, 2000; Portugal, 1995; Slovenia, 1995, 2000; Slovak Republic, 2000, 2004; Spain, 1995; Estonia, 2004; Latvia, 2004; Malta, 2000, 2004; Portugal, 2000; Lithuania, 2004.

School life expectancy (primary to tertiary) in mean is 13.6 years and adult literacy rate in mean is 92%. So, the countries from this group have average levels of education. Life expectancy at birth in mean is 74.6 years and Infant mortality rate in mean is of 9.8 dead infants for 1000 live births. Therefore, this cluster contains countries with an average level of health. The GDP per capita, PPP in mean is 14663 current international $.

The SMC countries from this cluster are on the left side of the graph and the EU countries from this cluster are on the right side of the graph. Thus, the SMC countries in this cluster are different from EU countries in education level (have lower education level) and Infant mortality rate (have higher Infant mortality).

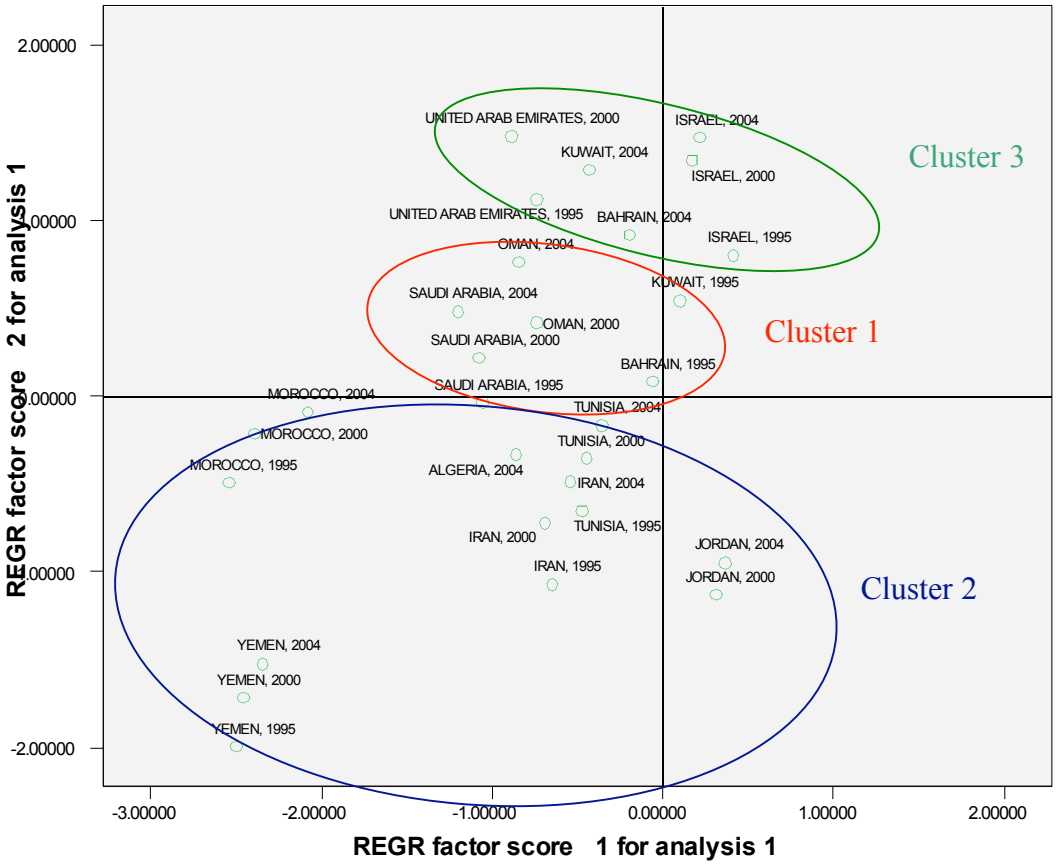


Figure 2 – SMC countries representation on factorial plan and wealth clusters

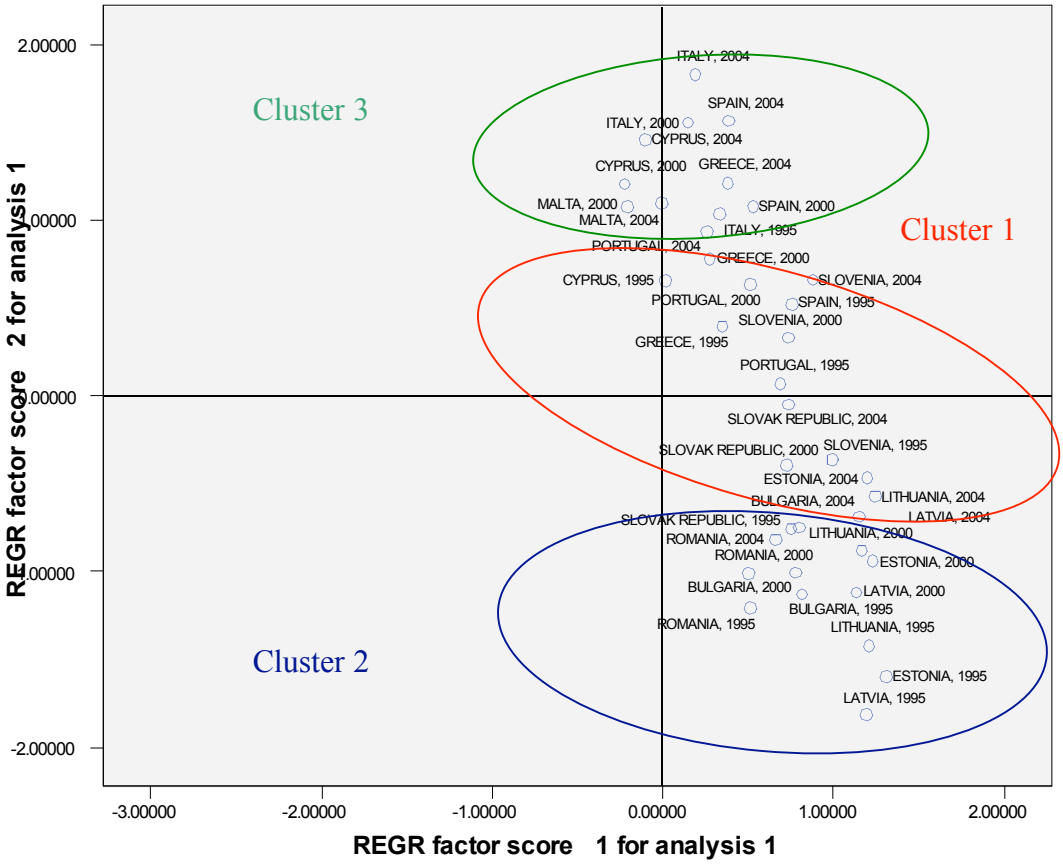


Figure 3 – EU countries representation on factorial plan and wealth clusters

Cluster 2 includes poor countries from all points of view:

- *SMC countries:* Algeria, 2004; Iran, 1995, 2000, 2004; Jordan, 2000, 2004; Morocco, 1995, 2000, 2004; Tunisia, 1995, 2000, 2004; Yemen, 1995, 2000, 2004;
- *EU countries:* Bulgaria, 1995, 2000, 2004; Estonia, 1995, 2000; Latvia, 1995, 2000; Lithuania, 1995, 2000; Romania, 1995, 2000, 2004; Slovak Republic, 1995

School life expectancy (primary to tertiary) in mean is 12.13 years and adult literacy rate in mean is 82%. So, the countries from this group have low levels of education. Life expectancy at birth in mean is 69.2 years and Infant mortality rate in mean is of 30.2 dead infants for 1000 live births. Therefore, this cluster contains countries with low level of health. The GDP per capita, PPP in mean is 5649 current international $.
As for the first cluster, the SMC countries differ from EU countries in education level (have lower education level) and Infant mortality rate (have higher Infant mortality).

Cluster 3 includes rich countries:

- *SMC countries:* Bahrain, 2004; Israel, 1995, 2000, 2004; Kuwait, 2004; United Arab Emirates, 1995, 2000
- *EU countries:* Cyprus, 2000, 2004; Italy, 1995, 2000, 2004; Greece, 2004; Portugal, 2004; Slovenia, 2004; Spain, 2000, 2004.

School life expectancy (primary to tertiary) in mean is 14.46 years and adult literacy rate in mean is 95%. So, the countries from this group have average levels of education. Life expectancy at birth in mean is 78 years and Infant mortality rate in mean is of 5.9 dead infants for 1000 live births. Therefore, this cluster contains countries with an average level of health. The GDP per capita, PPP in mean is 22171 current international $.
In this cluster there are not big differences between SMC and EU countries.

In time there are changes from a cluster to another. Kuwait and Bahrain passed from the cluster 1 to cluster 3, so from medium wealthy countries to rich countries. Many of new entrants in EU passed from cluster 2 of countries with low level of wealth indicators to cluster 1 of countries with medium level of wealth indicators. The classification of countries and the changes in time, confirm the interdependencies between the wealth components. The increase in GDP is correlated with the improvement in health and in education. SMC countries have lower education level and lower level of health then EU countries for the same level of GDP per capita.

2.3: What are the main determinants of wealth patterns?

In order to answer to that question it is used a discriminant function analysis. The results obtained are significant, with a probability of 95%.
Discriminant analysis determines some optimal combination of variables (called discriminant functions) so that the first function provides the most overall discrimination between groups; the second provides second most, and so on. Moreover, the functions will be independent or orthogonal, that is, their contribution to the discrimination between groups will not overlap.
The first function discriminates between the first cluster and the others, so between the medium wealth countries and the rest of the countries. The variables which contribute the most to this discrimination are: GDP per capita and life expectancy at birth. This function is significant with a probability of 99% (see Wilks' Lambda table).
The second function discriminates between the second and the third cluster, so between the rich and poor countries. The variables which contribute the most to this discrimination are: school life expectancy, adult literacy rate and infant mortality rate. This function is significant with a probability of 90% (see Wilks' Lambda table).

2			4	

Therefore, GDP per capita and life expectancy at birth determine the pattern of medium wealth countries. To be identified as a rich or as a poor country, the other variables as school life expectancy, adult literacy rate and infant mortality rate are important. So, the economic and health components of wealth are used in the first time in identifying the wealth patterns of a country.

Interdependencies between education, health and economic development

By using discriminant analysis three classification functions are determined:

Cluster 1: f1 = -0.0161·GDP + 41.5181·LExp + 7.2403·LR + 10.4329·MRI + 2.3753·SLE - 1832.5091
Cluster 2: f2 = -0.0190·GDP + 42.5590·LExp + 7.3291·LR + 10.5740·MRI + 3.5402·SLE – 1903.3871
Cluster 3: f3 = -0.0135·GDP + 41.1570·LExp + 7.3210·LR + 10.5920·MRI + 1.5637·SLE – 1849.5680

The country it is classified into the group with the highest value of the classification function. By using these classification functions, 100% of the cases used into the analysis are correctly classified.

Some simulations for the SMC countries are done, to check if there is any possibility to pass from a group of country to another (from a medium wealthy country to a rich country of from a poor to a medium wealthy country) improving only one component of wealth, or it is necessary to improve more or less all components of wealth. For four SMC countries (Kuwait, Jordan, United Arab Emirates, Morocco) there are calculated the values for the classification functions, varying one by one the indicators from the minimum to the maximum observed value in the database and maintaining constant all the other indicators at 2004 observed level. Improvements in GDP per capita involve the revision of country classification. The speed of change depends on the level of all the other wealth components. The higher are levels of health and education the faster is the adjustment to a better group of countries.

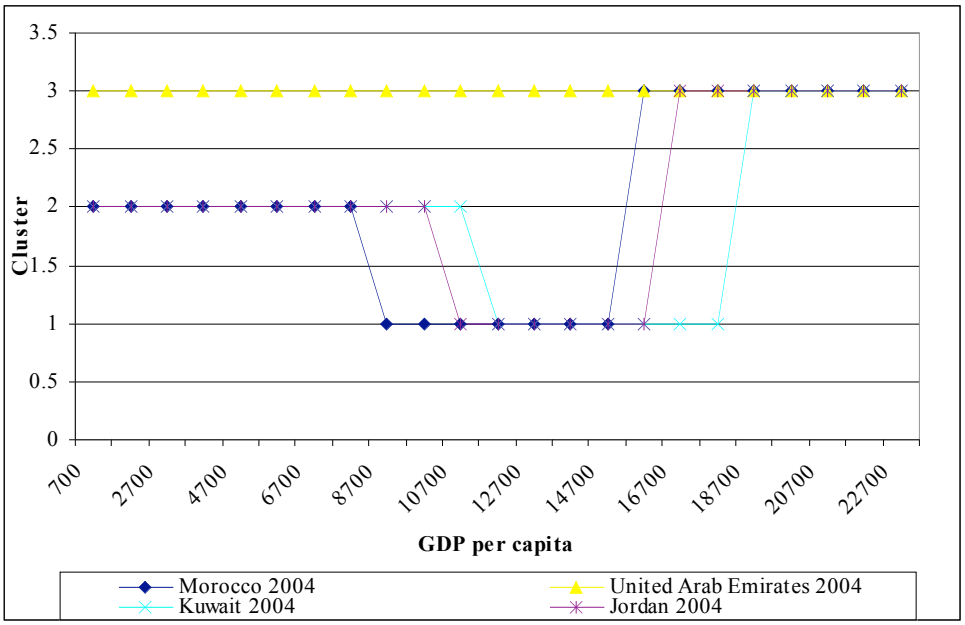


Figure 4 - Changes in classifications by GDP per capita

The main conclusion of this analyze is that all the wealth indicators are interdependent. Modifying or improving only one indicator it is not sufficient in general for a country to become wealthier.
However, a better health of population determines a better human capital, so more productivity and in conclusion a better economic result at country level. More educated people will determine

an improvement in human capital, so a greater level of GDP per capita. Furthermore, a richer country from economically point of view will invest more in education and in health of people but the response is not so quickly as for the other implications.
The next two sections give some measurable results of these two statements.

3. Econometric analysis of the relationship between education, health and economic development

The main question is: "Does the quality of human capital (health and education) enhance economic development?". There are compelling reasons to believe that education and health contributes positively to economic growth. But empirical studies show that this relationship is not always significant. Barro (1990) show that for a given level of wealth, the economic growth rate was positively related to the initial level of human capital of a country, whereas for a given level of human capital the growth rate was negatively related to the initial level of GDP per capita. Azariadis and Drazen (1990) assume that economic growth is not a linear process. Their results show that literacy is correlated with the variation of growth in the least advanced countries, but it does not seem to be related to the growth of the most developed countries. Furthermore, they show that the coefficient of human capital in the growth equation is about five times higher in the developing countries than in the developed countries.
Therefore, one of the main conclusions of the analyses of the human capital-growth relationship is the absence of homogeneity across countries. If economic, social and cultural characteristics of each country modify the relationship between human capital and growth, then the estimation of this relationship must be regional and to take into account the initial level of human capital. In order to include initial wealth of a country as factor in the econometric analysis, it is created a dummy variable which indicates if a country is rich or with medium wealth (dummy=1) or if it is poor (dummy=0), using the country classification made in the previous section.

3.1: The effect of Health on economic development

Regarding the relationship between health and GDP per capita there is a strong relationship between them. All the models are very good with R^2 greater than 93% for SMC countries and greater than 75% for EU countries. The parameter coefficients are significant with a probability of 99%.

The parameter estimates of the regression models which describe the relationship between health and GDP per capita taking into account the initial level of wealth of a country are provided in the following table:

Variables**	N	R^2	F	Model
SMC countries				
Dependent variable: GDP Independent variables: LEB Dummy variable	29	0.968	252.99	GDP = -23011.7 + 401.749·LEB – (-4.457) (5.317) – 69781.1·Dummy + 1068.254·LEB·Dummy (-5.927) (6.678)
Dependent variable: GDP Independent variables: IMR Dummy variable	29	0.93	120.85	GDP = 8243.643 - 87.444·IMR + (-7.051) (-3.707) +15907.915·Dummy – 450.125·IMR·Dummy (9.662) (-5.181)
EU countries				

Dependent variable: GDP Independent variables: LEB Dummy variable	38	0.873	120.28	GDP = -74752.2 + 1162.2·LEB + (-6.087) (6.659) + 48.93·LEB·Dummy (2.685)
Dependent variable: GDP Independent variables: IMR Dummy variable	38	0.756	54.353	GDP = 17175.362 – 719.152·IMR + (5.754) (-3.535) + 5142.729·Dummy (2.563)

*Under each regression coefficient it is written the corresponding t-value

**Dummy=1 if rich or with medium wealthy country and Dummy=0 if poor country; GDP = GDP per capita, PPP (current international $); LEB = Life expectancy at birth, total (years); Mortality rate, infant (per 1,000 live births) (IMR)

The main conclusion provided by these models is that the effect of improvements in health on the growth of GDP per capita is more important for rich or medium wealthy SMC countries than for poor SMC countries.

An increase of 1 year in life expectancy at birth implies an increase in GDP per capita 3.5 times higher for rich or medium wealth SMC countries than for poor SMC countries (1470 (PPP) current international $ for rich and medium wealthy countries versus 401 (PPP) current international $ for poor countries). The intercept (GDP per capita for life expectancy at birth of 0 years) depends too on the initial wealth of a country. A minimum life expectancy at birth of 63.12 years in order to obtain a positive GDP per capita, for medium and rich SMC countries versus a minimum life expectancy at birth of 57.27 years in order to obtain a positive GDP per capita, for poor SMC countries.

The behavior of EU countries is different. The intercept does not depend on the initial wealth of the country and the effect of an increase of 1 year in life expectancy at birth is slightly higher (of 1.04 times) for rich or medium wealthy EU countries than for poor EU countries (Table 4).

The difference between rich and poor countries in the speed of GDP per capita growth with the improvements in Infant mortality rates is higher then the response at improvements in life expectancy. A decrease of 1 dead infant per 1000 live births implies an increase in GDP per capita 6 times higher for rich or medium wealthy SMC countries than for poor SMC countries (537.569 (PPP) current international $ for rich and medium wealthy countries versus 87.444 (PPP) current international $ for poor countries). For an infant mortality rate of 0 dead infant per 1000 live births, GDP per capita is 24151.56 (PPP) current international $ for rich and medium wealthy SMC countries versus 8243.643 (PPP) current international $ for poor SMC countries.

Concerning EU countries, only the initial GDP per capita for an Infant mortality rate of no dead infant per 1000 live births depends on the initial wealth of country (22318.09 (PPP) current international $ for medium wealthy and rich countries, versus 17175.362 (PPP) current international $ for poor countries). A decrease of 1 dead infant per 1000 live births implies an increase in GDP per capita of 719.15 (PPP) current international $.

3.2: The effect of Education on economic development

Concerning the relationship between education and GDP per capita there is a strong relationship between them for SMC countries but not for EU countries. The models are good with R^2 greater than 86%. The parameter coefficients are significant with a probability of 99%.

The parameter estimates of the regression models which describe the relationship between education and GDP per capita taking into account the initial level of wealth of a country are provided in the following table:

Variables* (SMC countries)	N	R^2	F	Model **
Dependent variable: GDP Independent variables: LR Dummy variable	29	0.86	76.45	GDP = -5672.798 + 155.483·ALR + (-1.982) (3.635) +10309.03·Dummy (7.721)
Dependent variable: GDP Independent variables: SLE Dummy variable	29	0.90	119.35	GDP = -8698.406 + 1193.866·SLE + (-3.452) (5.357) +11503.689·Dummy (11.942)

*Dummy=1 if rich or with medium wealthy country and Dummy=0 if poor country; GDP = GDP per capita, PPP (current international $); LR = Adult literacy rate (%). Total; SLE = School life expectancy (years). Primary to tertiary. Total
**Under each regression coefficient it is written the corresponding t-value

An increase of 1% in adult literacy rate implies an increase in GDP per capita of 155.48 (PPP) current international $. The intercept depend on the initial wealth of the country.
An increase of 1 year in school life expectancy implies an increase in GDP per capita of 1193.87 (PPP) current international $. The intercept depend on the initial wealth of the country.

3.3: Other relationships between human capital and economic development

In the previous sections effects of education and health on economic development were treated as separate effects. This section describes the relationships between education and health and the impact of economic development on education and health.
The economic development and more important, the knowledge are factors which improve the health. For SMC countries, the relationships between these factors are validated and all the regression coefficients are significant with a probability of 99%.
The variation of life expectancy at birth explained by the variation of adult literacy rate or school life expectancy and initial wealth is lower then the variation explained of infant mortality rate by the same factors. An increase of 1% in adult literacy rate lowers the infant mortality rate with 1 year and an increase of 1 year in school life expectancy lowers the infant mortality rate with 6 years.

Variables*(SMC countries)	N	R^2	F	Model**
Dependent variable: LEB Independent variables: LR Dummy variable	28	0.696	28.63	LEB = 54.153 + 0.217·ALR + (18.033) (4.83) +2.936·Dummy (2.094)
Dependent variable: LEB Independent variables: SLE Dummy variable	29	0.767	42.85	LEB = 51.796 + 1.494·SLE + (18.772) (6.123) +4.808·Dummy (4.558)
Dependent variable: IMR Independent variables: LR Dummy variable	28	0.766	40.92	IMR = 107.485 – 0.978·LR - (9.26) (-5.64) -14.468·Dummy (-2.67)

Dependent variable: IMR Independent variables: SLE Dummy variable	29	0.784	47.169	IMR = 112.051 – 6.188·SLE - (9.63) (-6.012) - 23.32·Dummy (-5.242)
Dependent variable: LEB Independent variables: GDP Dummy variable	29	0.867	84.51	LEB = 60.668 + 0.002 ·GDP - (58.537) (8.097) – 0.001·GDP·Dummy (-5.487)
Dependent variable: IMR Independent variables: GDP Dummy variable	29	0.781	46.35	IMR = 72.85 – 0.007·GDP + (12.525) (-5.737) + 0.004·GDP·Dummy (3.764)
Dependent variable: ALR Independent variables: GDP Dummy variable	29	0.630	21.27	ALR = 46.247 + 0.004·GDP - (9.032) (4.023) – 450.125·GDP·Dummy (-2.67)
Dependent variable: SLE Independent variables: GDP Dummy variable	29	0.668	26.16	SLE = 7.22 + 0.001·GDP - (10.759) (6.001) – 0.001·GDP·Dummy (-4.888)

*Dummy=1 if rich or with medium wealthy country and Dummy=0 if poor country; GDP = GDP per capita, PPP (current international $); LR = Adult literacy rate (%). Total; SLE = School life expectancy (years). Primary to tertiary. Total

**Under each regression coefficient it is written the corresponding t-value

As for the impact of economic development on health, could be observed an inverse relation then for education. The variation of life expectancy at birth explained by the variation of GDP per capita and initial wealth is higher then the variation of infant mortality rate explained by the same factors. So, the education is more important in decreasing the infant mortality rate and economic development is more important in increasing life expectancy.

Since education is often subsidized by the state and in some countries education is compulsory for certain minimum length of times, the economic development of a country has a direct effect on the educational level of a country.

For SMC countries, the relationships between these factors are validated and all the regression coefficients are significant with a probability of 99%.

For SMC countries, 66.8% of the variation of school life expectancy and 63% of the variation of adult literacy rate is explained by the variation of GDP per capita and initial wealth. The impact of GDP per capita on adult literacy rate is 1.5 times higher for poor countries then for rich and medium wealthy countries. The impact of GDP per capita on school life expectancy is 2 times higher for poor countries then for rich and medium wealthy countries.

This paper shows that for SMC countries the economic development depends on the improvements in education and health, as well as on the initial wealth of a country. There are some differences between SMC countries and EU countries. No direct relationship between the level of education and economic development could be seen and the relationship between health and economic development is different from SMC countries.

Conclusion

The regression analysis of different clusters concerning the potential relationships between education, health and income measurements helps to come up with the following conclusions.

First, the use of aggregate data such as the "world cluster" to illustrate relationships, without taking care of the different economic, social, regional, and development specificities, leads to contradictory findings. The example of the regression analysis of the children out of primary school illustrates the ineffectiveness of aggregate data since the results of world countries completely contradicts the results of five sub-clusters. Data from sub-clusters, in contrast, improves the efficiency and helps detect the level of significance existing between the GDP per capita and both health and education.

Second, the GDP per capita impact on improving education is not very significant. In fact, the overall conclusion that could be driven from the regression analysis of the education and income indicators is that the relationship significance of GDP per capita is not considerable. In other words, the improvement of education within different clusters does not necessarily require an economic involvement or an increase in the income of the population. The single argument in favor of the importance of the GDP per capita for ameliorating the level of education concerns the literacy rates in middle income countries (mainly SMC, major oil net exporters, and high and medium human development). In general, other arguments than income should be studied in order to enhance education.

Third, in contrast to education, the interpretations of regression tables for health and income indicators proved that GDP per capita is the key for most of clusters. The enhancement of health in different clusters can only occur if it is accompanied by an amelioration of the income level of the population. Alternatively, low human development countries need to focus on other measures than GDP per capita to determine a significant relationship with health issues. The main point of the low human development countries' health indicators is that the relationship significance varies from year to year. This "instability" can be explained by the rise of new factors that alter health, more than the GDP per capita would do, within a particular period.

References:

- Barro, Robert J. (1991), "Economic growth in a cross-section of countries", Quarterly Journal of Economics, 106: 407-443.
- Simon Appleton, S., Teal F. (1998), "Human Capital and Economic Development", African Development Report
- The World Bank (2008), "The road not traveled. Education reform in Middle East and Africa", MENA Development Report

Appendix to Chapter 3:

Table 1 – Mean values of selected indicators of heath, education and economic development, MENA and EU countries

Region	MENA			EU		
Year	1995	2000	2004	1995	2000	2004
GDP per capita, PPP (current international $)	8124.6	9153.06	10881.22	15615.03	20615.25	24509.07
Life expectancy at birth, total (years)	68.69	70.76	71.84	74.52	75.94	76.80
Adult literacy rate (%). Total	67.53	73.95	78.98	-	-	97.18
Mortality rate, infant (per 1,000 live births)	39.23	30.72	27.65	8.68	6.56	5.73
School life expectancy (years). Primary to tertiary. Total	10.94	10.43	11.63	14.98	15.10	15.47

Table 2 – Mean values of selected indicators of heath, education and economic development, 2004

	MENA	EU	ROW	Oil exporters and OPEC countries	Developed countries	Developing countries	Underdeveloped countries	All countries
GDP per capita, PPP (current international $)	10881	24509	7277	13476	22319	5038	1369	10391
Life expectancy at birth, total (years)	72	77	64	69	77	65	47	66
Adult literacy rate (%). Total	79	97	78	83	94	83	52	80
Mortality rate, infant (per 1,000 live births)	28	6	50	36	8	42	99	44
School life expectancy (years).	12	15	11	12	15	12	7	12

Primary to tertiary. Total								

Table 3 – Regression models for MENA countries*

Variables	n	R^2	F	Model
Dependent variable: School life expectancy (years). Primary to tertiary. Total (SLE) Independent variable: GDP per capita, PPP (current international $) (GDP)	35	0.42	23.65	SLE = -6.93 + 2.05·ln(GDP) (-1.86) (4.86)
Dependent variable: Adult literacy rate (%). Total (LR) Independent variable: Life expectancy at birth, total (years) (LEB)	45	0.63	72.59	LR = -100.95 + 2.44·LEB (-4.97) (8.61)
Dependent variable: School life expectancy (years). Primary to tertiary. Total (SLE) Independent variable: Life expectancy at birth, total (years) (LEB)	40	0.77	129.00	SLE = -91.85 + 24.31·ln(LEB) (-10.12) (11.36)
Dependent variable: Life expectancy at birth, total (years) (LEB) Independent variable: GDP per capita, PPP (current international $) (GDP)	45	0.69	97.98	LEB = 18.68 + 5.90·ln(GDP) (3.55) (9.90)
Dependent variable: Mortality rate, infant (per 1,000 live births) (IMR) Independent variable: GDP per capita, PPP (current international $) (GDP)	45	0.69	94.63	MR = 251.88 - 25.00·ln(GDP) (12.00) (-9.73)
Dependent variable: Mortality rate, infant (per 1,000 live births) (IMR) Independent variable: Adult literacy rate (%). Total (LR)	45	0.72	115.04	MR = 373.812 - 80.93·ln(LR) (11.563) (-10.726)

*Under each regression coefficient it is written the corresponding t-value

Figure 5 – The relationship between economic development variables and health and education variables

Chapter IV: Interdependency, Health, education and poverty based on Country Data

This part of the research deals with analyzes conducted on household data obtained from the Demographic and Health Surveys Data (DHS) pertaining to Morocco, Egypt, and Turkey. Further analyzes concern a sample of data from the 1999 consumption survey of Morocco besides samples of the Community Monitoring Based Surveys (CMBS) conducted in the Moroccan regions of Bouaboud and Essaouira. Analyzes use the primary data collected through the surveys of large samples at the level of each country mentioned above. A large number of variables were included in the surveys. The variables are most of the time categorical and related to the households. They concern health, education and poverty. The techniques applied include Logit, Probit and Chi-Squared methods. The subsequent sections introduce the survey data, the methods of analysis and the results attained under each type of data.

The DHS data for Morocco include 64000 household while Egypt has 17000 households and Turkey 13000 households. The variables are related to different dimensions related to health, education, wealth and standard of living.
The CMBS data for Morocco has households for the zones of Bouaboud and Essaouira. The 1999 sample of the Moroccan consumption survey include households where data are related to consumption expenditures.

The Methods for the analysis of categorical data have been extensively developed under the assumption of multinomial or product multinomial sample. The Pearson Chi-squared test statistics for goodness of fit and independence in two way contingency tables are well known. The log-likelihood ratio and Wald statistic that is asymptotically equivalent to the Pearson statistic is also used. The theory associated with Pearson and log-likelihood ratio statistics is given in Bishop, Fienberg and Holland (1975). Many illustrations of the use of the Chi-squared statistics are given by Holt, Scott and Ewings (19980) – Chi-squared Test with Survey Data-; Dietrich Eherler, Thomas Lehmann (2007) using CHAID (Ch-Squared Automatic Interaction Detector); K.Habbani, W.Groot and jeovac (2007); Cochran-Mantel-Haenszel Chi-Squared Test for Count Data.; Andrija Tomovic and Edward J.Oakeley (2007); R.P. Chakrabarty (1989). The studies conducted above by different researchers in different areas dealt with categorical data analysis using Chi-squared, Logit, and Probit regression methods of analysis. Similarly, the chi-squared test of independence and probit regression model will be used in the case of the interdependency among the dimensions related to health, education and poverty.

I. Conceptual framework

The conceptual framework will encompass the Chi-squared test, and the probit regression model.

i) Chi-Squared Test of Independence

The hypothesis to be test is the following:

Ho : Health, education and poverty are independents ??

Ha : Health, education and poverty are dependents ??

The usual Chi-squared test of independence:

$$\sum_{i=1}^{r}\sum_{j=1}^{k}[n_i(P_{ij}-f_j)^2/(f_j)]$$

Where $\mathbf{fj} = \sum \mathbf{f_{ij}}/\sum \mathbf{n_i}$, **this has** $\chi^2_{(r-1)(k-1)}$ distribution under Ho with independent multinomial sampling in each population.

P_{ij} represents the probably from the theoretical probability density function (pdf)

n_i represents the absolute frequency

(r-1)(k-1) represent the chi-squared degrees of freedom.

In terms of the data processing, the SPSS package will be used with the specification of the appropriate Chi-squared model displayed above.

ii) Probit Model

The Probit model is the techniques for analyzing the relationship between fixed-level independent variables and a dependent variable constrained to vary between 0 and 1

The general formulation of the Linear Probability Model (LPM): Transform (Pi) = a+bXi

P_I = probit: the Z score associated with the proportion quantifying the likely contribution of the variables representing health, education and wealth in explaining the dependent variable (health, education, and poverty).

a = constant

b = Probit regression coefficient

X_i = Level of the independent variable

Probit transformation: Convert the proportion responding to a level of the independent variable to the corresponding Z score on a standard normal curve.

In the probit model, we assume that the $\varepsilon_i \sim N(0,\sigma^2)$. That is, we assume the error in the utility index model is normally distributed. In this case,

$$p(y_i = 1) = F\left(\frac{\beta_1 + \beta_2 x_i}{\sigma}\right)$$

Where *F* is the standard normal cumulative density function. That is

$$p(y_i = 1) = F\left(\frac{\beta_1 + \beta_2 x_i}{\sigma}\right) = \int_{-\infty}^{\frac{\beta_1+\beta_2 x_i}{\sigma}} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt$$

In practice, the c.d.f. of the logit , and the probit look quite similar to one another. Once again, calculating the derivative is moderately complicated . In this case,

$$\frac{\partial prob(y_i = 1)}{\partial x_i} = \frac{\partial F(\frac{\beta_1 + \beta_2 x_i}{\sigma})}{\partial x_i} = f\left(\frac{\beta_1 + \beta_2 x_i}{\sigma}\right)\beta_2$$

Where *f* is the density function of the normal distribution. As in the logit case, the derivative is nonlinear and is often evaluated at the mean of the explanatory variables. In the case of dummy explanatory variables, it is common to estimate the derivative as the probability $y_i = 1$ when the

dummy variable is 1 (other variables set to their mean) minus the probability $y_i = 1$ when the dummy variable is 0 (other variables set to their mean). That is, you simply calculate how the predicted probability changes when the dummy variable of interest switches from 0 to 1.
In this microeconomic analysis the above probit theoretical model are used in order to reveal and identify the likely interdependency among health, education and wealth. The results of regression analysis using probit model are given in the subsequent sections

II. Results of the Dependency Analysis

Two by two contingency tables were estimated respectively for education versus wealth, and health versus education. Wealth, education, and health are represented by different dimensions related to each of the vectors. Education is represented by the different level of education, no education, incomplete primary, complete primary, secondary, and higher. Wealth is represented by all the capital goods such as means of transportation, equipments, factories, housing, and businesses. Health is represented by individual weight and height, illnesses besides the state of health.

A. Case of Morocco

1. Wealth versus education

Contingency tables were computed for wealth with two criteria or levels and education with 7 criteria. A pre-selection of the predictor variables were made. The results of Chi-squared test; contingency tables and the observed χ^2 are introduced in appendix A.
The Chi-squared test shows that education and wealth taken as two groups are interdependent for all the 9 contingency tables computed. The number of observations in all contingency tables is around 64000 observations. For example, the contingency table 1, representing means of transportation versus educational attainment, is computed with 63964 observations and results in a Chi-squared value of 35.507 with 6 degrees of freedom. The theoretical Chi-squared value is equal to 14.4494 with 6 degrees of freedom and 5% level of significance. The comparison between the observed and the theoretical Chi-squared shows that means of transportation and education attainment are dependent. All the other contingency tables have an observed Chi-Squared value greater than that of table 1, the degrees of freedom is 6 with 5% level of significance means that wealth and education are dependent. This dependency between these two groups of variables indicates that wealth or poverty and education are interdependent.

Table1: **Mean of transportation of goods * Educational attainment**

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.507[a]	6	.000
Likelihood Ratio	41.015	6	.000

Linear-by-Linear Association	31.218	1	.000
N of Valid Cases	63964		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 1.82.

Table 2: Machinery and industrial equip. * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.583 E2[a]	6	.000
Likelihood Ratio	232.616	6	.000
Linear-by-Linear Association	237.527	1	.000
N of Valid Cases	64023		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 1.39.

Table 3: Manufactory * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.863[a]	6	.000
Likelihood Ratio	20.498	6	.002
Linear-by-Linear Association	22.262	1	.000
N of Valid Cases	64019		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .11.

Table 4: Commercial construction * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	2.097 E2[a]	6	.000
Likelihood Ratio	195.68 2	6	.000
Linear-by-Linear Association	198.53 4	1	.000
N of Valid Cases	64007		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 2.91.

Table 5: Housing construction * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.567 E2[a]	4	.000
Likelihood Ratio	141.72 2	4	.000
Linear-by-Linear Association	121.72 6	1	.000
N of Valid Cases	64010		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.81.

Table 6: Non farming land * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.159 [a]	6	.000
Likelihood Ratio	44.041	6	.000
Linear-by-Linear Association	11.772	1	.001
N of Valid Cases	64005		

a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 3.46.

Table 7: Farming land * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.687 E3[a]	6	.000
Likelihood Ratio	2.807 E3	6	.000
Linear-by-Linear Association	2.490 E3	1	.000
N of Valid Cases	64016		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.98.

Table 8: Poultry * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.279 E3[a]	6	.000
Likelihood Ratio	4.725 E3	6	.000
Linear-by-Linear Association	4.034 E3	1	.000
N of Valid Cases	64014		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.62.

Table 9: Livestock * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.052 E3[a]	6	.000
Likelihood Ratio	4.462 E3	6	.000
Linear-by-Linear Association	3.801 E3	1	.000

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.052 E3[a]	6	.000
Likelihood Ratio	4.462 E3	6	.000
Linear-by-Linear Association	3.801 E3	1	.000
N of Valid Cases	64023		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.09.

2. Health versus education

Here the number of observations or households is about 9200. Health and education are represented by series of related variables that include:

i. Medication for the disease,
ii. Highest educational level,
iii. education for the disease,
iv. Educational attainment,
v. Other illness
vi. Respondent's weight (kilos-1d),
vii. Respondent's height (cms-1d) versus

For each group different predictor variables were used and contingency tables were elaborated. The contingency tables and their relative observed Chi-squared test are represented in the following tables.

The results show that the observed Chi-square value is 14.78, with 8 degrees of freedom for the categories medical for disease versus educational level, compared to theoretical chi-square value of 17.53 with 8 degrees of freedom we conclude that these two categories of variables are interdependent with 5% level of significance and two sided test. At the level of other categories of variables the observed Chi-square values are greater than those of the theoretical chi-square values with 5% level of significance (see tables 10 to 16).

Table10: Medication for the disease * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.780[a]	8	.064

Likelihood Ratio	14.236	8	.076
Linear-by-Linear Association	1.152	1	.283
N of Valid Cases	9268		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .00.

Table 11: Medication for the disease * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.068[a]	12	.020
Likelihood Ratio	25.169	12	.014
Linear-by-Linear Association	2.286	1	.131
N of Valid Cases	9268		

a. 8 cells (38.1%) have expected count less than 5. The minimum expected count is .00.

Table 12: Other illness * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.484E2[a]	4	.000
Likelihood Ratio	155.018	4	.000
Linear-by-Linear Association	96.904	1	.000
N of Valid Cases	9275		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 2.77.

Table13:Respondent's weight (kilos1d) * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.686E2[a]	1184	1.000
Likelihood Ratio	911.693	1184	1.000
Linear-by-Linear Association	3.465	1	.063
N of Valid Cases	16945		

a. 1182 cells (79.6%) have expected count less than 5. The minimum expected count is .00.

Table14: Respondent's weight (kilos-1d) * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.585E3[a]	1776	1.000
Likelihood Ratio	1.268E3	1776	1.000
Linear-by-Linear Association	5.959	1	.015
N of Valid Cases	16945		

a. 1731 cells (83.3%) have expected count less than 5. The minimum expected count is .00.

Table15: Respondent's height (cms1d) * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.827E3[a]	1480	.000
Likelihood Ratio	1.702E3	1480	.000
Linear-by-Linear Association	390.307	1	.000

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.827 E3[a]	1480	.000
Likelihood Ratio	1.702 E3	1480	.000
Linear-by-Linear Association	390.3 07	1	.000
N of Valid Cases	16921		

a. 1420 cells (76.5%) have expected count less than 5. The minimum expected count is .00.

Table 16: Respondent's height (cms-1d) * Educational attainment

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.592 E3[a]	2220	.000
Likelihood Ratio	2.188 E3	2220	.682
Linear-by-Linear Association	389.0 56	1	.000
N of Valid Cases	16921		

a. 2140 cells (82.4%) have expected count less than 5. The minimum expected count is .00.

B. Case of Turkey

1. Wealth versus education: Presentation and interpretation of the results

The data used in turkey are similar to Morocco; however the number of observations is larger than that of Morocco. In turkey more than 17000 households and the variables representing wealth are somehow different from those of Morocco; In turkey wealth is represented by the type of job, social security, the work place, the type of activities, the position in the job, the level of income. Each variable representing wealth is depends on other variables that are taken into consideration in dependency analysis. Education is similar levels of variables are similar to those of Morocco; No education, preschool, primary, higher, and so forth. The tables 1 to 18 show the characteristics of factors of each group of variables.

The SPSS package is used for data processing, 18 contingency tables were developed with the corresponding chi-squared tests. The results of the testing indicate that wealth and education are

interdependent this is justified by the observed Chi-square values with their magnitudes that are greater than 70 with degree of freedom that varies between 4 and 9 for income ranges, tables 14 to 18 appendix C. The theoretical Chi- square values varies within the range 11.4 to 19.022 with 5% level of significant and the range of degrees of freedom between 4 and 9. Comparing the observed and the theoretical Chi-square values indicate that the wealth and education are dependent on each other. The other categories of variables includes type of jobs , social security, the job position present large values of observed Chi-square above 171 with degrees of freedom above 18. The corresponding theoretical Chi-squared values are above 30.19 with 5% level of significance, and double sided Chi-squared test. The comparison between the observed and theoretical chi-square values indicate that the two categorical variables that represent wealth and education are dependent.

Table1: **Last attempt to find a job * Educational level during previous school year**

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.084 E2[a]	20	.000
Likelihood Ratio	371.262	20	.000
Linear-by-Linear Association	101.088	1	.000
N of Valid Cases	17578		

a. 14 cells (46.7%) have expected count less than 5. The minimum expected count is .00.

Table 2: Looking for a job * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.375 E2[a]	8	.000
Likelihood Ratio	468.875	8	.000
Linear-by-Linear Association	401.795	1	.000

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.375E2[a]	8	.000
Likelihood Ratio	468.875	8	.000
Linear-by-Linear Association	401.795	1	.000
N of Valid Cases	19733		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .01.

Table 3: Main reason not working * Level of Education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.381E3[a]	114	.000
Likelihood Ratio	9.799E3	114	.000
Linear-by-Linear Association	57.856	1	.000
N of Valid Cases	15649		

a. 67 cells (47.9%) have expected count less than 5. The minimum expected count is .00.

Table 4: Social security * Educational level as in report

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.186E3[a]	24	.000
Likelihood Ratio	5.293E3	24	.000
Linear-by-Linear Association	137.875	1	.000
N of Valid Cases	16579		

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.186 E3[a]	24	.000
Likelihood Ratio	5.293 E3	24	.000
Linear-by-Linear Association	137.87 5	1	.000

a. 8 cells (22.9%) have expected count less than 5. The minimum expected count is .04.

Table 5: Social security * Educational level during previous school year

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.743 E2[a]	18	.000
Likelihood Ratio	359.65 9	18	.000
Linear-by-Linear Association	.375	1	.540
N of Valid Cases	16510		

a. 10 cells (35.7%) have expected count less than 5. The minimum expected count is .04.

Table 6: Place of work * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.539 E3[a]	32	.000
Likelihood Ratio	4.992 E3	32	.000
Linear-by-Linear Association	327.99 6	1	.000
N of Valid Cases	16630		

a. 14 cells (31.1%) have expected count less than 5. The minimum expected count is .01.

Table 7: Type of workplace * Level of Education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.650 E3[a]	24	.000
Likelihood Ratio	2.309 E3	24	.000
Linear-by-Linear Association	214.57 2	1	.000
N of Valid Cases	14675		

a. 20 cells (57.1%) have expected count less than 5. The minimum expected count is .00.

Table 8: Position at work * Level of Education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.964 E3[a]	54	.000
Likelihood Ratio	4.535 E3	54	.000
Linear-by-Linear Association	131.37 9	1	.000
N of Valid Cases	14673		

a. 23 cells (32.9%) have expected count less than 5. The minimum expected count is .00.

Table 9: Economic activity * Level of Education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.066 E3[a]	354	.000
Likelihood Ratio	6.200 E3	354	.000

Linear-by-Linear Association	1.390 E3	1	.000
N of Valid Cases	14679		

a. 237 cells (56.4%) have expected count less than 5. The minimum expected count is .00.

Table 10: Why did not work * Educational attainment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.475 E2[a]	54	.000
Likelihood Ratio	477.87 1	54	.000
Linear-by-Linear Association	8.939	1	.003
N of Valid Cases	3077		

a. 28 cells (40.0%) have expected count less than 5. The minimum expected count is .05.

Table 11: House has formal title deeds * Educational level as in report

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	74.267 [a]	8	.000
Likelihood Ratio	77.077	8	.000
Linear-by-Linear Association	23.589	1	.000
N of Valid Cases	5767		

a. 2 cells (13.3%) have expected count less than 5. The minimum expected count is 1.81.

Table 12: Income < 150 million * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	1.716 E2[a]	4	.000
Likelihood Ratio	176.36 3	4	.000
Linear-by-Linear Association	102.97 4	1	.000
N of Valid Cases	14179		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.30.

Table 13: Income < 300 million * Educational level as in report

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.634 E2[a]	4	.000
Likelihood Ratio	770.36 8	4	.000
Linear-by-Linear Association	652.50 0	1	.000
N of Valid Cases	26965		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.57.

Table 14: Income < 300 million * Highest educational level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.275 E2[a]	4	.000
Likelihood Ratio	634.30 2	4	.000
Linear-by-Linear Association	513.68 3	1	.000
N of Valid Cases	26965		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.57.

Table 15: Income > 600 million * Level last year

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	70.172[a]	6	.000
Likelihood Ratio	71.930	6	.000
Linear-by-Linear Association	57.667	1	.000
N of Valid Cases	4586		

a. 2 cells (14.3%) have expected count less than 5. The minimum expected count is .40.

Table 16: Income > 450 million * Highest year of education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.200 E3[a]	9	.000
Likelihood Ratio	1.212 E3	9	.000
Linear-by-Linear Association	60.417	1	.000
N of Valid Cases	35150		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.90.

C. Dependency analysis: Case of Egypt

1. Wealth versus education: Presentation and interpretation of the results

In Egypt about 13000 households were surveyed with large number of categorical variables related to health, education and poverty. Different groups of variables were selected in the framework of the dependency analysis ; wealth versus education are represented by radio versus literacy, car/truck versus literacy, motorcycle/scooter versus literacy, bicycle versus literacy, refrigerator versus literacy , television versus literacy, electricity versus literacy . Literacy is assessed by the education levels whereas indicators of wealth have three levels household have or does not have the item or the good, and not dejure resident. Contingency tables 1 to 7 and their corresponding Chi-square values were developed and presented in appendix D. The Chi-squared tests and likelihood ratios indicate that wealth and education are dependent; this is shown by the computed chi-square values that vary between 106, 8 and 365, 6

with 6 degrees of freedom. The theoretical Chi-square value is 14. 44 with 6 degrees of freedom and 5% level of significance and double sided test. Contrasting the observed chi-square values with theoretical result in the dependency between health and education.

Table 1 : Has radio * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.451E2[a]	6	.000
Likelihood Ratio	645.889	6	.000
Linear-by-Linear Association	231.315	1	.000
N of Valid Cases	13816		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .59.

Table 2: Has car/truck * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.147E2[a]	6	.000
Likelihood Ratio	228.166	6	.000
Linear-by-Linear Association	121.563	1	.000
N of Valid Cases	13781		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .55.

Table 3: Has motorcycle/scooter * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.368E2[a]	6	.000
Likelihood Ratio	133.065	6	.000
Linear-by-Linear Association	100.654	1	.000
N of Valid Cases	13801		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .19.

Table 4: Has bicycle * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.068E2[a]	6	.000
Likelihood Ratio	113.774	6	.000
Linear-by-Linear Association	99.135	1	.000
N of Valid Cases	13807		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .59.

Table 5: Has refrigerator * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	1.670 E3[a]	6	.000
Likelihood Ratio	1.681 E3	6	.000
Linear-by-Linear Association	365.8 39	1	.000
N of Valid Cases	1381 5		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .59.

Table 6: Has television * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.656 E2[a]	6	.000
Likelihood Ratio	366.9 26	6	.000
Linear-by-Linear Association	155.5 81	1	.000
N of Valid Cases	1381 7		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .59.

Table 7: Has electricity * Literacy

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.169 E2[a]	6	.000
Likelihood Ratio	233.1 86	6	.000

Linear-by-Linear Association	108.309	1	.000
N of Valid Cases	13821		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is .10.

2. Health versus education: Presentation and interpretation of the Results

In terms of health versus education dependency analysis different group of variables were selected; different educational levels and the different variables representing health. The results of dependency analysis based on Ch-squared tests are shown on tables 8 to 11 and demonstrate that health and education are also dependent. The observed chi-squared values compared to those of the critical Chi-square values with 5% level of significance confirm the interdependency between health and education.

The dependency analysis based on categorical data with large number of observations related to households (64000 in Morocco, 17000 in Turkey, and 13000 in Egypt) were surveyed. The observations concern the variables representing health, education, and wealth. The model based on chi-squared test indicates that health, education, and wealth are interdependent at the level of all the three countries. The observed Chi-square values are very large with respect to the theoretical Chi-square values with 5% level of significance and more than 8 degrees of freedom in the two categories of dependency analysis. The results demonstrates the link between poverty, education and wealth which is a proxy variable for poverty. The results of this dependency analysis at the level of these three countries indicate also that for any economic development three sectors, health, education and wealth should be taken into account because of their interdependencies. Failing to consider health, education and wealth in any economic and political decision making will lead to a non desirable and unsatisfactory results.

Furthermore, the dependency analysis based on the chi-squared test of hypothesis about health, education and poverty (refer to the appendix) at the level of Morocco, Egypt, and Turkey indicates that health, education and poverty are inter-related in the sense that the investment in education for example affects positively health and reduces poverty because the education contributes to the economic growth which in turn affects positively the standard of living leading to the reduction of poverty. In other side, investment in health at the level of the entire society will ensure the high productivity in education then contributing to economic growth and reduction of poverty.

The findings of interdependency research at the level of Morocco, Egypt and Turkey indicate that the degree of interdependency measured by the Chi-squared hypothesis testing, at the level of these countries is the same, that is, this result shows somewhat a certain similarity in terms of the economic, and social policies adopted toward health, education and poverty. Besides, the domestic and regional policies have implications and effects on health, education and poverty , means that a certain regional policy integration for the development must be considered in order to enhance education , improve health, and combat poverty in the southern Mediterranean countries. The economic and political integration proposition come from the fact that the southern Mediterranean countries are complementary in terms of resource endowments , the production of goods and services . This economic and political integration will generate a certain

synergies among different economies that will lead to economic development, improvement of health and reduction of poverty in the Mediterranean countries.

Table 8: Respondent's height (cms-1d) * Husbands education-single yrs

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.219E4[a]	8165	.000
Likelihood Ratio	7.744E3	8165	1.000
Linear-by-Linear Association	175.872	1	.000
N of Valid Cases	13660		

a. 7828 cells (91.6%) have expected count less than 5. The minimum expected count is .00.

Table 9: Respondent's height (cms-1d) * Respondent's occupation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.923E4[a]	12425	.000
Likelihood Ratio	4.854E3	12425	1.000
Linear-by-Linear Association	.392	1	.531
N of Valid Cases	13724		

a. 12538 cells (97.8%) have expected count less than 5. The minimum expected count is .00.

Table 10: Respondent's weight (kilos-1d) * Husbands education-single yrs

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.645E4[a]	17411	.000

Likelihood Ratio	1.413E4	17411	1.000
Linear-by-Linear Association	238.872	1	.000
N of Valid Cases	13660		

a. 17612 cells (96.8%) have expected count less than 5. The minimum expected count is .00.

Table 11: Respondent's weight (kilos-1d) * Respondent's occupation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.419E4[a]	26565	.000
Likelihood Ratio	7.774E3	26565	1.000
Linear-by-Linear Association	10.952	1	.001
N of Valid Cases	13724		

a. 26866 cells (98.2%) have expected count less than 5. The minimum expected count is .00.

III. Probit Analysis: presentation and interpretation of the results

Different variables representing health, education, and poverty are dichotomous. The Probit and logit regression models are widely used to quantify the interdependencies among these categorical variables, Health, education, and poverty. Given the large number of the variables and observations related to the populations at the level of Morocco, Egypt and turkey, and representing health, education and wealth, many probit models were estimated, however we did proceed with a selection a the most significant models at the level of each country and the results and interpretation of these empirical probit models are given below, with the SPSS outputs concerning the probit models provided under each section.

A. Morocco:

Two models were retained , the first one is related to education versus wealth; highest educational level as dependent variable and the explanatory variables are , has car/truck, has a bicycle, and education attainment . The estimated model using the maximum likelihood is the following:

P=-2.103-0.56(has car/truck) +0.53(has a bicycle) +0.388(educational attainment) (1)

The model (1) goodness of fit based on Chi-squared test shows that the model fits well to the data, the regression coefficients are significant at 95% level of confidence, and the signs are those expected. The model also indicates that education depends on health in Morocco , however the contribution in terms of probability of each variable representing wealth varies , for example , with wealth equal zero the probability of highest educational level is 1.79% which is rational because the probability is very low; moreover, an increase in wealth represented by has car/truck and has a bicycle induce education with about 28.78% and 70.19% respectively which is greater than the absence of any indicator of wealth; in terms of education attainment the probability of the highest educational level is about 67%.

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	distance_ecole	-.001	.002	-.605	.545	-.006	.003
	Sait_lire_ecrire	-.380	.035	-10.983	.000	-.448	-.312
	Intercept	-.223	.061	-3.637	.000	-.285	-.162

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

		Chi-Square	df[a]	Sig.
PROBIT	Pearson Goodness-of-Fit Test	1213.652	1322	.984

a. Statistics based on individual cases differ from statistics based on aggregated cases.

The second model deals with wealth versus education, wealth represented by has car/truck as dependent variable, and education represented by highest year of education and educational attainment as determinants of education. The estimated model is the following:

P=-2.025+0.026(highest year of education)-0.66(educational attainment) (2)

The goodness of fit relative to wealth against education model indicates that the probit model fits well to the data; the chi-squared test and the coefficients of regressions are significant at 95% level of confidence. The model indicate that without any education the probability of wealth is 2.02% which is an important result linking wealth and education ; with respect to highest year of education impact on wealth there is a 51.20% chance of an improvement of the standard of living of the households; the education attainment contributes to wealth with 25.46%.

These two probit regression models indicate that education and wealth are interdependent with different effects of each variable representing wealth and education.

Parameter Estimates

Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Highest year of education	.026	.004	6.247	.000	.018	.035
Educational attainment	.082	.006	13.388	.000	.070	.094
Intercept	-2.025	.024	-83.680	.000	-2.050	-2.001

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

			Chi-Square	df[a]	Sig.
PROBIT	Pearson	Goodness-of-Fit Test	27564.191	7817	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

B. Egypt:

In the case of Egypt only one probit model is developed which combines wealth represented by has a car/truck as dependent variable , and education represented by highest educational level , literacy and health represented by visited health facility last 6 months. The estimated model is as follows:

P= -2.390+0.174(highest educational level)-0.021(literacy)-0.01(sons at home) +0.083(visited health facility last 6 months) (3)

The goodness of fit test and the test of significance concerning the regression coefficients show that the model fits well to the data. The expected signs are what were expected, for instance considering education and health variables in the model (7) equal to zero, the probability of having a car/truck is 0.96% which is less likely to be better off without education and health. In the case highest educational level its effect on wealth it terms of probability is about 56.80% which somehow more likely with respect to the absence of education and health. The impact of literacy change on wealth is about 49.20%, whereas health facility last 6 months change affects the wealth with about 53.24%. The model seems to indicate the significant likelihood interdependency among wealth, education and poverty.

Parameter Estimates

Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound

PROBIT[a]	Highest educational level	.174	.030	5.753	.000	.115	.233
	Literacy	-.021	.033	-.632	.528	-.085	.044
	Sons at home	-.010	.013	-.766	.443	-.034	.015
	Visited health facil. last 6 months *	.083	.028	3.022	.003	.029	.137
	Intercept	-2.390	.036	-66.645	.000	-2.426	-2.354

Chi-Square Tests

		Chi-Square	df[a]	Sig.
Pearson Test	Goodness-of-Fit	28026.254	11230	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

C. Turkey:

In the case of Turkey the probit model is estimated using has a bicycle as dependent variable representing wealth versus highest educational level, highest year of education, education in a single year, educational attainment, and member still in school as explanatory variables. The model estimated fits well to the data based on goodness of fit test; the coefficients of regression are significant at 95% level of confidence. The sings of the coefficients are appropriates and are in concordance with the economic concepts. The empirical model estimated is as follows:

P= -1.673-0.031(highest educational level)-0.008(highest year of education) +0.009(educational attainment) +0.145(member still in school) (4)

The model indicates that with the absence of education the probability of wealth is 4.75% with is very low, whereas the changes of the explanatory variables representing education affect wealth with the probabilities greater than 50%; for example, the unit change of highest educational level lead to the probability of wealth of about 48.8%, in the case of highest year of education , and educational attainment the probability of wealth is about 49.80%, the probability of wealth with respect to member still in school is about 92.65%. The probit empirical model seems to explain the relationship between wealth, and education through the variables (dependent and explanatory) included in the model, the result also shows that education and wealth are interdependent.

Parameter Estimates

Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Highest educational level	-.031	.032	-.955	.339	-.093	.032
Highest year of education	-.008	.004	-2.111	.035	-.015	.000

Education in single years	.009	.004	2.267	.023	.001	.017
Educational attainment	.067	.017	3.871	.000	.033	.100
Member still in school	.145	.015	9.380	.000	.114	.175
Intercept	-1.673	.027	-62.028	.000	-1.700	-1.646

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

			Chi-Square	df[a]	Sig.
PROBIT	Pearson	Goodness-of-Fit Test	54865.386	35065	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

IV. Results of the CMBS sample from Morocco

A. Essaouira (Morocco):

Two models were developed ; the first model concern Wealth in terms of health where the dependent variable is savings and the explanatory variables are Chronic illness , sector of activity which are retained ; the second model concerns Education and wealth, where education is represented by going-to-school with explanatory variables, distance to school, and knowing how to read and write.

The first empirical probit model is:

P= -0.983 +0.146(sector of activity) – 0.149 (chronic-illness) (5)

The goodness of fit based on the Chi-squared test shows that the probit model fits well to the data. The signs of the model are what were expected ; The coefficients represent Z-scores , for example the coefficient of chronic illness is negative which indicates that for one unit of illness the Z score will be reduced by 0.149, in terms of probability the severity of illness reduces the probability of savings by 44% , where as the sector of activity coefficient which represent somewhat the income, its contribution to savings is positive , meaning that as the income increases the probability of savings increases by 55.56%, however if the sector of activity and chronic illness were to be absent the probability of savings will be 16.35% .

The second empirical fitted model is:

P= - 0.223 - 0.38(knowing how to read and write) - 0.001(distance-to-school) (6)

Parameter Estimates

						95% Confidence Interval	
	Parameter	Estimate	Std. Error	Z	Sig.	Lower Bound	Upper Bound
PROBIT[a]	Maladie_Chronique	-.149	.020	-7.501	.000	-.188	-.110
	Secteur_Act	.146	.029	4.981	.000	.089	.204
	Intercept	-.983	.164	-5.977	.000	-1.147	-.819

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	Maladie_Chronique	-.149	.020	-7.501	.000	-.188	-.110
	Secteur_Act	.146	.029	4.981	.000	.089	.204
	Intercept	-.983	.164	-5.977	.000	-1.147	-.819

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

		Chi-Square	df[a]	Sig.
PROBIT	Pearson Goodness-of-Fit Test	234.016	9	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

In this second the dependent variable is going to school against knowing how to read and write, and distance to school as explanatory variables. Based on the Chi-squared test for the goodness of fit of the model and the confidence intervals for the significance of coefficients The model fits well to the data, the signs are appropriate, for example the distance and the probability of going to school are negatively related, as the distance increases the Z score decreases by 0.001, in terms of probabilities, as the distance to school increases by one unit the probability of going to school is about 50%. For Essaouira significant relationships among education, health, and poverty have been identified through the probit regression models.

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	distance_ecole	-.001	.002	-.605	.545	-.006	.003
	Sait_lire_ecrire	-.380	.035	-10.983	.000	-.448	-.312
	Intercept	-.223	.061	-3.637	.000	-.285	-.162

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	distance_ecole	-.001	.002	-.605	.545	-.006	.003
	Sait_lire_ecrire	-.380	.035	-10.983	.000	-.448	-.312
	Intercept	-.223	.061	-3.637	.000	-.285	-.162

		Chi-Square	df[a]	Sig.
PROBIT	Pearson Goodness-of-Fit Test	1213.652	1322	.984

a. Statistics based on individual cases differ from statistics based on aggregated cases.

B. Bouaboud (Morocco)

Two empirical probit regression models were selected for Bouaboud, the fist model concerns wealth as dependent variable represented by the type of school, and explanatory variables are number of years of education, going to school, activities after school. The estimated probit model is

P= -1.29+4.123(activities after school) - 0.923(going to school)-0.038(number of years of schooling) (7)

The fitted model is appropriate to the data and indicates a rational relationship between the type of school (private or public) representing wealth as dependent variable and as explanatory variables activities after school, going to school, and number of year of schooling representing education. As activities after school changes by one unit Z score increases by 4.123, in terms of probabilities indicates that as activities after school increase by one unit the probability of the "type of school to go to" is about 100%, whereas going to school affect the type of the school to go to with about 17.62%; change of the number of years of schooling by one unit affect the type of school to go to by 48.40%. In Morocco the private school is costly and in rural and urban areas in which the economic activities are that not important the case of Bouaboud where people can not afford to pay education, the choice of the type of school depends on the household economic activities and their revenues.

Parameter Estimates

Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound

PROBIT[a]	Nbre_Ann_Alpha	.038	1.688	.022	.982	-3.270	3.345
	Freq_Ecole	-.914	.779	-1.173	.241	-2.440	.613
	activite_apres_ecole	4.123	.359	11.471	.000	3.419	4.827
	Intercept	-1.290	.846	-1.525	.127	-2.137	-.444

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

			Chi-Square	df[a]	Sig.
PROBIT	Pearson	Goodness-of-Fit Test	325.680	507	1.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

The second model concerns School-locality as dependent variable representing education and wealth is represented by distance to health center, activities after school and looking for a job as explanatory variables; the estimated model is as follows:

P=-3.137 + 0.180(distance to health center) + 3.634(activities after school) + 0.159(looking fro a job) (8)

All the z scores are significant at 95% confidence level and the model fits well to the data .The signs of the coefficients of explanatory variables are all positive except the intercept meaning that as each explanatory variable changes by one unit, its corresponding z score increases by the regression coefficient. In terms of probabilities, for instance, a one unit change in distance to health center, the choice of "school –locality" probability is 57.14%; the probability of school-locality choice is 99.98% for one unit change in activities after school; looking for a job affects the school locality with a probability of 72.24%. The probit regression model identifies the interdependencies among health, education and wealth.

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	Distance_Centre_sante	.180	.117	1.544	.122	-.049	.409
	activite_apres_ecole	3.634	.214	16.974	.000	3.215	4.054
	Cherche_Travail	.159	.201	.789	.430	-.235	.553
	Intercept	-3.137	.378	-8.309	.000	-3.515	-2.759

a. PROBIT model: PROBIT(p) = Intercept + BX

Chi-Square Tests

			Chi-Square	df[a]	Sig.
PROBIT	Pearson	Goodness-of-Fit Test	2.322E5	1276	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

V. Link between socio-economic factors and health status and behavior

The above results show that there is link between socio economic status and health. This section looks at the relationships between socioeconomic factors and health status. It is expected that those with higher level of education attainment to be less likely to report poor health. As suggested by Cutler Lleras Muney and Vogl (2008) various measures of socio economic factors as well as their interaction and their impact on health status and behavior are explored. The full CMBS survey is used for that purpose. Two samples with their urban and rural segments will allow to draw conclusions on the link between health status and socio economic status but also to identify trends of research that can be useful in the context of developing countries and for South Mediterranean region. As rightly pointed out by Cutler Lleras Muney and Vogl (2008) the link between socio economic status (SES) and health applies to countries at different levels of development however "the SES health gradient and its mechanisms demand further attention in poor countries". In the case of developing countries there is evidence that there is a link between SES and health but this link is more often pointed out by studies that are quasi experiments and undertaken by researchers in fields other than economics such as demography or medical scientists (Strauss and Thomas, 1998; Miguel and Kremer, 2004; Bobonis et al., 2006; Bleakley, 2007). Further, this link is poorly understood. It is not known through which mechanisms a higher education level allows better health. Is it simply because it allows for better information through the ability to read or could it be that the social network through schools allows for a better inclusion into society. One channel that seems evident in this study is that education affects health behavior. Does it make a difference at which age you acquire education for the positive benefit on health? The fact that some individuals go through literacy programs and learn how to read and write only at a later age allows testing for possible differences. This also relates to the question of the importance of early age conditions for future health. This study distinguishes between how reading and writing skills are acquired and see if acquiring these skills at school or through literacy or others programs at older ages makes a difference.

The impact of poverty on health seems obvious but here again the links as studied in the developed world do not directly apply to the context of developing countries. One of the links studied for industrialized countries is through the difference in the behavior of poor people versus rich people and in the difference of health care system distinguishing between market based health care and universal health care. In the developing countries the mechanism will be of course different and probably more basic, linked to nutrition at early ages, immunization, and existence or not of health facilities. The direction of the link may be more pronounced from health to poverty than the other way around.

In many developing countries some segments of the population do not have easy access to public resources and this might contribute to the development of health disparities. This may interfere

with the mechanisms linking poverty and health. Marie Claude Martin (2008) in studying the perception that rural women in Morocco have of their health shows that better access to own as well as to collective resources contributes to the creation of capabilities to maintain a decent health status which comfort the association between SES and health but also highlight the complexity of the mechanisms associating the two. Here notions such as freedom, governance and equity all take part in the explanation of the link and all have relevance in terms of policy implications. Mutangadura Gladis and all (2007) found lower health outcomes for disadvantaged groups in all the African countries studied of which Morocco and Egypt. They use bivariate analysis of Demographic Health Survey data and identify geographical and financial access as the main source of inequities.

In this study, the Community Based monitoring survey (CBMS) is used. to analyze the link between SES and health in specific regions of Morocco. For the health status, the most widely used measure which is the self reported health status. It has been demonstrated in other studies that the self reported health status and objective measures of health are highly correlated. Three domains of economic status: education attainment, poverty and occupational status are also considered. Various measures of education attainment are used. The education system in Morocco is subdivided into six cycles. The poverty is approached toward the individual's perception of poverty. Activity is subdivided only in terms of whether the person is active or not and not by type of occupation because of data availability. Gender and age are used as control variables.

1. The Model and the Data

In this section we the following regressions are estimated:

$H_i = c + \beta\ SES_i + \delta X_i + \varepsilon$

Where H_i measures individual's health or health behavior, SES_i is a measure of socio economic status that can take the form of education, financial resources and or activity, X_i is a vector of individual characteristics including gender and age, c is a constant and ε is the error term. Here the socio economic status can be measured through different variables. Some of course clearly linked one to the other. We report the results for the urban city of Essaouira and then we see how the rural sector differs. We estimate linear models and we use logit models for dichotomous variables.

The study uses a new data set published in 2007, the community based monitoring survey (CBMS) produced by the Ministry of Finance in cooperation with UNIFEM. It is conducted as of today only in two localities chosen based on data of the population census of 2004 and on the poverty map of Morocco. The first locality is urban (Essaouira) and the second is rural (Bouaboud). The survey questionnaire addresses the following theme: demographic characteristics, culture and education, economic activities, employment and unemployment, poverty, micro-credit, health, housing, violence, environment, governance and gender.

The link between education, poverty and health is evaluated for the urban and rural sector.

In the questionnaire for the city of Essaouira the question concerning health status are wide ranging. The individual is asked whether or not he or she suffers from chronic diseases. Out of the population of Essaouira 16.64 percent declare that they have a chronic illness. Then the question refers to the type of disease. The most common chronic diseases are diabetes (19%), hypertension (17%), allergies (17%) and heart diseases (7%). The tests are not conducted disease by disease because of limited observations for particular illness. A dummy variable is created that to inform on whether the individual declares that he suffers from a chronic disease or not. The

variable takes the value of 1 if the individual declares that he suffers from a chronic disease and 0 otherwise.
The health behavior uses of contraceptive and the prenatal consultation of women that have given birth. 67.54 percent of women that have given birth went through prenatal consultation and 32.46 percent did not. 63.24 percent of adult individuals used contraceptives and 36.76 percent did not.
The information we use to estimate the socio economic status are data on education, poverty and activity.
The CBMS data gives information on education based on the Moroccan education system which includes levels from primary to higher education. The variable takes the value of 0 if the individual has not been to school (30.40%), 1 if he went to preschool (0.76%), 2 if he completed primary education (18.80%), 3 if he completed college education (20.88%), 4 if he completed high school (21.32) and 5 if he completed higher education (0.78%).
The data on poverty used refers to the individual's own perception of whether he or she feels poor, vulnerable or not poor. It has been shown that these perception data is closely linked to actual status of poverty when the latter is evaluated by income measures. The individual declares that he perceives himself as poor or vulnerable (52.96%) or otherwise (47.04 %). Age and gender are used as control variables.

2. Results

The first hypothesis to be tested is the link between education and health status. The impact of education on the probability to suffer from a chronic disease is evaluated for both the urban and the rural community using logit estimation. The results for the urban setting are introduced first while those of the rural sector are presented briefly afterwards.
The first results indicate that the probability to suffer from a chronic disease decreases as the level of education rises. Here there are 3 measures of economic status. Education is measured by the level of education attained. It is only at the fourth and fifth levels of education attainment that the impact of education on health becomes significant. As shown in table 1 reaching levels 4 and 5 in the education system reduces the likelihood of the individuals self reporting of poor health. It should be reminded that only a small portion of the population studied (29 percent) reach those levels of education.

Table 1: Impact of socio economic status on self reported health status (Essaouira)

Survey: Logistic regression
Number of strata = 1 Number of obs = 1195
Number of PSUs = 1193 Population size = 77083
Design df = 1192
F(9, 1184) = 13.98
Prob > F = 0.0000

malade	Linearized Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_ISEXE_2	.715133	.2444144	2.93	0.003	.2356026	1.194663
AGE_REV	.0465402	.0065662	7.09	0.000	.0336576	.0594228
_Iniveausc~1	-.9667134	1.246876	-0.78	0.438	-3.413029	1.479602
_Iniveausc~2	-.2955115	.2540828	-1.16	0.245	-.7940108	.2029877
_Iniveausc~3	-.4183572	.2848351	-1.47	0.142	-.9771913	.1404768
_Iniveausc~4	-.6268319	.304635	-2.06	0.040	-1.224512	-.0291514
_Iniveausc~5	-1.176709	.4831958	-2.44	0.015	-2.124718	-.2287001
_Ipauvre_1	-.2363686	.1914553	-1.23	0.217	-.6119955	.1392583

```
  _Iactif_1 |  -.1134199   .2333403    -0.49   0.627    -.5712234    .3443837
      _cons |  -3.520845   .5356784    -6.57   0.000    -4.571822   -2.469867
------------------------------------------------------------------------------
```

This says that a high level of education has to be reached for the positive impact of health to be realized. This has strong implications for the Moroccan context because of the fact that many students drop out before they reach the fourth level which is the high school level. Age and gender are highly significant.
There are important differences by gender. Gender is positive and significant, being a female increase the probability to suffer from a chronic disease. Here it is difficult to identify whether this means that women have a smaller access to health services and thus are less likely to be cured and thus have more chance to declare being ill. However other existing studies have shown that household resources are not distributed equally among girls and boys and among women and men inside the household. This will impact health outcome.
Age is significant and of positive sign, increases in age increases the probability to suffer from chronic disease. The other two measures of socio economic status included here: income and activity are not significant.

Other results shown in table 2 indicate a very significant and consistent impact of education on health behavior when the later is measured by prenatal consultation of women. However when contraceptive is used as an indicator of health behavior the results are inconclusive. Here all the levels of education that is present in the sample of women that have given birth during the period are significant and of the expected sign. The likelihood of prenatal consultations of women increases with the education for all levels of education. Age as could be expected reduces the probability of prenatal consultations. The other socio economic variables are not significant. The results for the use of contraceptive do not show a link between education and the use of contraceptives.
The link between education and health status and behavior could be working through the impact of education on poverty which would explain in part why poverty appears insignificant with regard to the self reported health status and the health behavior.

Table 2: Impact of socio economic status on health behavior (Essaouira)

```
Number of strata   =         1              Number of obs      =       375
Number of PSUs     =       375              Population size    =     24202
                                            Design df          =       374
                                            F(   8,    367)    =      9.82
                                            Prob > F           =    0.0000
------------------------------------------------------------------------------
             |             Linearized
   consultp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    _ISEXE_2 |   1.870514   .7989788     2.34   0.020      .2994602    3.441568
     AGE_REV |  -.0674032   .0098347    -6.85   0.000     -.0867415   -.0480648
_Iniveausc~2 |   1.136551    .406942     2.79   0.005      .3363701    1.936732
_Iniveausc~3 |   1.902031   .6303916     3.02   0.003      .6624746    3.141587
_Iniveausc~4 |   2.044709   .6425014     3.18   0.002      .7813407    3.308077
_Iniveausc~5 |   1.860937   .7261739     2.56   0.011      .4330411    3.288832
  _Ipauvre_1 |   .1224869   .2920708     0.42   0.675     -.4518199    .6967938
  _Iactif_1 |  -.470143   .3764364    -1.25   0.212     -1.21034    .2700541
      _cons |   1.526331   .9937516     1.54   0.125     -.4277099    3.480372
------------------------------------------------------------------------------
```

Table 3 shows that levels three, four and five of education attained (college, high school and university) have a strong and significant impact on poverty. The probability that an individual is poor is reduced for these level of schooling attained.

Table 3: Impact of education and health on poverty (Essaouira)

. Survey: Logistic regression

Number of strata	= 1	Number of obs	= 1195
Number of PSUs	= 1193	Population size	= 77083
		Design df	= 1192
		F(8, 1185)	= 9.95
		Prob > F	= 0.0000

pauvre	Coef.	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Imalade_1	-.2064165	.1878793	-1.10	0.272	-.5750275	.1621945
_Iniveausc~1	-1.246372	.8500933	-1.47	0.143	-2.914218	.4214737
_Iniveausc~2	-.2425407	.202298	-1.20	0.231	-.6394404	.1543591
_Iniveausc~3	-.7487778	.2081506	-3.60	0.000	-1.15716	-.3403954
_Iniveausc~4	-1.243246	.2005407	-6.20	0.000	-1.636699	-.8497943
_Iniveausc~5	-2.067398	.2905817	-7.11	0.000	-2.637506	-1.497289
_ISEXE_2	-.1340993	.1333861	-1.01	0.315	-.3957969	.1275984
AGE_REV	-.0156615	.0045978	-3.41	0.001	-.0246822	-.0066408
_cons	1.454495	.2825172	5.15	0.000	.9002083	2.008781

The way in which education affects health is still poorly understood and more research in this area is needed. Attempts at looking at differences in types of education show that learning through literacy programs or by means other than schooling does not lead to health improvements (table 4).

Table 4: Type of education and health (Essaouira)

Survey: Logistic regression

Number of strata	= 1	Number of obs	= 863
Number of PSUs	= 863	Population size	= 55522
		Design df	= 862
		F(4, 859)	= 18.02
		Prob > F	= 0.0000

malade	Coef.	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
_Itypeduc_2	1.009816	.5336927	1.89	0.059	-.0376729	2.057306
_Itypeduc_3	.9500013	.5564142	1.71	0.088	-.1420839	2.042086
_ISEXE_2	.7369831	.2626619	2.81	0.005	.2214514	1.252515
AGE_REV	.0616099	.0087694	7.03	0.000	.044398	.0788217
_cons	-4.888817	.4457287	-10.97	0.000	-5.763657	-4.013976

Attempts to distinguish between the rural and urban sector raised the issue of the very low level of school attainment in the rural areas. It has been shown for the urban areas that it is only at relatively high levels of education that the positive benefits of health materialize. In the rural sectors the share of the population reaching these levels of education is so small in the sample that mades the analysis difficult. The levels of education reached in Bouaboud are very low and do not bring the health improvements seen in Essaouira.

3. Results of the analysis of the 1999 sample from Household Expenditures Survey

The analysis using regressions shows the high levels of interdependencies between different household consumption expenditures. Food expenditure appears clearly to account for the other levels such as housing and energy, household equipments and health care besides the expenditures for transportation and communication while health care appears both as log linear (positive elasticity) and log squared (negative elasticity). These same patterns seem also to affect the expenditures on clothing as also related to both health expenditures and it squared with similar effects expressed by education. But, all the estimated coefficients in both equations show positive signs at the exception of those of the squared variables. Again, the variables that appear to have high explanatory power are education and health expenditures. This is confirmed also in the equation related to housing and energy expenditures as well as household equipments. The expenditures on health care show also a positive relationship with expenditures on education that is likely to be reduced by the negative effect of this same variable. The relationships and the interdependencies among different types of expenditures are consequently clearly assessed as introduced in the following table. The role of education and health care are also clearly identified in the regression shown below.

Relationships among Household Expenditures Morocco 1998-1999 300 Households randomly extracted from global survey data	***R²***	***N***
D1 on All		
D1= 0.21 HS + 0.15 D3 + 0.28 D4 + 0.51 D5 + 0.13 D6 – 0.39 D52	0.51	299
(4.54) (2.93) (5.77) (4.12) (2.40) (-3.25)		
D2 on All		
D2= 0.11 D4 + 0.65 D5 + 0.36 D7 + 0.18 D8 + 2.58 D9 – 0.26 D72 – 0.57 D52	0.46	299
(2.13) (5.08) (2.83) (3.33) (4.82) (-2.34) (-4.60)		
D3 on all		
D3= 0.19 D1 + 0.70 D7 - 0.38 D72	0.36	299
(2.93) (5.23) (-3.17)		
D4 on All		
D4= 0.38 D1 + 0.14 D2 + 0.40 D7 – 0.25 D72	0.33	299
(5.77) (2.13) (2.88) (-2.01)		
D5 on D52, D7, D72 & HS		
D5= 0.13 D7 – 0.09 D72 + 0.07 HS + 0.91 D52	0.87	299
(2.65) (-2.02) (2.98) (42.10)		
D6 on All		
D6= -0.10 HS + 0.15 D1 + 0.81 D7 + 0.20 D8 – 0.65 D72	0.89	299
(4.12) (2.40) (6.47) (3.46) (-5.84)		
D7 on all		
D7= 0.07 HS + 0.08 D2 + 0.12 D3 + 0.07 D4 + 0.16 D6 + 0.78 D72	0.88	299
(3.25) (2.83) (5.23) (2.88) (6.47) (34.35)		
D8 on All		

D8= 0.20 D2 + 0.20 D6 + 0.15 D9 + 0.31 D72	0.40	299
(3.33) (3.46) (2.63) (2.70)		
D9 on All		
D9= -0.13 HS + 0.29 D2 – 0.36 D5 + 0.15 D8 + 0.50 D 52	0.38	299
(-2.57) (4.82) (-2.54) (2.63) (3.73)		

Source of Data: Household Survey Morocco Survey 1998-1999***;*** Database communicated by "HCP" (Haut Commissariat au Plan), Rabat. 7200 Household with 300 randomly extracted
Definition of Variables: HS: Household Size Household Gender: (1) Male & (2) Female**;** D1: Food D2: Clothing D3: Housing and Energy; D4: Household equipment; D5: Health Care D6: Transportation and communication
D7: Education, Leisure and CultureD8: Other; D9: Administrative D52: D5 squared D72: D7 squared.

Conclusion

This study was based on micro-level analysis of variables that focuses on health, education, and wealth at the level of Morocco, Egypt, and turkey. The information collected provides an ample idea about the health, education and wealth in response to economic variation, and other factors that affect health, education and wealth.

Education, health and are influenced by a number of socioeconomic factors which include household characteristics, household resource endowments, access to information and availability of formal institutions. Many variables representing health, education, and wealth were considered..

This chapter explored the interdependency among health, education and wealth which is a proxy variable for poverty using household characteristics with different adaptation measures using a Chi-squared hypothesis testing and a multivariate probit model.

The Chi-squared hypothesis testing showed a significant dependency between health versus, education, education versus wealth with many characteristics concerning health, education, and wealth.

The Probit model allows for the simultaneous identification of the interrelationships between health and education, education and wealth, and wealth and health. Different probit equations were estimated and were valid in explaining the behavior of each dependent variable (health, education, or poverty) with respect to the independent variables (health, education, and poverty). The probit estimated models showed a significant likely interdependency among health, education and wealth through a high probability of occurrence between each dependent variable representing either health, education, or wealth and the independent variables representing either health, education, or wealth. The results of the microeconomic analysis undertaken at the level of Morocco, Egypt, and turkey appear to be quite similar. It may be confirmed from this study that the sectors included in the analyzes are determinants for economic development. The results attained with Bouaboud and Essaouira data do also help underline the high level of interdependencies between health, education and poverty. These relationships are also confirmed with the consumption expenditures that have appeared to be highly inter-related.

The above results could have been expected because based on household data that are supposed to reflect the types of inter-relations in decision making at the microeconomic levels. But, it is important to reveal the effects of aggregation over countries on these interdependencies. The direction of answer of this question is important as far as country and regional policies are concerned. The persistence of interdependencies at the regional level can be an important signal of consistency between microeconomic and macroeconomic models. The opposite will be a sign of inadequate policies when based on aggregated views. These matters are analyzed in the following chapter.

References

- Andrija Tomovic and Edward J. Oakeley (2007) "Position dependencies in transcription factor binding sites" Oxford Journals, Life sciences, Bioinformatics Vol. 23, No 8 PP. 933-941
- Bishop, Y. M. M., Fienberg, E. F. & Holland, P. W (1975). "Discrete multivariate analysis. Theory and practice", Cambridge, Mass.: MIT Press
- Boutayeb A, 2006: Social inequalities and health in Morocco, International Journal of Equity in Health, 2006, p 5 -15.
- Chakrabarty R.P (1989) "Multivariate analysis by users of SIPP micro-data files", SIPP Working paper series No 8915. Washington, D.C. U.S. Bureau of Census.
- Dietrich Eherle, Thomas Lehmann (2007) "Responder profiling with CHAID and dependency analysis " lehrstuhl fur Wirtschafts-und Sozialstatistik Friederich—Schriller- Universitat Jena. Carl-Zeiss-Str. 3,07743 Jena.
- Glewwe Paul (1998), Why does Mother's Schooling Raise Child Health in Developing Countries? Evidence from Morocco, The Journal of Human Ressources, Vol.34, N°1, p125.
- Habbani K., Groot W., and Jelovac I. (2007) "Do free-of-charge public health services impede cost recovery policies in Khartoum state, Soudan?" Eastern Mediterranean Health Journal, Vol. 13, No 4.
- Holt D., Scott A. J. and Ewings P. (1980), "Chi-Squared Tests with Survey data" Journal of the Royal Society, Series A (general), Volume. 143, No. 3, pp.303-320. htt://sekhon.berkley.edu/library/stast/htm/mantelhen.test.html
- Martin Marie Claude (2008) Individual and Collective Resources and Health in Morocco. United Nations University, UNU WIDER Research Paper No 2008/1
- Mutangadura Gladis, Adrian Gauci, Bartholomew Armah, Elizabeth Woldemariam, Daniel Ayalew and Biniam Egu (2008) Health inequities in selected African countries: Review of evidence and policy implications
- OOmman Nandini, Elisabeth Lule, Deborah Vazirani, Ritu Chabra (2003), Morocco : Inequalities in Health, Nutrition and Population, World Bank
- Wagner Anita, Sheila Reiss, Amy Johnson and Dennis Ross Degnan (2007): Results of Feasibility Study Using World Health Survey Data to Measure Medicine Need, Use and Out of Pocket Expenditures in Eight Low and Lower-Middle Income Countries, Final Report Harvard Medical School, World Health Organisation and Harvard Pilgrim.

Chapter V: Interdependencies between health, education and poverty based on Regional Data

The major assumption underlying this chapter is related to the aggregation of interdependencies throughout the countries analyzed in this panel. This says that the aggregation of the interconnections already observed at the level of households in different countries of the region is likely to occur in cross-sections of countries. If household data have shown the existence of interdependencies that captured the behavior of individuals and group ages with regard to health, education and poverty, there might be patterns through which household behavior is transmitted at the country and at the levels of the region. Series of regressions results are attempted in the following sections and that are respectively based on World Bank database, UN most recent data and on composite indices besides the use of regression analysis on Institutional profile data. An attempt is made to assess Granger causality between variables.

In order to start the process of setting interdependencies at the regional level, it can be observed from the following graphs that GDP per capita and the other variables such as life expectancy at birth, mortality under 5, physicians per 1000 people and female adult mortality entertain quadratic relationships. This implies that there can be a threshold that shows the likely effects of other variables. These variables are also related to the socio-economic area and include other series of explanatory factors. Figures 1, 2, 3 and 4 are devoted to confirming the existence of Preston's (Preston, 1975; Preston, 1996; Fogel, 2004; A.Deaton, 2006) curves for the South Mediterranean countries considered.

Figure 1:

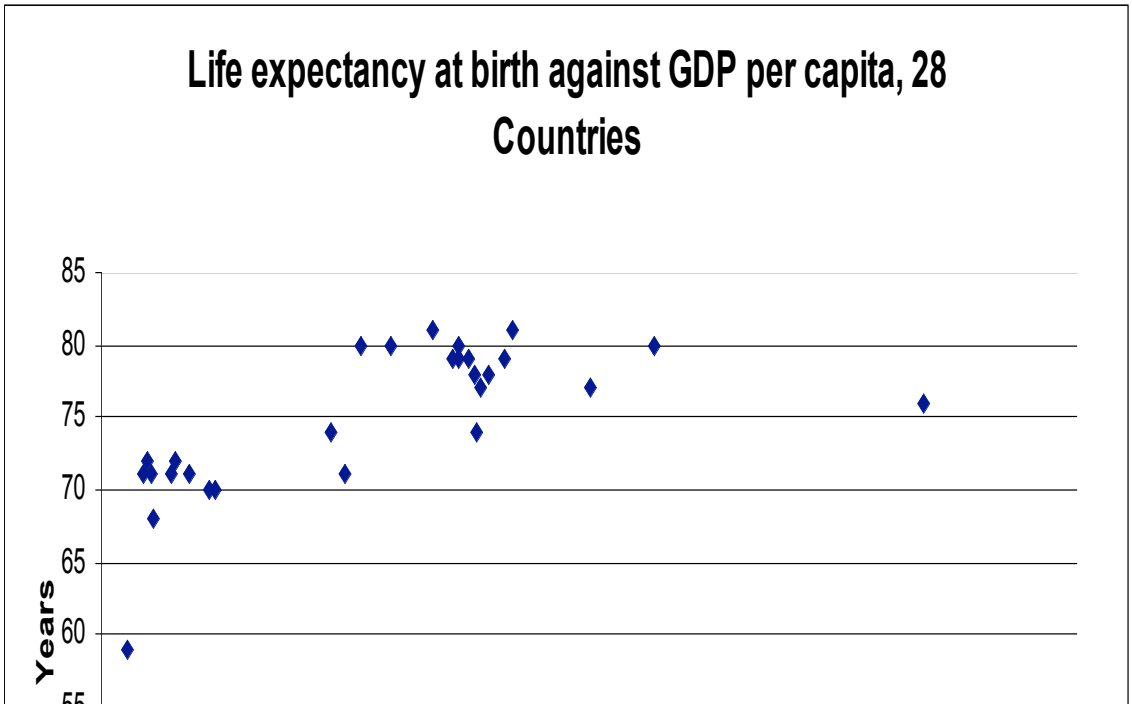


Figure 2:

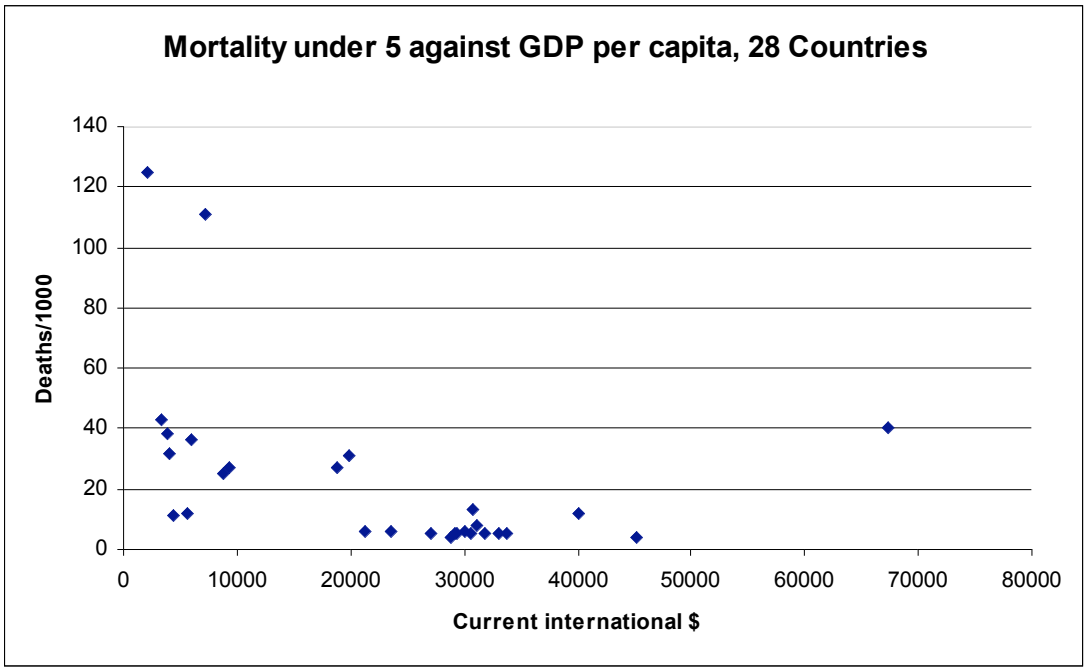


Figure 3:

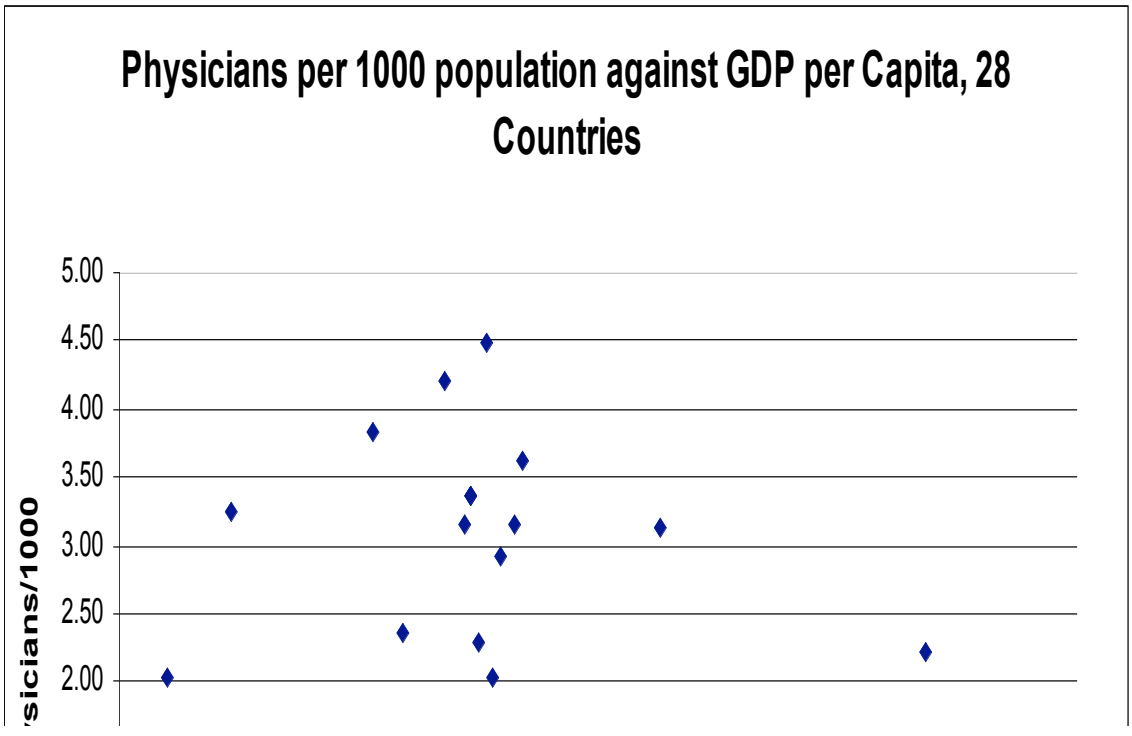


Figure 4:

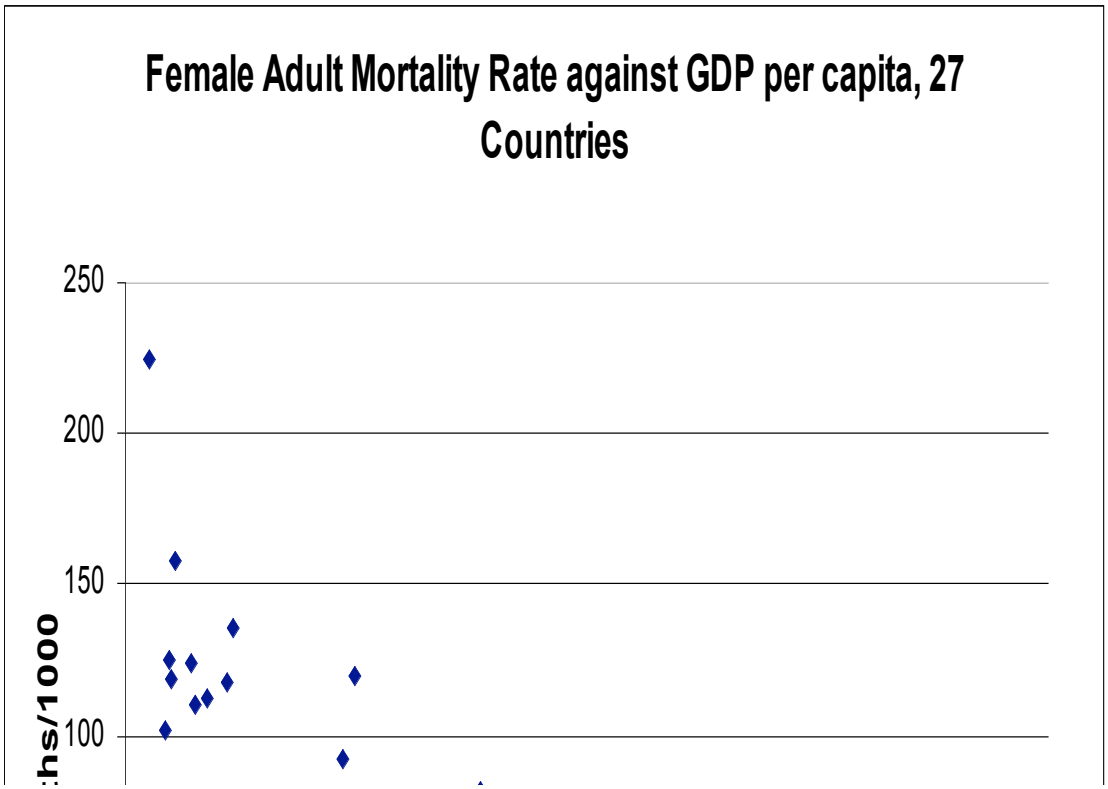
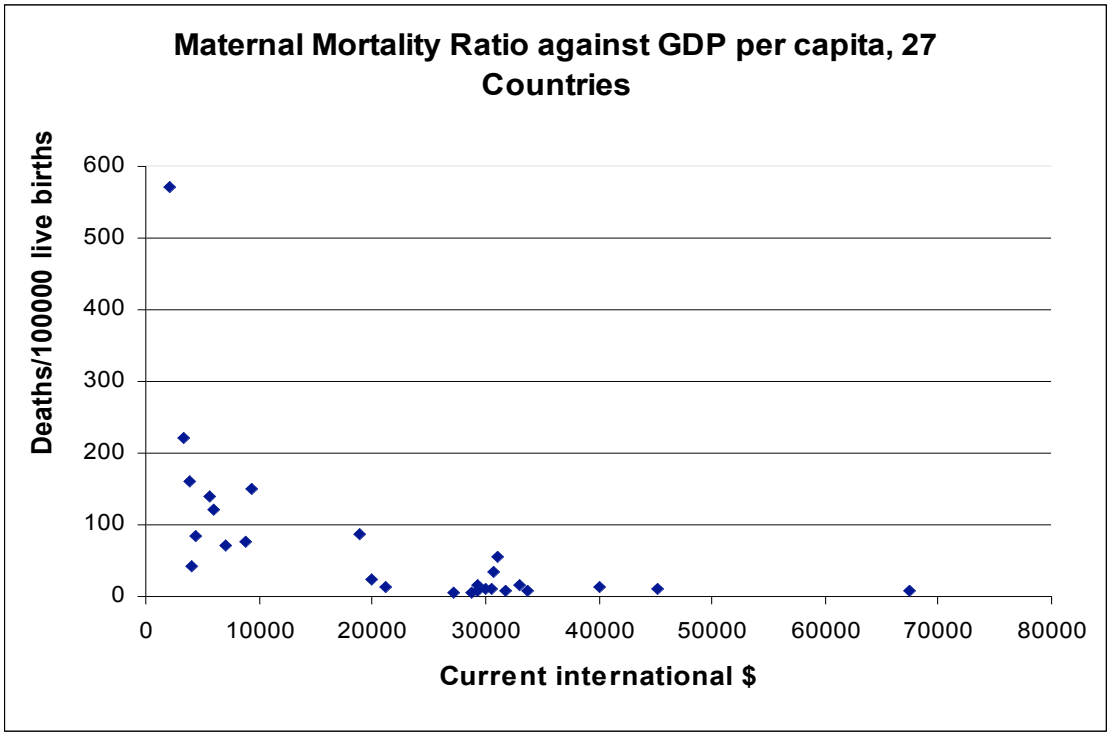

Female Adult Mortality Rate against GDP per capita, 27 Countries
250
200
150
100
hs/1000

Figure 5:


Maternal Mortality Ratio against GDP per capita, 27 Countries
Deaths/100000 live births
600
500
400
300
200
100
0
0
10000
20000
30000
40000
50000
60000
70000
80000
Current international $

1. Using World Bank data

1.1Health and wealth relationships

In a first set of regressions, the relationships between health measures represented by life expectancy at birth and by indices of mortality and wealth measured by GDP per capita are attempted over the 28 countries composing the South Mediterranean sample. The results attained show definitely that life expectancy at birth is strongly related to GDP per capita and its square implying that life expectancy at the level of this region of the world is directly under the effect of GDP per capita and that an increase (decrease) of 1 leads to a net increase (decrease) of life expectancy by 0.45. This same measure of wealth explains also under 5 mortality rate and an increase (decrease) of GDP by 1 unit decreases (increases) this variant of mortality by 0.74 units. The obtained result shows also the existence of a strong positive relationship between GDP and the number of physicians per 1000 population. This explains the other results where female adult mortality, maternal mortality ratio, life expectancy at birth and others are explained either by per capita GDP or by the number of physicians. The following table introduces the most important relationships between variables related to health and wealth.

	R^2	Obs.
$\underset{}{\text{Ln}(\text{Life Exp at Birth})} = \underset{(2.04)}{1.82} + \underset{(2.44)}{0.47}\,\text{Ln}(\text{GDP per capita}) - \underset{(-2.12)}{0.02}\,\text{Ln}(\text{GDP per capita})^2$	0.73	28
$\underset{}{\text{Ln}(\text{Under 5 mortality rate})} = \underset{(6.47)}{9.78} - \underset{(-4.79)}{0.74}\,\text{Ln}(\text{GDP per capita})$	0.47	28
$\underset{}{\text{Ln}(\text{Physicians per 1000})} = -\underset{(-4.42)}{4.53} + \underset{(5.02)}{0.53}\,\text{Ln}(\text{GDP per capita})$	0.49	28
$\underset{}{\text{Ln}(\text{GDP per capita})} = \underset{(43.05)}{9.20} + \underset{(4.29)}{1.02}\,\text{Ln}(\text{Physicians per 1000})$	0.50	28
$\underset{}{\text{Ln}(\text{Under 5 mortality rate})} = \underset{(16.82)}{3.17} - \underset{(-4.84)}{0.99}\,\text{Ln}(\text{Physicians per 1000})$	0.47	28
$\underset{}{\text{Ln}(\text{Life Exp at Birth})} = \underset{(426.64)}{4.26} + \underset{(7.65)}{0.08}\,\text{Ln}(\text{Physicians per 1000})$	0.69	28
$\underset{}{\text{Ln}(\text{Life Exp at Birth})} = \underset{(344.02)}{4.27} + \underset{(6.61)}{0.09}\,\text{Ln}(\text{Physicians per 1000})$	0.70	28
$\underset{}{\text{Ln}(\text{Life Exp at Birth})} = \underset{(208.52)}{4.46} - \underset{(-7.42)}{0.06}\,\text{Ln}(\text{Under 5 mortality rate})$	0.68	28
$\underset{}{\text{Ln}(\text{Female adult mortality rate})} = \underset{(18.14)}{7.94} - \underset{(-8.06)}{0.36}\,\text{Ln}(\text{GDP per capita})$	0.72	27
$\underset{}{\text{Ln}(\text{Maternal mortality ratio})} = \underset{(11.02)}{14.96} - \underset{(-8.55)}{1.19}\,\text{Ln}(\text{GDP per capita})$	0.74	27

The introduction of the education sector into the system of relationship may be an important source for the explanation of further levels of interdependencies.

1.2. Education, health and income

Using the other available sources of data for variables related to education, income, unemployment and other health variables for the countries under study, a system of relationships have been estimated. The level of enrollment in primary school appears to be under the effect of both health and wealth variables. It is also affected by poverty as measured by the human poverty index. But, the human development index is directly related to high enrollment. Poverty and bad health do negatively affect the level of enrollment at the primary school. Similarly, infant

mortality rate is sensitive to both income and education. The levels of unemployment do affect infant mortality. Finally, the level of corruption as measured by CPI appears to be negatively related to income.

Education, Health and Income/ poverty

$\underset{}{\text{Ln}(\%\text{ Enrolment primary})} = \underset{(5.21)}{6.14} - \underset{(-2.64)}{0.20}[\text{Ln}(\text{Low birth weight})] - \underset{(-2.08)}{0.07}[\text{Ln}(\text{GNI})]$	0.64	17
$\underset{}{\text{Ln}(\%\text{ Enrolment primary})} = \underset{(6.51)}{7.21} - \underset{(-2.94)}{0.23}[\text{Ln}(\text{Low birth weight})] - \underset{(-2.04)}{0.10}[\text{Ln}(\text{HPI})]$	0.46	17
$\underset{}{\text{Ln}(\text{Infant Mortality})} = \underset{(-2.39)}{-0.23}[\text{Ln}(\text{Income})] - \underset{(-2.46)}{0.26}[\text{Ln}(\%\text{ Education})]$	0.84	13
$\underset{}{\text{Ln}(\%\text{ Enrolment primary})} = \underset{(20.51)}{5.67} - \underset{(-3.26)}{0.18}[\text{Ln}(\text{Low birth weight})] + \underset{(2.06)}{0.26}[\text{Ln}(\text{HDI})] - \underset{(-2.94)}{0.07}[\text{Ln}(\text{GNI})]$	0.58	17

Health, Income & Unemployment

$\underset{}{\text{Ln}(\text{Infant Mortality})} = \underset{(-3.49)}{-0.21}[\text{Ln}(\text{Income})] + \underset{(3.21)}{1.29}[\text{Ln}(\text{Unemployment})]$	0.86	13
$\underset{}{\text{Ln}(\text{Unemployment})} = \underset{(-9.02)}{-3.40} - \underset{(-2.98)}{0.54}[\text{Ln}(\text{Poverty rate})]$	0.39	15

Income, Education & Corruption

$\underset{}{\text{Ln}(\text{Income})} = \underset{(-2.80)}{-7.90} + \underset{(6.39)}{5.76}[\text{Ln}(\text{CPI})]$	0.84	13

The central role of health requires larger supplies of different forms of direct and indirect services in this area to cover the expected increasing needs of the populations in different countries of the region. This requires that medical and paramedical coverage be enhanced at the levels of infrastructure and mainly human capital. Medical doctors and nurses besides health care technicians play a critical role in this process, through their knowledge and abilities but also through their numbers (stocks and flows). But, given the trends taking place internationally and with the likely impacts of the brain drain effects, it is important also to account for, at least the risks related to the eventual existence of medical brain drain. This issue is covered in the following chapter.

2. Using the UN most recent database to check for consistencies with the above estimations

Using again the seemingly unrelated equation system estimations method with the most recent UN-database for the South Mediterranean Countries, a system of equations is estimated to show that again there are major interdependencies between health, education and economic sets of variables as published in the above database. As variables are expressed under logarithmic forms, elasticities can be directly set through the estimations. The estimated equations are in appendix UN 1.

Total fertility rate appears consequently to be highly responsive to be mainly responsive to the annual rate of urban population change with a corresponding elasticity of 0.635 with a significant impact of adult economic activity rate (elasticity of -1.47). To lesser degrees the mortality rate of children under age of 5 years and the per capita income may also affect the level of fertility in the overall sample of countries forming the SMC (elasticities of 2.03 and 0.22 respectively).

The maternal mortality rate appears to be sensitive to the mortality rate of children under five years (elasticity of 5.22) and to the share of rural population (elasticity of 1.19) implying that decreases (increases) in rural population contribute to decreases (increases) in maternal mortality.

School life expectancy appears to be mainly driven by infant mortality rate (elasticity of -0.22), adult unemployment rate (elasticity of 0.17) and to a lesser extent by youth literacy rate (elasticity of 1.97). But, the school life expectancy for men appear to be directly affected by the level of adult literacy rate (elasticity of 0.57) while that of women seems to be under the effects of adult illiteracy rate of women (0.45) and the life expectancy at birth of women (1.54).
Life expectancy at birth for men is statistically related to that of women (0.62) and to infant mortality rate (-0.06) while that of women is also related to life expectancy of men (0.07) besides the infant mortality rate (1.44).
The infant mortality rate seems to be more responsive to the mortality rate occurring under the age of five years (0.86) but also income as represented by GDP per capita (-0.06).
Mortality of children under the age of five seems to be mainly under the effect of adult unemployment rate (0.70).
The annual urban rate of population change appears to be highly sensitive to the total fertility rate (1.85) while the level of income varies with both the total school life expectancy (3.33) but mainly with the adult economic activity rate (14.43). This latter is also related to the income level (0.05) but also to adult unemployment rate (-0.11). The adult economic activity rate for women appears to be mainly under the effect of the total level of unemployment rate (-0.33).
The total literacy rate is mainly related to the total level of fertility (0.69). Only life expectancy of women does slightly affect their literacy (0.56) rate implying that there are different variables to which the literacy rates of men and women can be responsive. When accounting for the literacy rate of adult more sensitivity is mainly expressed through the school life expectancy of men (0.47). When looking at the literacy rate of young women, this variable appears to be more sensitive to the school life expectancy of men (0.52).

Seemingly Unrelated Equation System Estimations based on the most recent UN-database for the South Mediterranean Countries **(t-stat between between parentheses)**

Regression	R^2
V1= 2.030 V9 + 0.635 V12 + 0.221 V14 – 1.469 V15 (2.089) (3.369) (2.037) (-2.382)	0.89
V2= 5.225 V9 + 1.188 V11 (2.135) (4.498)	0.96
V3= 1.968 V21 + 0.170 V24 – 0.218 V8 (2.052) (2.583) (-2.690)	0.86
V4= 0.568 V18 (3.186)	0.87
V5= -6.080+ 1.539 V7 + 0.449 V20 (-2.542) (2.281) (2.264)	0.75
V6= 1.86 + 0.620 V7 – 0.057 V8 – 0.007V14 (5.497) (9.468) (-4.988) (-1.748)	0.99
V7= -2.063 + 0.066 V8 + 1.436 V6 (-2.756) (2.711) (9.468)	0.98
V8= 0.912 + 0.855 V9 – 0.064 V14 (2.234) (17.149) (-2.226)	0.99
V9= 0.698 V24 (4.339)	0.68
V12= 1.853 V1 (2.884)	0.85
V14= -62.285 + 3.333 V3 + 14.434 V16 – 0.195 V17 (-4.692) (3.300) (4.430) (-0.235)	0.77
V15= 3.894 + 0.47 V14 – 0.114 V24 (14.746) (2.181) (-2.918)	0.94
V17= 4.584 – 0.052 V14 – 0.330 V24 (5.129) (-0.705) (-2.501)	0.68
V18= 2.661 + 0.691 V3	0.56

(6.106) (3.933)	
V20= 3.262 + 0.564 V5 – 0.124 V8	0.69
(3.703) (2.120) (-1.355)	
V21= 3.293 + 0.470 V4	0.83
(6.842) (3.603)	
V23= 3.096 + 0.524 V4	0.80
(4.514) (2.821)	

V1: Total Fertility Rate, **V2**: Maternal Mortality Ratio, **V3**: Total "School Life Expectancy (in years)", **V4**: Men "School Life Expectancy (in years)", **V5**: Women "School Life Expectancy (in years)", **V6**: Life Expectancy at Birth "Men", **V7**: Life Expectancy at Birth "Women", **V8**: Infant Mortality Rate , **V9**: Under 5 Mortality Rate , **V10**: Population Distribution (%) 2008 "Urban", **V11**: Population Distribution (%) 2008 "Rural", **V12**: Annual Rate of Population Change (%) 2005-2010 "Urban", **V13**: Annual Rate of Population Change (%) 2005-2010 "Rural", **V14**: Per Capita GDP (US$), **V15**: Adult (15+) Economic Activity Rate "Total", **V16**: Adult (15+) Economic Activity Rate "Men", **V17**: Adult (15+) Economic Activity Rate "Women", **V18**: Adult (15+) Literacy Rate "Total", **V19**: Adult (15+) Literacy Rate "Men", **V20**: Adult (15+) Literacy Rate "Women", V21: Youth (15-24) Literacy Rate "Total", V22: Youth (15-24) Literacy Rate "Men", **V23**: Youth (15-24) Literacy Rate "Women", **V24**: Adult (15+) Unemployment Rate "Total", **V25**: Adult (15+) Unemployment Rate "Men", **V26**: Adult (15+) Unemployment Rate "Women", V27: Improved Drinking Water Coverage (%) "Total", **V28**: Improved Drinking Water Coverage (%) "Urban", **V29**: Improved Drinking Water Coverage (%) "Rural", **V30**: Improved Sanitation Coverage (%) "Total" , **V31**: Improved Sanitation Coverage (%) "Urban", **V32**: Improved Sanitation Coverage (%) "Rural"

The above results are consistent with those that have been discussed earlier attained with the other databases.

3. Interdependencies Based on Aggregate Composite Indices

At this stage of the investigations, it appears important to see how aggregated composite indices developed for the countries of the region are related. The reason for this exercise is directly linked with the fact that most indices are provided by different sources and that there is no reason to think that these indices are inter-related.

The indices used include the Human development Index (HDI) and the Human Poverty Index (HPI) as they are published by UNDP. It includes also the Economic Freedom Index (EFI) produced by the Heritage Foundation, the Knowledge Economic Index produced (KEI) by World Bank Institute (WBI) with other indices related to the perception of the environment.

Regression	R^2
CPI= -4.411 + 1.045 HDI + 1.486 IEF	0.748
(-3.3.5) (3.099) (4.608)	
HDI= -2.675 – 0.110 HPI + 0.334 ENV	0.905
(-3.555) (-2.674) (3.972)	
ENV= 8.398 + 1.556 HDI	0.799
(101.608) (7.197)	
KEI= -0.374 HPI	0.943
(-3.668)	
HPI= 2.209 IEF – 1.515 KEI	0.826
(2.251) (-6.336)	

The above results show again levels of interdependencies among these indices that are produced by different sources using different methods. These regressions show how corruption perception index can be improved (reduced) with more (less) improvements (reduction) in the human development and the economic freedom indices. Also, human development is positively related to the environmental index but negatively related to human poverty. The other relationships show how the knowledge and poverty are negatively related. The estimated levels of elasticities (coefficients) are important (1 to 2) knowing that the scales used vary from 1 to 10 for CPI and from 0 to 1 for most of the other composite indices. For example, any improvement in the openness of the economy in the region would imply less corruption and more transparency as

higher CPI indicates. Another improvement in HDI leads also to larger transparency. Improvements in the physical environment is also a source for the promotion of HDI and then of transparency. The promotion of education reduces poverty with an increase of the HDI and then of transparency.

4. Testing for Granger-Causality using country time series data on some variables

With the above analyzes conducted both at the country and regional levels interdependencies have been identified among different variables at both country and regional levels. There are still several issues that need clarification. Among the important matters to be pursued, there is the direction of relationships between variables. One answer to this debate can be provided by testing for Granger-Causality between the variables considered. But, there are few variables on which longer time series are available. The variables that have been selected are those of life expectancy at birth as representative of heath and the remittances of migrants and the share of trade in GDP in Algeria, Egypt, Turkey and Morocco besides the primary and secondary enrollment in the case of Morocco only. One, two and three lags have been used to test for Granger causality. This is achieved through running unrestricted and restricted regressions between each two couple of variables that are found to have enough observations and that represent respectively health, economics and education. In this context and for each couple of variables an F-statistic test has been performed. This is to test for the hypothesis H0 (the explanatory variable does not Granger cause the dependent variable again HA (the explanatory variable does cause in the Granger sense, the dependent variable). The results of these tests are introduced respectively as they are summarized below under one lag, two lags and three lags knowing that the number of observations in each annual series has been lower than 30. It is recognized though that at least two limitations may affect the attained results. The first one is directly related to the number of variables in the categories health, economics and education while the second is the length of the time series.

The results achieved under the above limitations are considered respectively under the 10, 5 and 1 percent probabilities. It seems that life expectancy at birth as representation of health does cause in the Granger sense the share of trade in GDP for Algeria only under the 10 % probability. Otherwise, no Granger causality has been established for Algeria under one lag. With two lags, trade appears to be Granger causing health as measured by life expectancy at birth both at 10 % and 5 % probabilities. The same result is attained under three lags but only with a 10 % level of significance. No causation has been attained for Egypt under one lagged models. But, under two lags, life expectancy at birth working appears to be Granger causing under the 5 % significance level. This is confirmed again under the three lagged models. For Turkey, life expectancy seems also to be causing life expectancy at 1 % significance level with one and three lagged models. The most important results that are attained are related to Morocco where education represented by enrollment at the primary school level appears to be Granger causing life expectancy. This is confirmed for both primary and secondary enrollment when using two and three lagged models. The following tables introduce respectively the details by country and for each couple of regressions.

One lagged Variables:

		F-Calculated	H0 10%	H0 5%	H0 1%
Egypt	LEB LWR	0.000	Accept	Accept	Accept
	LEB LTR	0.000	Accept	Accept	Accept
	LWR LEB	**1.860**	Accept	Accept	Accept
	LTR LEB	2.865	Accept	Accept	Accept
Turkey	LEB LWR	**0.000**	Accept	Accept	Accept
	LWR LEB	**7.680**	Reject	Reject	Accept
Morocco	LEB/LPSS	26.000	Reject	Reject	Reject
	LEB/LSS	0.000	Accept	Accept	Accept
	LEB/LWRS	3.333	Reject	Accept	Accept
	LEB/trade	0.000	Accept	Accept	Accept
	LPSS/LEB	0.000	Accept	Accept	Accept
	LSS/LEB	0.510	Accept	Accept	Accept
	LWR/LEB	7.780	Reject	Reject	Reject
	Trade/LEB	3.850	Reject	Accept	Accept
Algeria	LEB/trade	0.000	Reject	Accept	Accept
	Trade/LEB	3.940	Reject	Accept	Accept

Variables with two lags

		F-Calculated	**H0 10%**	**H0 5%**	**H0 1%**
Egypt	LEB LWR	3.667	Reject	Accept	Accept
	LEB LTR	3.667	Reject	Accept	Accept
	LWR LEB	5.923	Reject	Reject	Accept
	LTR LEB	2.013	Accept	Accept	Accept
Turkey	LEB LWR	12.000	Reject	Reject	Reject
	LWR LEB	4.904	Reject	Accept	Accept
Morocco	LEB/LPSS	5.750	Reject	Reject	Accept
	LEB/LSS	5.750	Reject	Reject	Accept
	LEB/LWRS	0.000	Accept	Accept	Accept
	LEB/trade	0.000	Accept	Accept	Accept
	LPSS/LEB	2.300	Accept	Accept	Accept
	LSS/LEB	0.632	Accept	Accept	Accept
	LWR/LEB	4.083	Reject	Accept	Accept
	Trade/LEB	1.825	Accept	Accept	Accept
Algeria	LEB/trade	5.250	Reject	Reject	Accept
	Trade/LEB	0.053	Accept	Accept	Accept

Variables with three lags

		F-Calculated	H0 10%	H0 5%	H0 1%
Egypt	LEB LWR	0.000	Accept	Accept	Accept
	LEB LTR	0.000	Accept	Accept	Accept
	LWR LEB	**5.431**	Reject	Reject	Accept

	LTR LEB	2.865			
Turkey	LEB LWR	**7.000**	Reject	Reject	Accept
	LWR LEB	**4.971**	Reject	Reject	Accept
Morocco	LEB/LPSS	3.333	Reject	Accept	Accept
	LEB/LSS	3.000	Reject	Accept	Accept
	LEB/LWRS	3.333	Reject	Accept	Accept
	LEB/trade	0.000	Accept	Accept	Accept
	LPSS/LEB	1.667	Accept	Accept	Accept
	LSS/LEB	0.543	Accept	Accept	Accept
	LWR/LEB	2.966	Reject	Accept	Accept
	Trade/LEB	1.457	Accept	Accept	Accept
Algeria	LEB/trade	3.000	Reject	Accept	Accept
	Trade/LEB	1.466	Accept	Accept	Accept

But, besides the limitations related to the absence of microeconomic and time series data and in addition to the difficulty of the determination of causality under Granger tests, other difficulties are related to the choices and trade-offs made by individuals and households over different socio-economic components (Fukuda-Parr, Sakiko, 2007; Gaertner, Wulf, 2008).

5. Regressions based on institutional profiles

While the best appreciations are set at the level of 4, the lowest level is 0. In this context only few variables attain levels above 2.5 in the region. A905 and D801 as they refer respectively to the appreciation of equity in the access to basic public services (education, health, water and electricity) and to the net migration flow of non qualified labor are the ones that are above average. While the standard deviations are not high meaning that countries of the region have almost similar levels, D801 and D802 have higher dispersions. All the other appreciations of training of the elites, professional training, and openness to foreign expertise, social mobility in relation to hiring and to the situation of the young school graduates are not well appreciated.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
A905	13	1.0	4.0	2.865	.9471
A906	13	1.0	3.1	2.089	.7212
D500	13	1.0	3.5	1.437	.7127
D800	13	1.0	4.0	2.501	.9071
D801	13	.0	4.0	2.077	1.5516
D802	13	.0	4.0	1.534	1.2833
D901	13	1.4	3.4	2.420	.4754
D902	13	1.0	3.3	2.020	.8024

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D901	13	1.4	3.4	2.420	.4754
D902	13	1.0	3.3	2.020	.8024
Valid N (listwise)	13				

The descriptive statistics related to all the detailed components included are introduced in the appendix. They show that A905, A9050, A9051, A9052, A9053, D8001 and D90011 are above average.

The correlation table shows that the appreciation of equity of access to basic services (A905: education, health, water and electricity) is highly correlated with net migration flow of non qualified labor (D801: net migration flows of non qualified labor of men and women) (level of correlation: 0.47) and with the perception of social mobility (D901: hiring and promotion) (level of correlation: 0.55). The perception of the training of elites (D500) is revealed to be independent from all other perceptions. A similar result is attained for the perception of openness to foreign expertise (D800). The net migration flow of qualified labor D802 is also not related to the other perceptions (D802) while the non qualified labor (D801) is correlated with social mobility of university graduates (D902). Finally the perception of social mobility in relation to hiring and promotion (D901) is correlated with the other component that is social mobility of university graduates (D902). The details results are introduced in table 1 in the appendix to this chapter.

Further details can be obtained when observing the correlation matrix between each of the disaggregated components of the way different variables are perceived. The perception of access to public schools (A9050) is linked with the perception of access to basic health services (A9051) and with the perception of the local of the training of elites (A9060). Access to health is found to be related only to the net migration flow of non-qualified women (D8011). The perception of access to water (A9052) appears to be in relation with access to electricity (A9053), to social mobility in the public sector (D9010) and with the attractiveness of enterprises to hiring graduates (D9022). The perception of access to electricity (A9053) is related to social mobility (D9010) and to the attractiveness of enterprises to hiring graduates (D9022). The perception of the locations where elites are trained (A9060) seems to account for the perceptions of professional training and satisfaction of enterprise needs (D5001) and negatively to the access of foreign human resources in local enterprises (D8000). The "perceptions of the social roles of the training systems" (A9061) is not related to any of the other variables while the professional

training of adults (D5000) is viewed in relation to "the professional training and enterprise needs: D5001" and to the "consistency between training and job market: D9021". "Enterprise needs and professional training: D5001" is negatively related to "foreign expertise in local enterprises: D8000", to "social mobility in public services: D90010" and to the relationship between training and job market: D9021". The "hiring of foreign expertise in local enterprises: D8000" and the hiring of foreign enterprises in foreign firms: D8001" are not related to any of the other variables. Similarly, the "net migration flow of qualified men and women D8020 and D8021" besides the "consistency of the training systems and the job market D9021" do not correlate with any of the other variables. The net migration flow of non-qualified male labor D8010 is related to the same variable related to female labor D8011, to the variable representing qualified male labor D8020 and to the perception of the unemployment rate by young graduates D9020. The net migration flow of non qualified female labor D8011 correlates with the perception of the unemployment rate by young graduates D9020. Social mobility in the private sector D9011 is also related to this latter variable and to attractiveness of enterprises to hiring of graduates D9022. Finally, the perception of the unemployment rate by young graduates D9020 is related to D9022 as defined above.

The above results as indicated in table 2 in the appendix to this chapter, express the existence of interdependencies among the way different variables are perceived in the sample composing the institutional profile of 2006 in the South Mediterranean countries.

The aggregate results show that interdependencies are not only occurring at the level of objective socio-economic variables but also in the way these variables are appreciated by economic agents. These subjective appreciations within the scale 0 to 4 with 0 being the lowest level of assessment, the different components appear to be inter-related. This is clearly expressed through the set of regressions introduced below. The subjective appreciation of access to basic public goods appears to be related to the level of appreciation of access to health care and to the assessment of social mobility. While access to education seems to be driven mainly by the levels of health care to some level (quadratic term in the equation). Further explanations are provided in the following regressions that all confirm the links between education, health care and other variables that relate to economic performance.

Regressions of health, education and poverty components as appreciated within the survey

Regression outputs	R^2	N
A905 on D901, A9051, D800, D500, A9051 sq A905= -2.98 A9051sq + 3.49 A9051 + 0.65 D901 (-2.85) (3.38) (3.20)	**0.87**	**12**
A9050 on A9051sq, A9051 A9050= 2.90 A9051 – 2.05 A9051sq (3.06) (-2.16)	**0.83**	**12**
A9051 on A9052, A9050, A905 A9051= 2.40 A905 – 1.58 A9052 (3.07) (2.40)	**0.88**	**12**
A905 on D901, A9051, D800, A9051sq A905= -2.81 A9051sq + 3.33 A9051 + 0.55 D901 (-2.79) (3.34) (3.43)	**0.86**	**12**
A9050 on D901, A9051, D800, A9051sq A9050= -2.66 A9051sq + 3.41 A9051 (-3.30) (4.27)	**0.91**	**12**
A905 on D901, A9051, D800, D500, A9051sq A905= -2.98 A9051sq + 3.49 A9051 + 0.65 D901 (-2.85) (3.38) (3.20)	**0.87**	**12**

A905 on D901, A9051, D800, A9051sq A905= -2.81 A9051sq + 3.33 A9051 + 0.32 D901 (-2.79) (3.34) (3.43)	**0.86**	**12**
A9050 on D901, A9051, D800, A9051sq A9050= -2.66 A9051sq + 3.41 A9051 (-3.30) (4.27)	**0.91**	**12**
D500 on D901 D500= 0.63 D901 (2.67)	**0.39**	**12**

Definition of Variables:A905: Fairness in accessing public goods : education, healh, water and electricity; A9050 : Access to primary and secondary schooling; A9051 : Access to basic health system; A9052 : Access to water; A9053 Access to electricity; A906: Training of elites; A9060 : Location of training of elites; A9061 : Are the training systems for elites closed or open to be source of social mobility. D500 : Professional training D5000 : Professional training of adults D5001 : Enterprise needs and professional training D800 : Foreign participation to professional training D8000 : Foreign expertise in local enterprises D8001 : Foreign expertise in foreign enterprises D801 : Net migration of non qualified labor; D8010 : Net migration non qualified males; D8011 : Net migration non qualified females; D802 : Net migration skilled labor; D8020 : Net migration skilled men; D8021 : Net migration skilled females ; D901 : Social mobility through hiring and promotion ; D9010 : Social mobility through hiring and promotion public sector; D9011 : Social mobility through hiring and promotion private sector; D902 : Social mobility of university graduates ; D9020 : Unemployment of university graduates relative to average; D9021 : Adaptation of training to market needs ; D9022 : Levels of enterprise interests to university graduates.

All the results attained at this level of analysis of these subjective data reveal also that interdependencies do exist even when looking at subjective aggregate data. Are these indications related to the persistence of microeconomic interdependencies even when aggregation takes places? The quantitative aggregated data analyzed and discussed earlier seem to be confirming that the microeconomic interdependencies observed at the level of countries are well expressed also at the level of the region.

Conclusion

In this chapter, regression, correlation and granger-tests have been the main techniques used on different data. The first set of data is mainly that of World Bank and that was described in the previous chapter. The second is the most recent database of the UN. The third set is composed of the composite indices provided by different international organizations. The last set is the 2006 institutional profile data of the French Ministry of Finance.

The overall results attain at every level of the analysis is the high magnitude of interdependencies among all sets of variables related to health, education and poverty. Health and education appear to have an important driving effect for these interdependencies.

This is shown with the analyzes of World Bank data as well as with the new UN database. The representative variables of health, education and poverty seem to entertain higher levels of interdependencies meaning that any change in one of the variables affect the others. This is confirmed again through the analysis of some composite indices where clear relationships have been estimated. Furthermore, even the subjective appreciations of achievements in different variables related to health, education and economic activities have appeared to show interdependencies.

The results attained so far at the regional and aggregated levels appear to be referring to the real situations faced by households in different countries. This latter has already been shown through the results shown in the previous chapter with the analyzes of household data.

But, given the type of data used at both country and regional levels, it has been very hard to account for some the issues that are crucial to this study. Some of these issues are tackled in the following chapter.

References

- Akala, Francisca Ayodeji & Sameh El-Saharty (2006). "Public-Health Challenges in the Middle East and North Africa," The World Bank, Middle East and North Africa Region, Human Development Sector, Originally Published in "Lancet", Vol 367, March 25, 2006.
- Arab Human Development Report 2002,2003,2004
- Barro, Robert J. (1991), "Economic growth in a cross-section of countries", Quarterly Journal of Economics, 106: 407-443.
- Cutler DM, Miller G. The role of public health improvements in health advances: the twentieth-century United States. Demography (2005) 42:1–22.
- Cutler DM, McClellan M. Productivity change in health care. Am Econ Rev (2001) 91:281–86.
- Deaton A. The great escape: a review essay on Fogel's *The Escape from Hunger and Premature Death*, 1700-2100. J Econ Lit (2006) 44:106–14.
- Deaton, A. (2006). *Global Patterns of Income and Health: Facts, Interpretations and Policies*. Research Program in Development Studies, Center for Health and Wellbeing, Princeton University.
- Farzaneh Roudi, 2001. Population Trends and Challenges in the Middle East. United Nations Population Division, World Urbanization Prospects, the 1999 Revision: Key Findings (New York: UN Population Division, 1999). http://www4.gvsu.edu/coler/GPY355/Readings/Population%20ME.htm
- Fogel RW. The Escape from Hunger and Premature Death, 1700–2100: Europe, America, and the Third World (2004) Cambridge: Cambridge University Press.
- Fukuda-Parr, Sakiko. "Human Rights Based Approach to Development – Is it Rhetorical Repackaging or a New Paradigm?" HD Insights, HDR Networks, Issue 7 (2007).
- Gaertner, Wulf. "Individual Rights versus Economic Growth". Journal of Human Development 9 (2008).
- Lleras-Muney A. The Relationship Between Education and Adult Mortality in the United States. Rev Econ Stud (2005) 72:189–221.
- Simon Appleton, S., Teal F. (1998), "Human Capital and Economic Development", African Development Report.
- Sofiane Bouhdiba. L'enfant Arabe et les Risques Urbains: Une Approche Démographique à Travers L'Observation de la Mortalité Infantile. Université de Tunis. http://www.araburban.org/Employee/Menacpi/uploadfiles/Sofiane_Bouhdiba.pdf
- Persson, Torsten, and Guido Tabellini."Is Inequality Harmful for Growth?" American Economic Review 84 (1994).
- Preston SH. American Longevity, Past, Present and Future. Syracuse University. Maxwell School Center for Policy Research. Policy Brief 7/1996.
- The World Bank (2008), "The road not traveled. Education reform in Middle East and Africa", MENA Development Report.
- World Development Indicators 2003 p. 9
- World Development Indicators 2003 p. 10
- Ziad K. Abdelnour. 2003. Democratization of Capital in the Arab World. Middle East Intelligence Bulletin Vol. 5, No. 5. http://www.meib.org/articles/0305_me1.htm

Appendix to Chapter 5

Table 1: Correlations of aggregate perceptions (institutional profiles 2006)

	A905	A906	D500	D800	D801	D802	D901	D902
A905	1	0	0	0	.746**	0	.555*	0
A906		1	0	0	0	0	0	0
D500			1	0	0	0	0	0
D800				1	0	0	0	0
D801					1	0	0	.684**
D802						1	0	0
D901							1	.585*
D902								1

Table 2: Correlations between perception components (institutional profiles 2006) South Mediterranean countries

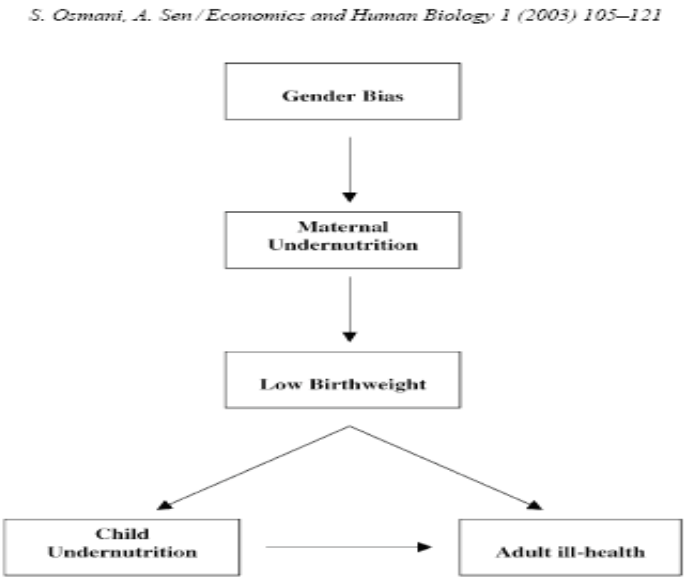
	A9050	A9051	A9052	A9053	A9060	A9061	D5000	D5001	D8000	D8001	D8010	D8011	D8020	D8021	D9010	D9011	D9020	D9021	D9022
A9050	1	.918**	0	0	.557*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A9051		1	0	0	0	0	0	0	0	0	0	.611*	0	0	0	0	0	0	0
A9052			1	.982**	0	0	0	0	0	0	0	0	0	0	.561*	0	0	0	.670*
A9053				1	0	0	0	0	0	0	0	0	0	0	.639*	0	0	0	.636*
A9060					1	0	0	.571*	-.568*	0	0	0	0	0	0	0	0	0	0
A9061						1	0	0	0	0	0	0	0	0	0	0	0	0	0
D5000							1	.702**	0	0	0	0	0	0	0	0	0	.644*	0
D5001								1	-.644*	0	0	0	0	0	.600*	0	0	.583*	0
D8000									1	0	0	0	0	0	0	0	0	0	0
D8001										1	0	0	0	0	0	0	0	0	0
D8010											1	.805**	.613*	0	0	0	.728**	0	0
D8011												1	0	0	0	0	.659*	0	0
D8020													1	0	0	0	0	0	0
D8021														1	0	0	0	0	0
D9010															1	0	0	0	0
D9011																1	.698**	0	.568*
D9020																	1	0	.843**
D9021																		1	0
D9022																			1

Chapter VI: Further Risk Factors Connected to Health, education and Poverty

While the above microeconomic and macroeconomic sections showed the existence of important interdependencies among the components related to health, education and poverty, there are also important risks that affect both supply and demand for these components. The problem of migration of skilled labor with its relationship to education, poverty and to the overall social, economic and political conditions is a major example of the risks that are faced by developing economies and the region. Besides short, medium and long term effects of the risks related to migration of skilled labor, there are other risks related to longer terms impacts. These latter risks include environmental risks besides the structural trends that relate to the population. In this chapter, a special focus is placed on brain drain, gender issues and rural versus urban trends.

1. Accounting for gender inequality

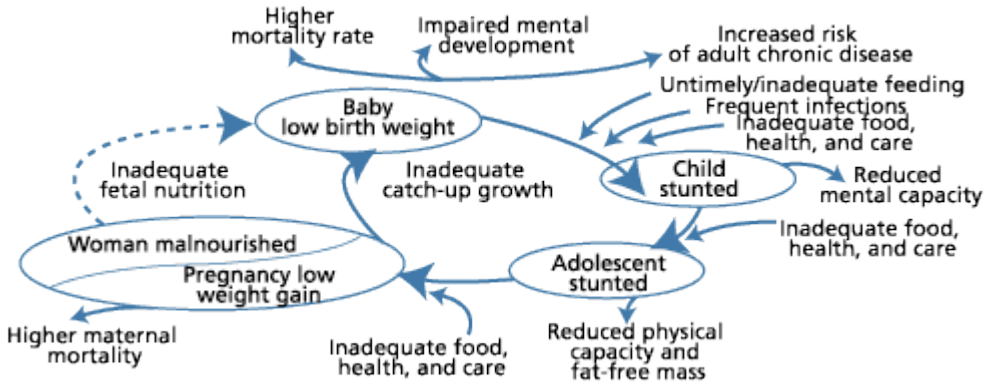
The best contribution in this area is that of Siddiqi Osmani and Amartya Sen (2003). They looked at the interconnections between gender inequality and maternal deprivation, on the health of coming generations. Women's deprivation in nutrition, healthcare and others at any age affects negatively society in the form of ill-health of current and future children but also of future adults. Maternal deprivation "adversely affects the health of the fetus, which in turn leads to long-term health risks that extend not just into childhood but into adulthood as well". But differences have been identified in the ways children and adults experience the consequences via fetal deprivation. According to the authors, gender inequality leads to a double loss that aggravates both regimes of diseases and thus raising the economic cost of "overlapping health transition".



Another contribution took the same avenue through focusing on why "Nutrition of Women and Adolescent Girls" matters (Elizabeth I. Ransom and Leslie K. Elder, 2003). Malnutrition as both under-nutrition and deficiencies related to absence of micronutrients is an ill health caused by poor food regime intake and its interactions with infectious and other poor health and social

conditions. This is affecting the well-being of millions of women and adolescent girls around the world. Although malnutrition's effects on this group have been recognized for decades, there has been little measurable progress in addressing the specific nutritional problems of women and adolescent girls. Ignorance about the symptoms of malnutrition, such as the lethargy and depression caused by iron deficiency, may be dismissed as "normal" or unimportant, further exacerbating the problem. Adequate nutrition is especially critical for women because affects not only the own health of undernourished women but also that of their children. Children of malnourished women are more likely to face cognitive impairments, short stature, lower resistance to infections, and a higher risk of disease and death throughout their live. Women in general express higher levels of health vulnerability relative to men. According to medical and specialized studies, this vulnerability is higher under poverty and absence of education. Socio-cultural factors and gender disparities increase women's chances of being malnourished. Globally, 50 percent of all pregnant women are anemic, and at least 120 million women in less developed countries are underweight. Research shows that being underweight hinders women's productivity and can lead to increased rates of illness and mortality. In some regions, the majority of women are underweight (South Asia, 60 percent of women are underweight). Many women who are underweight are also stunted, or below the median height for their age. Stunting is a known risk factor for obstetric complications such as obstructed labor and the need for skilled intervention during delivery, leading to injury or death for mothers and their newborns. It also is associated with reduced work capacity. Adolescent girls are particularly vulnerable to malnutrition because they are growing faster than at any time after their first year of life. They need protein, iron, and other micronutrients to support the adolescent growth spurt and meet the body's increased demand for iron during menstruation. Adolescents who become pregnant are at greater risk of various complications since they may not yet have finished growing. Pregnant adolescents who are underweight or stunted are especially likely to experience obstructed labor and other obstetric complications. There is evidence that the bodies of the still-growing adolescent mother and her baby may compete for nutrients, raising the infant's risk of low birth weight (defined as a birth weight of less than 2,500 grams) and early death. The following diagram shows the levels of interconnections among the variables involved throughout the life cycle.

Interdependencies of poor Nutrition, Health, Children and Capacity of Women



Source: Nutrition of Women and Adolescent Girls: Why It Matters, *by Elizabeth I. Ransom and Leslie K. Elder* (July 2003), reported as adapted from the ACC/SCN-appointed Commission on the Nutrition Challenges of the 21st Century.

Gender Empowerment Measure (GEM) as developed by UNDP has been showing consistently lower values for its different components that measure the participation of women (parliament, management and administration, technical and professional jobs). In 2002, the GEM values for Morocco, Mauritania, Turkey and Egypt were respectively 0.421, 0.410, 0.312 and 0.260. During the same year, the GEM of Norway and Finland attained 0.837 and 0.803. The most values attained by this index in 2007/2008 are 0.325, 0.129, 0.263 and 0.298 for Morocco, Yemen, Egypt and Turkey respectively.

This low level of the index indicates that women are not fully engaged in their respective economies. This is an important signal for the limited social, political and economic inclusion for most of the women in the countries of this region. While improvements in women social and familial status were promoted in Tunisia and more recently in Morocco, most women and mainly those in poor neighborhoods and in rural areas. They suffer from poor health, limited education besides poverty.

Based on WHO data on some health related variables, the estimated relationships have shown that urbanization is an important driver for the enhancement of medically controlled birth of children.

Country	Maternal mortality ratio (per 100 000) [Lower estimate-upper estimate]	Lifetime risk of maternal death (1 in)	Total fertility rate	Births attended by skilled health personnel (%)	Infant mortality rate (per 1000)	Urbanization (%)
	MMR	LRMD	FR	BASHP	IMR	URB
Algeria	0.140	0.005	2.500	0.920	3.500	0.633
Bahrain	0.028	0.001	2.500	0.990	0.900	0.965
Egypt	0.084	0.003	3.300	0.694	2.600	0.428
Iran	0.076	0.003	2.100	0.896	3.200	0.669
Iraq	0.250	0.015	4.800	0.721	10.200	0.669
Jordan	0.041	0.002	3.500	0.995	2.300	0.823
Kuwait	0.005	0.000	2.400	1.000	1.000	0.983
Lebanon	0.150	0.004	2.300	0.930	2.700	0.866
Libya	0.097	0.004	3.000	0.944	1.800	0.848
Mauritania	1.000	0.071	5.800	0.569	7.800	0.404
Morocco	0.220	0.008	2.800	0.626	3.800	0.587
Oman	0.087	0.006	3.800	0.947	1.000	0.715
Qatar	0.007	0.000	3.000	1.000	1.000	0.954
Saudi	0.023	0.002	4.100	0.930	2.200	0.810
Syria	0.160	0.008	3.500	0.700	1.500	0.506
Tunisia	0.120	0.003	2.000	0.898	2.100	0.653
Turkey	0.070	0.002	2.500	0.830	2.800	0.673
Emirates	0.054	0.002	2.500	1.000	0.700	0.767
Yemen	0.570	0.053	6.200	0.216	8.200	0.273

It is a 1 % change in urbanization that produces a similar level of realization in births attended by skilled medical staff. Otherwise, the maternal and infant mortality rates are still high in the region. They appear also to be inter-related and that a 1 point reduction in maternal mortality rate leads to 0.44 reductions in infant mortality. But, the increasing rate of urbanization can reduce

drastically the maternal mortality rate in these regions. Other related results are included in the following table.

Regressions	R^2	Observations
BASHP= 0.16 + 0.96 URB (2.52) (7.82)	0.78	19
IMR= 1.94 + 0.44 MMR (7.31) (4.62)	0.56	19
TFR= 1.95 + 0.14 LRMD (8.27) (3.54)	0.42	19
MMR= 4.49 + 1.02 LRMD – 1.10 TFR (16.03) (35.94) (-8.53)	0.99	19
MMR= -3.90 -1.88 URBR + 0.75 IMR (-13.17) (-2.59) (2.38)	0.69	19
IMR= 2.71 + 0.35 LRMD (2.75) (2.56)	0.59	19
BASHP= 0.49 – 0.19 IMR – 0.49 TFR (2.18) (-2.06) (-2.23)	0.56	19

Definition of variables: BASHP: Births attended by skilled health personnel %; IMR: Infant mortality rate per 1000; MMR: Maternal mortality rate 1 per 10000; LRMD: Lifetime risk maternal death 1 in; TFR: Total fertility rate; URBR: Urbanization rate %.

While the above results confirm the important role of women in the determination of different health, education and other socio-economic deficits, the case study of Morocco using aggregate data on drop-out from different school levels, do underline the magnitude of global interdependencies. This is again strengthened using cross section data on South Mediterranean countries. In these two exercises, data from different sources are used. In terms of nutrition, the variables used stand for the percentage of under-fives (2000-2006) suffering from underweight-moderate & severe, Vitamin A supplement coverage rate (6-59 months) 2005- at least one dose (%), Vitamin A supplement coverage rate (6-59 months) 2005- full coverage (%), percentage of children (2000-2006) who are breastfed with complementary food (6-9 months), percentage of infants with low birth weight 1999-2006 and percentage of households consuming iodized salt 2000-2006. Concerning health, the indicators used are the percentage of population using improved drinking-water sources 2004 (urban and Total), percentage of new-borns protected against tetanus, 1-year-old children immunized (2006) against Tuberculosis (corresponding vaccine is BCG), infant mortality rate (per 1000 live births), maternal mortality ratio (per 100 000 live births), life expectancy at birth- total (years), general government expenditure on health as percentage of total expenditure on health (% health), total expenditure on health as percentage of gross domestic product (Health exp) and total fertility rate 2006 (per woman). This report also uses a Moroccan local indicator which is the distribution of the number of disease cases subject to vaccination per region (2006) published by the "Direction de l'Epidémiologie et de la lutte Contre les Maladies (DELM)", Ministry of Health, Morocco. This indicator represents the incidence rate per 100000 inhabitants and the diseases are Measles, Tetanus, Whooping-cough, Poliomyelitis, Diphteria, Tuberculosis, Typhoid, Viral hepatitis, Bilharziose, Paludism and Leishmaniose. The average disease cases number per region is then computed and used in the regressions.

The education indicators used are the primary school enrolment ratio 2000-2006- net male, primary school enrolment ratio 2000-2006- net female, primary school attendance ratio (2000-2006) net male, drop out % rate primary, youth (15-24 years) literacy rate 2000-2006 (Female), primary school enrolment (% gross), secondary school enrolment (% gross) and percentage of

central government expenditures (1995-2005) on education. Other indicators related to the drop out rate from primary (per year, 6 years), secondary (per year, 3 years) and tertiary schools (per year, 3 years) per region for female and total (Ministry of Education, Morocco).

Concerning the explanation of drop-out in the case of Morocco, regression results show clearly the relationships between the rate of failure and drop-out from schools and the levels of poverty and health. The first set of outputs explains the drop-out rate at the level of primary schooling. Children leave school because of health problems (measured by average frequency of diseases in a region) and poverty (measured by region). The elasticity of loss relative to health is 0.81 meaning that a 1 % change in average disease leads to 0.81 % change in drop-out. Otherwise, to decrease drop-out from school by 0.81 %, health needs to be improved such that the frequency of diseases be reduced by 1 %. Similarly, a 1 % change in poverty leads to 0.56 % change in drop-out meaning that reduction of poverty by 1 % reduces the drop-out from primary school by 0.56 %. In case of simultaneous health and poverty improvements, the result is 1.37 % reduction in drop-out. Girls appear to have the leading role in this process because the corresponding elasticities are higher. These results are again confirmed when looking at the effect of age. It seems that health conditions and poverty affect the drop out at all levels of the primary school with poverty only affecting the drop-out of girls in 2nd and 3rd years. For the college level poverty seems to have an important influence on the drop out for both males & females. But the effects of poverty are getting lower in general and for females especially implying that other factors do affect the drop-out rate.

Interdependencies: Case of Morocco)	**R^2**	**Obs.**
Drop Out from Primary, Poverty & Health		
$\underset{}{\text{Ln}}\left(\text{Total primary drop out, M \& F}\right) = \underset{(-2.99)}{-0.81}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(3.97)}{0.56}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.63	15
$\underset{}{\text{Ln}}\left(\text{Total primary drop out, Female}\right) = \underset{(-3.32)}{-0.92}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(4.56)}{0.66}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.69	15
$\underset{}{\text{Ln}}\left(\text{Drop out from 1st year, primary, M \& F}\right) = \underset{(2.68)}{0.48}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.38	15
$\underset{}{\text{Ln}}\left(\text{Drop out from 1st year, primary, Female}\right) = \underset{(2.78)}{0.56}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.45	14
$\underset{}{\text{Ln}}\left(\begin{matrix}\text{Drop out from 2nd}\\ \text{year, primary, M \& F}\end{matrix}\right) = \underset{(-2.17)}{-1.03}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(3.02)}{0.84}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.56	14
$\underset{}{\text{Ln}}\left(\text{Drop out from 2nd year, primary, Female}\right) = \underset{(3.43)}{1.04}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.56	14
$\underset{}{\text{Ln}}\left(\text{Drop out from 3 rd year, primary, M \& F}\right) = \underset{(2.42)}{0.57}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.45	14
$\underset{}{\text{Ln}}\left(\text{Drop out from 3 rd year, primary, Female}\right) = \underset{(3.03)}{0.60}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.48	15
$\underset{}{\text{Ln}}\left(\text{Drop out from 4 th year, primary, M \& F}\right) = \underset{(-2.83)}{-0.99}\left[\text{Ln}\left(\text{Average Diseases}\right)\right]$	0.46	15
$\underset{}{\text{Ln}}\left(\begin{matrix}\text{Drop out from 4 th}\\ \text{year, primary, Female}\end{matrix}\right) = \underset{(-2.70)}{-1.12}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(2.49)}{0.54}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.48	15
$\underset{}{\text{Ln}}\left(\begin{matrix}\text{Drop out from 5 th}\\ \text{year, primary, M \& F}\end{matrix}\right) = \underset{(-3.67)}{-0.98}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(2.52)}{0.35}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.58	15
$\underset{}{\text{Ln}}\left(\begin{matrix}\text{Drop out from 5 th}\\ \text{year, primary, Female}\end{matrix}\right) = \underset{(-3.56)}{-1.03}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(2.74)}{0.41}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.58	15

$\text{Ln}\left(\begin{matrix}\text{Drop out from 6 th}\\ \text{year, primary, M \& F}\end{matrix}\right) = \underset{(-2.06)}{-0.96}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(3.80)}{0.93}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.57	15
$\text{Ln}\left(\begin{matrix}\text{Drop out from 6 th}\\ \text{year, primary, Female}\end{matrix}\right) = \underset{(-2.28)}{-1.07}\left[\text{Ln}\left(\text{Average Diseases}\right)\right] + \underset{(4.24)}{1.04}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.62	15
Drop Out from College & Poverty		
$\text{Ln}\left(\text{Drop out from college, Total, M \& F}\right) = \underset{(-2.01)}{-0.93} + \underset{(4.37)}{0.35}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.60	15
$\text{Ln}\left(\text{Drop out from college, Total, Female}\right) = \underset{(-2.41)}{-1.02} + \underset{(4.03)}{0.30}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.57	15
$\text{Ln}\left(\text{Drop out from 1 st year, college, M \& F}\right) = \underset{(4.53)}{0.55}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.61	15
$\text{Ln}\left(\text{Drop out from 1 st year, college, Female}\right) = \underset{(4.79)}{0.60}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.64	15
$\text{Ln}\left(\text{Drop out from 2 nd year, college, M \& F}\right) = \underset{(3.11)}{0.81}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.45	15
$\text{Ln}\left(\text{Drop out from 2 nd year, college, Female}\right) = \underset{(-2.36)}{-1.50} + \underset{(2.68)}{0.30}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.37	15
$\text{Ln}\left(\text{Drop out from 3 rd year, college, M \& F}\right) = \underset{(4.10)}{0.25}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.59	15
$\text{Ln}\left(\text{Drop out from 3 rd year, college, Female}\right) = \underset{(-2.30)}{-0.75} + \underset{(3.29)}{0.19}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.50	15
Drop Out from High School & Poverty		
$\text{Ln}\left(\text{Drop out from High School, Total, M \& F}\right) = \underset{(2.61)}{0.41}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.35	15
$\text{Ln}\left(\text{Drop out from High School, Total, Female}\right) = \underset{(2.08)}{0.26}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.25	15
$\text{Ln}\left(\text{Drop out from 3 rd year of High School, M \& F}\right) = \underset{(2.05)}{0.39}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.27	15
$\text{Ln}\left(\text{Drop out from 3 rd year of High School, Female}\right) = \underset{(2.00)}{0.52}\left[\text{Ln}\left(\text{Poverty rate}\right)\right]$	0.26	15

The second set of regression results confirms the role of health and mainly that of women on education. In this context, health has been measured by weight, nutrition, vaccination, maternal mortality and health expenditures. All these variables show their appropriate links with dependent variables related to different dimensions of education. These include school enrolment, female literacy, drop-out and public expenditures on education. Different regression results are introduced in the following table.

Interdependencies	**R^2**	**Obs.**
$\text{Ln}\left(\begin{matrix}\text{Pr imary school enrolment}\\ \text{ratio (2000- 06), net Male}\end{matrix}\right) = \underset{(12.12)}{7.19} - \underset{(-4.57)}{0.21}\left[\text{Ln}\left(\begin{matrix}\text{Underweight}\\ \text{moderate \& severe}\end{matrix}\right)\right] - \underset{(-4.14)}{0.65}\left[\text{Ln}\left(\begin{matrix}\text{Vitamin A supplement}\\ \text{at least one dose (\%)}\end{matrix}\right)\right]$	0.62	20
$\text{Ln}\left(\begin{matrix}\text{Prim. sch. enrolm. ratio}\\ \text{(2000- 06), net Female}\end{matrix}\right) = \underset{(8.51)}{6.82} - \underset{(-4.31)}{0.27}\left[\text{Ln}\left(\begin{matrix}\text{\% under 5 (2000- 06) suffering}\\ \text{from underweight mod. \& sev.}\end{matrix}\right)\right] - \underset{(-2.46)}{0.53}\left[\text{Ln}\left(\begin{matrix}\text{Vitamin A supplement}\\ \text{at least one dose (\%)}\end{matrix}\right)\right]$	0.53	20
$\text{Ln}\left(\begin{matrix}\text{Pr im. sch. enrol. ratio}\\ \text{(2000- 06), net Male}\end{matrix}\right) = \underset{(32.62)}{3.97} + \underset{(7.84)}{0.34}\left[\text{Ln}\left(\begin{matrix}\text{Vitamin A}\\ \text{supplement Full}\end{matrix}\right)\right] - \underset{(-3.38)}{0.10}\left[\text{Ln}\left(\begin{matrix}\text{Underweight}\\ \text{mod. \& sev.}\end{matrix}\right)\right]$	0.83	20
$\text{Ln}\left(\begin{matrix}\text{Prim. sch. attendance ratio}\\ \text{(2000- 2006), net Male}\end{matrix}\right) = \underset{(2.16)}{0.25}\left[\text{Ln}\left(\begin{matrix}\text{Improved Drinking-}\\ \text{water sources}\end{matrix}\right)\right] + \underset{(4.18)}{0.65}\left[\text{Ln}\left(\begin{matrix}\text{Immun. vaccines}\\ \text{"BCG"}\end{matrix}\right)\right]$	0.80	20
$\text{Ln}\left(\begin{matrix}\text{Prim. sch. attendance ratio}\\ \text{(2000- 2006), net Male}\end{matrix}\right) = \underset{(2.35)}{0.33}\left[\text{Ln}\left(\begin{matrix}\text{Improved Drinking-}\\ \text{water sources}\end{matrix}\right)\right] + \underset{(3.58)}{0.59}\left[\text{Ln}\left(\begin{matrix}\text{Immun. vaccines}\\ \text{"BCG"}\end{matrix}\right)\right]$	0.81	20

$\underset{}{\text{Ln}}\left(\text{Infant mortality under 5}\right) = \underset{(5.40)}{19.53} - \underset{(-2.09)}{1.82}\left[\text{Ln}\left(\text{Female literacy}\right)\right] - \underset{(-2.57)}{1.90}\left[\text{Ln}\left(\text{Nb Tetanos}\right)\right]$	0.59	17
$\text{Ln}\left(\text{Drop out}\right) = \underset{(3.39)}{16.72} - \underset{(-2.45)}{1.89}\left[\text{Ln}\left(\text{Health expenditures}\right)\right] - \underset{(-3.23)}{3.15}\left[\text{Ln}\left(\text{\% Health}\right)\right]$	0.56	13
$\text{Ln}\left(\text{\% Enrolment secondary}\right) = \underset{(2.30)}{4.29} - \underset{(-2.51)}{0.05}\left[\text{Ln}\left(\text{Maternal mortality (100000 births)}\right)\right]$	0.72	19
$\text{Ln}\left(\text{\% of children (2000- 2006) breastfed with complementary (6- 9 months)}\right) = \underset{(3.10)}{1.98} + \underset{(2.28)}{0.46}\left[\text{Ln}\left(\text{Gov.Exp. on Education}\right)\right] + \underset{(2.67)}{0.18}\left[\text{Ln}\left(\text{Household Iodized Salt Consump.}\right)\right]$	0.37	20
$\text{Ln}\left(\text{Health Exp}\right) = \underset{(3.82)}{5.34} + \underset{(3.14)}{0.33}\left[\text{Ln}\left(\text{\% Education}\right)\right] - \underset{(-3.99)}{0.95}\left[\text{Ln}\left(\text{\% Health}\right)\right]$	0.72	14

2. The effects of Rural and Urban interconnections:

At the exception of Bahrain, Kuwait and Qatar that are mainly urban, the other countries have lower but intermediate urbanization rates. These include Saudi Arabia, Jordan, Lebanon, United Arab Emirates and Oman. The remaining countries are still having important rural population and economy. These countries are Mauritania, Yemen, Libya, Tunisia, Algeria, Morocco, Egypt and Turkey. The socio-economic situation in these latter countries is exacerbated by the deficits originating from rural areas. These deficits are expressed by the limited availability of infrastructure and the difficulties of access to basic facilities. Rural emigration can be understood as the consequence of the socio-economic deficits prevailing in rural areas but also among the causes of urban degradation and poverty.

The socio-economic degradation of rural areas with its consequences on both rural and urban population has been extensively discussed in series of publications. The role of adverse macroeconomic policies has been discussed by A. Krueger, M. Schiff & A. Valdès, (1988) and M. Schiff and A. Valdès (1987). Liberalization policies have not often generated major changes in the direction of biases affecting rural areas (Boussard & al, 2005; Kym Anderson & al, 2006). Other contributions have placed emphasis on the role of agricultural market imperfections and their effects on prices and revenues (Idranil Dutta, 2004). Such pressures on agriculture and rural areas do accelerate rural migration and intensify the level of poverty (M. Ravaillon, 2006).

Within the above framework, South Mediterranean Countries and mainly those with important rural areas are pursuing agricultural liberalization policies with focus on larger reduction of government intervention. Rural development in this region and mainly in North Africa, Egypt and Turkey is the central component of any strategy that leads to improve living conditions and well-being of the societies. The significance of agricultural reforms countries stems not only from the need to reduce poverty (estimated 70% of poverty is in rural areas when those areas cover about 43% of the population) and to increase the attractiveness of rural regions

Tunisia, Lebanon, Egypt, Turkey and Morocco are intensively engaged in these policies with dismantling of state commodity marketing monopolies and continuous reduction of tariffs. Some sector models have been indicating that these policies have not been often in favor of rural areas. Producers of cereals and livestock products in the region could suffer significant losses from trade liberalization (Go-EuroMed, 2007). This characterizes the processes of degradation of rural areas with an increase of urban poverty. It is not in favor of economic and social development. Health, education and other basic needs are consequently affected and a more general situation of deprivation is observed.

The following table is devoted to characterizing the predominance of rural versus urban living conditions and styles in the region. The first column of data is based on the estimated rate of rural migration as calculated over 1990-2006 data. It is the change in rural population adjusted for natural rural population growth and reported to total population for each country.

Country	Rural Migration	Urbanization Rate
Jordan	0.014	0.823
Libya	0.005	0.848
Lebanon	0.003	0.866
Yemen	0.006	0.273
Algeria	0.004	0.633
Tunisia	0.002	0.653
Syrian	0.004	0.506
Oman	0.004	0.715
Morocco	0.003	0.587
Turkey	0.003	0.673
Egypt	0.001	0.428
Mauritania	0.001	0.404

The second column shows that the urbanization rate is generally between 0.3 and 0.7 for the North African region and for Syria and Turkey. Otherwise this rate is around and above 0.8 as this is the case of Kuwait, Bahrain and Qatar. But the highest rates for rural migration are in Jordan, Sudan and Yemen. Mauritania and Egypt with both relatively low rural migration and low urbanization show the predominance of rural living conditions. North African countries express intermediate figures for both rural and urbanization rates.

Marie Claude Martin (2008) in studying the perception that rural women in Morocco have of their health shows that better access to own as well as to collective resources contributes to the creation of capabilities to maintain a decent health status which supports the association between SES and health but also highlight the complexity of the mechanisms associating the two. Here notions such as freedom, governance and equity all take part in the explanation of the link and all have relevance in terms of policy implications.
The results of the study emphasize the importance of tackling jointly (meaning here simultaneously but also in a coordinated manner) individual, family, communal or regional mediators of socio economic status will lead to health improvements. Any intervention that increases individual and collective wealth and capabilities may render the environment more prone to produce health. The public investments undertaken have to take into account not only the health objective but also the socio economic status and the population vulnerability factors. Also public resources invested in one sphere of activity, in particular in education, will have positive spillovers in health.
The question asked by Martin is whether or not the availability and access to public health resources can reduce health inequalities and compensate for lower income. Including variables linked to the level and type of social and economic services and infrastructure in an economy in evaluating health is seldom done even in developed country studies. In the developing countries what is sometimes done is to analyze the impact of infrastructure directly linked to the risk of disease transmission (potable water, sanitation, electricity, health services).

Martin adopted a production approach to estimate the capacity of women at given levels of vulnerability to produce health with both own resources and collective ones available.
As a measure of the availability of collective resource the author uses the availability of public goods and services. The measures are density of primary schools and health centers per capita. Their proximity encourages their use.
The results support the expected relations between the individual's variables and the perception of health. Controlling for the age, number of children, reported morbidity and education a strong is found between standard of living and health.
The results referring to the availability of collective resources show that the communes with a high density of schools seem to report better perceptions of health than communes with low density of schools.
Analyzing the interactions between individual and collective resources the author shows that the women's health is associated with the communes characteristics but also with the individual resources that the women have at their disposal. For example if the available collective resources are too expensive for the poorest women these resources will be used essentially by wealthy women.
Further the presence of public resources seems more strongly linked with the health of poor women than wealthy ones.

3. The Aggravating Effects of disabilities

Among the important sources dealing with handicaps and disabilities in the region there is a note by the World Bank. From this note, the data reported are based on the information provided by Metts (2004) and used in the World Bank note. This information about disable population in the region is not precise and may concern 10 to 27 million people in 2002 for a total population of 250 million. Egypt and Iran seem to have the highest figures in the region.

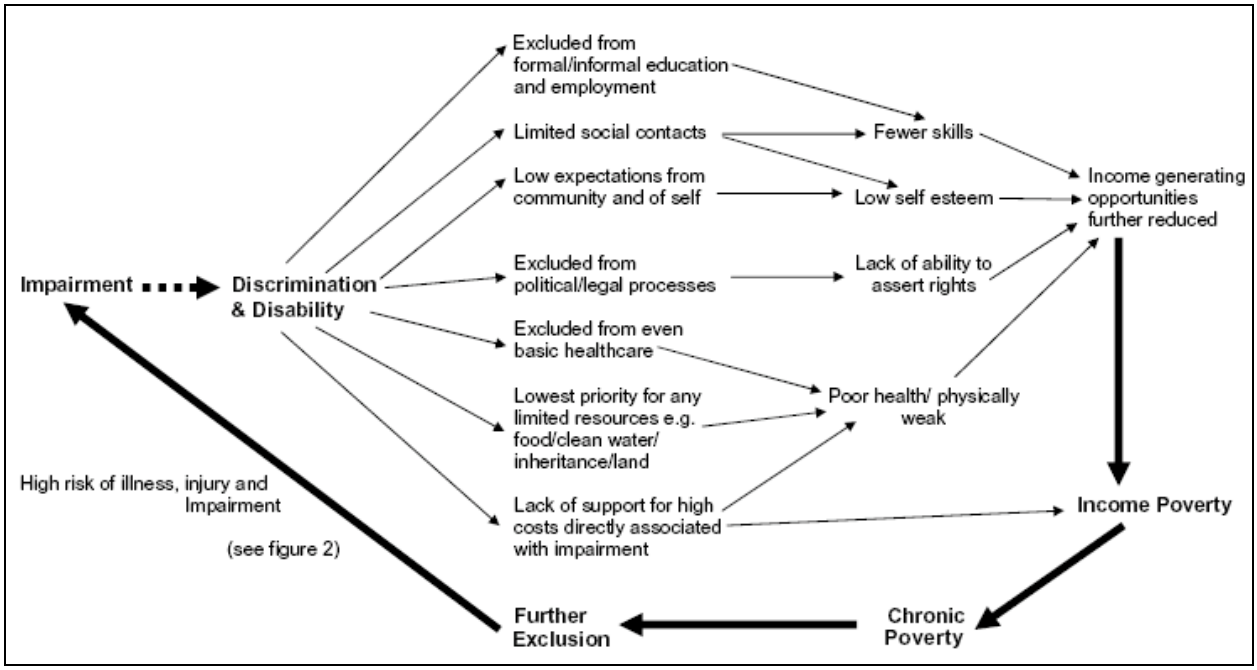
Disabled Population Estimates, 2002		
	Low Estimate	**High Estimate**
Algeria	1,158,100	3,098,700
Djibouti	7,000	69,300
Egypt	2,608,500	6,979,500
Iran	2,519,700	6,741,900
Iraq	725,200	1,940,400
Jordan	196,100	524,700
Lebanon	133,200	356,400
Morocco	1,113,700	2,979,900
Syria	510,600	1,366,200
Tunisia	358,900	960,300
West Bank & Gaza	125,800	336,600
Yemen	193,000	1,910,700
Total	9,649,800	27,264,600

Source: Metts (2004).

The literature on the relationship between poverty and disability in developing countries tends to be limited but seems to clearly be stating that poverty and disability are well related in the region. Also, disability appears to be an important source that can lead to poverty. It is also clearly established that the vulnerable segments of the population are likely to be suffering more from disabilities. Children, old people and women, especially in poor and rural areas are expected to suffer more from disabilities and handicaps. The following two figures show how the

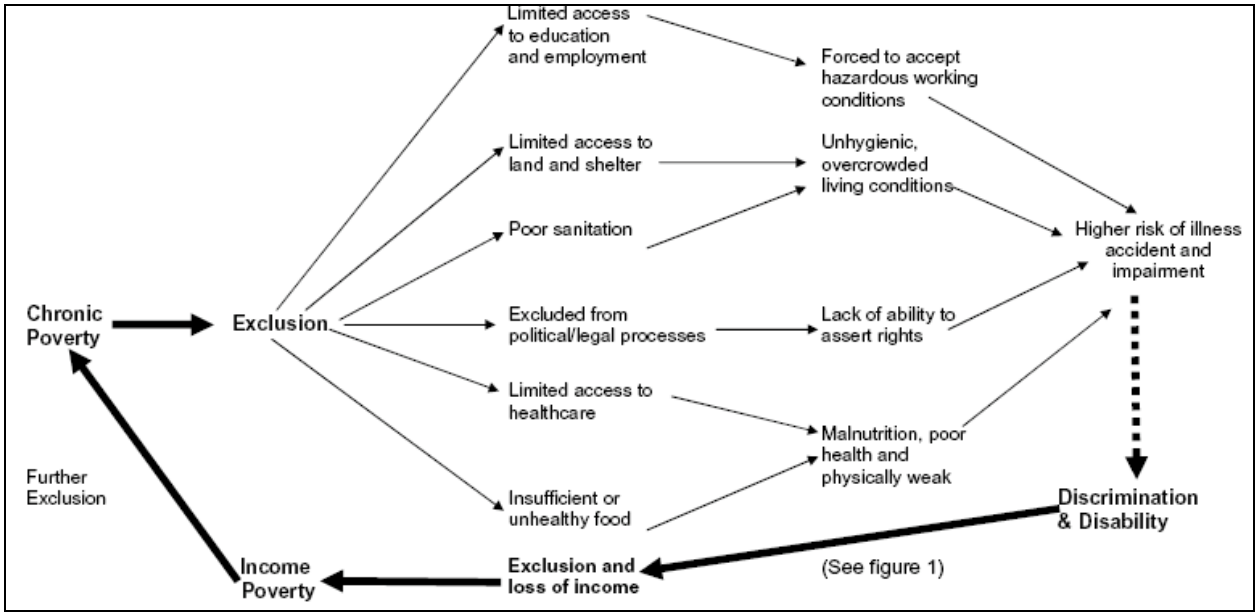
relationships between poverty and disabilities can be view and how the interdependent effects should be considered when looking at poverty alleviation.

Disability and Poverty



Source: Rebecca Yeo and Carren Moore. "Including Disabled People in Poverty Reduction Work: Nothing About Us, Without Us". (www.elsevier.com/locate/worlddev) World Development (2003) Vol. 31, No. 3, pp. 571–590, Elsevier Science Ltd.

Poverty and Disability



Source: Rebecca Yeo and Carren Moore. "Including Disabled People in Poverty Reduction Work: Nothing About Us, Without Us". (www.elsevier.com/locate/worlddev) World Development (2003) Vol. 31, No. 3, pp. 571–590, Elsevier Science Ltd.

Accidents, different hazards besides the prevalence of marriages contracted between close family members within the limits imposed by religion, appear to be the major sources of physical and mental disabilities and handicaps.

While further socio-economic and medical studies are needed for the region, the available investigations show that accidents at different stages of life that are related to different hazards, conflicts but also to the likely effects of consanguinity are the most important sources of handicaps and then of poverty.

The causes of disability in the region are also related to the "socio-economic and demographic changes, including aging populations, work-related injuries, accidents, increases in non-communicable diseases, and stress-related mental health problems" (Nour, 2005). These disabilities are then major sources for the development of distressed living conditions in different countries in the region. Different types of accidents including those on roads and others besides those related to smoking and other pratices have led to individual and group difficulties as the family impact can be observed quickly. It is certain that the on-going conflicts in the region are also among the sources of current observed handicaps. Studies from Yemen and Egypt indicate higher rates of disability for boys that could be related to higher mortality of disabled girls (Abu-Habib, 1997, cited in Nour, 2005). The UNDP site indicates that the disability rate in the region varies from 0.5 % to 4.4 % and is higher for males females. But these figures are too old that further monitoring of disabilities is needed.

		Disability Rate based on most recent surveys		
Country	Year	Total	Male	Female
Algeria	1992	1.2	1.4	1.1
Bahrain	1991	0.8	0.8	0.8
Egypt	1996	4.4		
Gaza	1996	2.1	2.3	1.8
Iraq	1977	0.9	1.1	0.7
Jordan	1994	1.2	1.5	1.0
Kuwait	1980	0.4	0.5	0.4
Lebanon	1994	1.0	1.2	0.8
Libya	1995	1.7	2.0	1.3
Mauritania	1988	1.5	1.5	1.5
Morocco	1982	1.1	1.2	1.1
Oman	1993	1.9	2.0	1.8
Qatar	1986	0.2	0.1	0.3
Sudan	1993	1.6	1.8	1.4
Syria	1993	0.8	1.0	0.6
Tunisia	1994	1.2	1.5	1.0
Turkey	1985	1.4	1.7	1.1
Yemen	1994	0.5	0.6	0.5

Other studies have attempted to reveal the extent of consanguinity in the region. While this is pervasive in other places in the world, the likely implied burden of this practice is likely to be

dominating among the poor households. But further investigations are needed to clarify the causal relationships between consanguineous marriage, disabilities and poverty.

The available literature shows that the extent of consanguinity in the region is not to be neglected even though sound economic, cultural and social reasons are behind it. But, these patterns are likely to affect to some extent, the level of disability and its social and economic consequences. As shown from the table below, the rate of first cousin marriage varies from the lowest 18 % and 20 % (Lebanon, Morocco and Egypt respectively) to 41 % to 43% (Saudi Arabia Libya, and Mauritania respectively). The other countries show rates that are between 20 and 34 %.

Rate of marriage with first cousin

Country	Percent of ever-married women (15 to 49 years old) who married a first cousin
Algeria	22
Bahrain	24
Djibouti	25
Egypt	20
Jordan	26
Kuwait	26
Lebanon	18
Libya	43
Mauritania	43
Morocco	19
Palestine	28
Oman	34
Qatar	34
Saudi Arabia	41
Syria	29
Tunisia	24
UAE	24
Yemen	31

Sources : League of Arab States, Pan-Arab Project for Child Development: Arab Mother and Child Health Surveys (Lebanon and Libya 1995, Morocco 1996/97) and Pan-Arab Project for Family Health (Syria and Tunisia 2001, Algeria Djibouti 2002, Morocco 2003/2004, and Yemen 2003); Council of Health Ministers of GCC States, Gulf Family Health Surveys (Bahrain, Oman, and United Arab Emirates 1995, Kuwait and Saudi Arabia 1996, Qatar 1998); ORC Marco, Demographic and Health Surveys (Mauritania 2001/2002, Jordan 2002, and Egypt 2003) and Palestinian Central Bureau of Statistics' special Tabulations of the 2004 Palestinian Demographic and Health Survey.
H.Rashad, M.Osman, and F.Roudi-Fahimi, 2005. Marriage in the Arab World. Population Reference Bureau (PRB)

Among the investigations devoted to the issues of consanguinity in the region, A.Bener and Khalid A.Alali (2004) dealt with the case of Qatar. They found that the degree of consanguinity between each female and her spouse in the studied sample was high (54 %) and that the dominant type of consanguineous marriage was between first cousins (35%). Furthermore, the consanguinity rate in Qatar appeared to have increased from 42% to 54 % in one generation. Another study looked at the case of Turkey (H.Flsloglu, 2002). This investigation showed that consanguineous marriage was preferred as important social and economic benefits are ensured to the family and to the group. Other studies (Lale Donbak, 2004) have looked at the consanguinity problem in a region of Turkey. The main results are that the region is experiencing a high rate of

consanguinity that is around 31 % on average and that there are needs for reduction to benefit the health quality of the population.

The following table as introduced in D.Tabutin and B.Shoumaker (2005) shows that consanguinity cannot be neglected when observing the relationships of marriages in South Mediterranean countries. The table shows that marriage between first cousins attains a maximum of 36 % in Saudi Arabia and a minimum of 15 % in Turkey. The other countries have rates varying from 22 % in Algeria (2002) to 35 in Egypt (1995).
Marriages between other relatives is less marked but still present with a maximum of 36% in Palestine (1995) and a minimum of 4 % in Egypt (1995) and Iran (1995). The other rates in the other countries vary between 6% in Yemen (1997) and 23% in Koweit (1987).

Country	Date of the survey	First cousins	Other relatives	no link	total
Algeria	1970	23	9	68	100
	1986	27	11	62	100
	2002	22	11	67	100
Saudi Arabia	1987	36	22	42	100
Egypt	1991	31	7	62	100
	1995	35	4	61	100
	2000	32	6	62	100
Iran	1991	25	4	71	100
Jordan	2002	26	17	57	100
Koweit	1987	30	23	47	100
Palestine	1995	30	36	34	100
Tunisia	1995	28	12	60	100
Turkey	1993	15	8	77	100
Yemen	1997	34	6	60	100

Sources: national reports

In Morocco, this type of marriage exists also as shown in J.Talbi et al. (2007). Consanguinity rate attains a maximum of 32.9% in Khouribga and a minimum of 18.2% in Safi. The table below shows also that high sickness rates within consanguineous marriages are observed with a maximum of 71.05% in El Jadida and a minimum of 53.85% in Khouribga. Consanguinity health related problems vary from 33.33% in Safi and 66.67% in Settat.
Another study (Noujai & Lfarakh, 1999) has already shown the role played by consanguineous marriages in the determination of socio-economics characteristics of families in Morocco. But further studies are needed to show the links between types of marriages, health and eventually handicaps.

4. The issue of children in the region:
The importance and extent of the issues related to children in the region is discussed here in relation to the new index related to child development indicator.
The Child Development Index (CDI) is produced by "Save the Children UK" is composed of three indicators covering the wellbeing of children in 88, 118 and 137 countries respectively for the periods 1990-94, 1995-99 and 2000-06.

The components included in the CDI measure deprivation in health, nutrition and schooling. Within a scale of 0-100, the lowest values show low levels of deprivations while higher scores indicate serious levels of deficits. These components include:
• Health: the under-five mortality rate (the probability of dying between birth and five years of age, expressed as a percentage on a scale of 0 to 340 deaths per 1,000 live births),
• Nutrition: the percentage of under age of five years, who are moderately or severely underweight,
• Education: the percentage of primary school-age children who are not enrolled in school.
The overall Child Development Index is the simple average of the three components for each period under review and for each country.

The following table introduces the levels of CDI for countries in the study region for the three successive periods.

Child Development Index 1990-2006

Country	Child Development Index		
	1990–94	1995–99	2000–06
Algeria	13.55	12.63	6.57
Bahrain	..	5.76	4.51
Egypt	16.94	12.66	7.61
Iraq	11.18	17.52	..
Jordan	8.01	8.17	6.84
Kuwait	..	9.1	9.89
Lebanon	..	8.9	10.23
Mauritania	50.12	32.03	29.69
Morocco	26.35	19.62	11.01
Oman	21.44	14.25	15.7
Qatar	..	6.83	5.16
S.Arabia	..	9.1	9.89
Syria	10.73	9.66	6.4
Tunisia	..	7.7	4.54
Turkey	20.01	15.25	7.12
U.A.E.	..	12.94	9.61
Yemen	40.37	42.03	33.32

Source: The Child Development Index Holding governments to account for children's wellbeing (2008) by Save the Children 1 St John's Lane London EC1M 4AR UK

For the period of 1990-94, the highest value of 50.12 is observed in Mauritania with the lowest for Jordan 8.17. For the period 1995-99, the highest and lowest values are respectively Yemen and Bahrain (42.03 and 5.76). The highest value for the period 2000-06 is for Yemen 33.32 while the lowest score is for Bahrain and Tunisia (4.51 and 4.54). But all these countries have had a decrease of their CDI. The means for all countries are respectively 21.87, 14.36 and 11.13 while the corresponding standard deviations are 13.70, 9.50 and 8.47. The maximal values are 50.12, 42.03 and 33.32 while the minimal ones are 8.01, 5.76 and 4.51.
This shows that the levels of CDI in the region are still high in comparison with developed economies but large variability in this index characterizes the region even though a creasing trend is observed for each country and overall.

5. Migration of Medical Skilled Labor:

The new economics of skilled labor emigration from developing countries has been providing new evidence to support the existence of human capital gains not only in the destination but also in the source countries. But, there has been no final position with regard to the magnitude of the potential gains and losses achieved by the countries source of emigration because remittances and skills may not be complements (G. Ranis, 2007). Also, when accounting for risk aversion, gains in education in countries of the origin of migrants are reduced and losses can be experienced (Driouchi, Baudassé, Boboc and Zouag, 2008). This brings back the issue of brain drain that has prevailed earlier. The emigration of medical doctors and nurses given the shortage experienced in developed countries helps understand the extent and magnitude of its socio-economic implications. While the brain drain can affect all the sectors in different economies, it is crucial for the area of health given its interdependencies with education and other socio-economic dimensions. This emigration constitutes an important risk for the supply of health care staff both quantitatively and qualitatively. South Mediterranean countries can suffer from this risk even if drastic health care plans and actions are developed without addressing the issue of brain drain.
This section introduces the main issues related to the problem of brain drain in general with a specific focus on its effects on health and related sectors in the context of South Mediterranean countries.

5.1: Brain Drain and Overall migration of skilled labor:

Important results have been attained when looking at the issue of brain drain. Some authors have developed models and assessments of human capital gains and losses over different economies (M. Beine et al, 2001, 2003, 2006; F. Docquier and H. Rapoport, 2003, 2005, 2007; F. Docquier, O. Lohest and A. Marfouk, 2005, 2007; F. Docquier and K. Sekkat, 2006; F. Docquier, B. Lindsay Lowell and A. Marfouk, 2007). Besides showing the existence of brain gains, the findings include also the factors that affect migration and the magnitude of human capital gains and losses. Given the multiplicity of factors that have an impact on human capital gains and losses in the countries source of skilled labor migration, domestic, regional and international policies need further investigations and more practical evidence (F. Docquier and K. Sekkat, 2006). In this process series of contributions are still developing (Peter Schaeffer, 2005; B. C. Chakraborty, 2006 and Hung-Ju Chen, 2006).
Based on the data of Docquier and Marfouk for the year 2000, the emigration rates of different labor skills in some South Mediterranean countries show levels that vary from 0 to 9.4 %. Highly skilled labor can represent up to 38.6 % of the total emigration. This generally a high rate compared to the total average shown in the first row of the following table. OECD countries appear to be among the major recipients of this emigration. These higher rates show that the likelihood of brain drain is very high for the region.

	Rate of emigration				Working-aged residents (in thousand)				Emigrants (OECD)			
	Low	Medium	High	Total	Low	Medium	High	Total	Low	Medium	High	Total
TOTAL	1.1%	1.8%	5.4%	1.8%	1880775	945844	360614	3187233	21511670	17107447	20403327	59022443
Algeria	4.6%	2.1%	9.4%	4.5%	9669	2557	822	13048	466467	55820	85537	607824

Egypt	0.2%	0.8%	4.6%	0.9%	18701	7434	3131	29266	46382	58048	149432	253861
Libya	0.5%	0.6%	2.4%	0.9%	1032	750	471	2253	4849	4854	11441	21144
Morocco	6.8%	8.1%	17.0%	7.6%	10635	2034	691	13361	773685	180313	141168	1095166
Sudan	0.1%	0.7%	6.9%	0.3%	11163	1198	252	12613	8442	8897	18789	36127
Tunisia	5.1%	3.8%	12.5%	5.4%	3574	799	274	4648	192846	31939	39350	264135
Mauritania	0.8%	3.6%	11.8%	1.2%	917	46	19	982	7398	1707	2556	11662
Bahrain	0.5%	1.0%	4.9%	1.3%	189	130	46	364	1017	1270	2351	4638
Iraq	1.3%	4.0%	11.1%	2.7%	6497	1560	758	8816	85838	65505	95086	246429
Jordan	1.0%	2.4%	7.2%	2.8%	923	671	421	2015	9685	16513	32768	58966
Kuwait	0.5%	0.9%	7.1%	1.8%	563	537	206	1306	2774	4706	15785	23266
Lebanon	9.4%	11.1%	38.6%	15.0%	911	625	220	1756	94613	77963	138214	310789
Oman	0.0%	0.0%	0.6%	0.1%	575	394	139	1108	276	194	791	1261
Qatar	0.1%	0.2%	2.5%	0.5%	183	125	44	352	246	247	1128	1621
Saudi Arabia	0.0%	0.1%	0.9%	0.2%	4854	3329	1169	9352	2232	3656	10738	16626
Syria	0.9%	2.3%	6.1%	1.9%	4087	1254	805	6146	36326	28947	51851	117124
Turkey	5.7%	4.9%	5.8%	5.6%	25742	4572	2816	33130	1556811	237729	174043	1968583
Emirates	0.1%	0.1%	1.0%	0.2%	864	593	208	1665	530	498	2119	3146
Yemen	0.1%	1.2%	6.0%	0.4%	4968	533	112	5614	7053	6678	7218	20949

This high level of emigration rate is critical for engineers, medical doctors and nurses besides other types of technicians. The following paragraph is devoted to medical doctors.

5.2: Migration of medical skilled labor:

The "Medical Brain Drain" is a new panel data on physicians' emigration rates (1991-2004) developed by Frédéric Docquier and Alok Bhargava in September 2006. This dataset is recognized by the authors as a product of the Trade Team - Development Research Group, is part of a larger effort in the group to measure the extent of the brain drain as part of the International Migration and Development Program (World Bank contract PO. 7669002). According to this database, the South Mediterranean countries have shown in 2004 high levels of emigration of medical doctors. The main countries of destination are UK, USA, France, Canada, Germany, Belgium, Australia, Italy, Sweden, Switzerland and Austria.

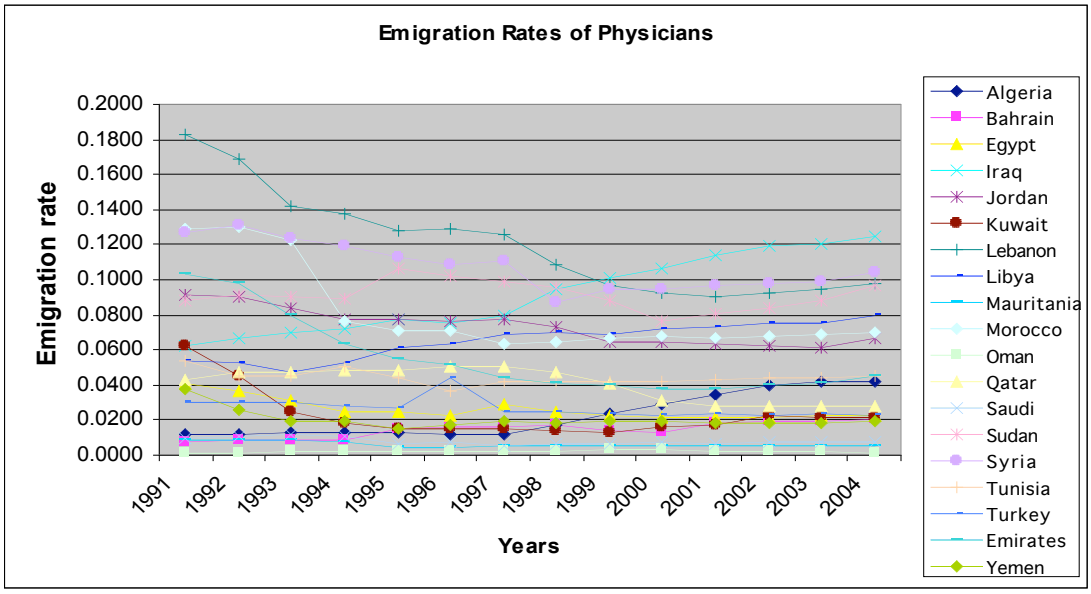
In 2004, the emigration of medical doctors rates for different countries of the region are shown in the following table. The total emigration rate related to all destinations ranges from 0.1 to 12 percent. The lowest rates occur in Oman, Saudi Arabia and Mauritania while the highest levels are attained by Iraq, Lebanon, Syria, Sudan and Morocco. Intermediate levels are recognized for the remaining countries with values between 2 and 4 percent.

Emigration rates of physicians in South Mediterranean Countries 2004

	Physicians' emigration rates in %											
COUNTRY	Total	USA	UK	CAN	FRA	GER	BEL	AUS	ITA	SWE	SWI	AUT
Algeria	0.0423	0.0011	0.0001	0.0008	0.0323	0.0004	0.0058	0	0.0005	0.0004	0.0008	0
Bahrain	0.0205	0.006	0	0.0086	0	0	0	0.0058	0	0	0	0
Egypt	0.0226	0.0123	0.0008	0.0012	0.0002	0.0008	0.0002	0.0041	0.0009	0.0003	0	0.0005
Iran	0.0633	0.0226	0.0011	0.0014	0.0007	0.0177	0.0007	0.0022	0.0013	0.0103	0.0001	0.0048
Iraq	0.1243	0.0309	0.0084	0.006	0.0007	0.011	0.0008	0.0124	0.0021	0.0292	0.0003	0.0043
Jordan	0.0662	0.0267	0.0021	0.0007	0.0003	0.0168	0.0009	0.0014	0.0146	0.0009	0.0002	0.0017
Kuwait	0.0214	0.0062	0.0003	0.0104	0	0	0	0.0021	0.0003	0.0021	0	0

Lebanon	0.0974	0.0508	0.0001	0.0093	0.0057	0.0054	0.005	0.006	0.0099	0.004	0.0004	0.0008
Libya	0.0794	0.0056	0.0073	0.0091	0	0.0171	0.0008	0.0007	0.0291	0.0013	0.0001	0.0011
Mauritania	0.0058	0	0	0	0	0	0.0033	0	0	0.0025	0	0
Morocco	0.0702	0.0023	0	0.0006	0.0159	0.0043	0.0439	0.0003	0.0016	0.0008	0.0004	0.0002
Oman	0.0013	0.0003	0	0	0	0	0	0.001	0	0	0	0
Qatar	0.0282	0	0	0	0	0	0.0282	0	0	0	0	0
Saudi Arabia	0.0077	0.0012	0.0001	0.0049	0	0.0007	0	0.0002	0.0002	0	0	0.0004
Sudan	0.0971	0.024	0.0141	0.002	0.0005	0.0104	0.0002	0.0077	0.0012	0.0024	0.0002	0.0011
Syria	0.1048	0.0543	0.002	0.0021	0.0076	0.0182	0.0015	0.0019	0.0098	0.0039	0.0001	0.0032
Tunisia	0.0453	0.0019	0.0001	0	0.0065	0.0029	0.021	0	0.0109	0.0011	0.0004	0.0003
Turkey	0.0231	0.0051	0.0002	0.0004	0.0001	0.0092	0.0046	0.0007	0.0003	0.0007	0.0003	0.0012
United Arab Emirates	0.0449	0.0012	0.0002	0.0426	0	0	0	0.0004	0	0.0005	0	0
Yemen	0.0194	0.0014	0.0012	0.0005	0	0.0108	0	0.0026	0.0006	0	0.0002	0.0019

Even though the rate in 2004 appears to be high, the trends expressed over the period 1991-2004 appear to be promising (constant or decreasing) for most of the countries in the region. The countries show increasing rates are Algeria, Iraq, Libya and Bahrain. All other countries have either constant or decreasing annual trends. The decreases even if statistically significant are still low. Lebanon and Syria besides Jordan and Egypt have shown important reduction in their rates of emigration of physicians. The following graph introduces the country comparisons.

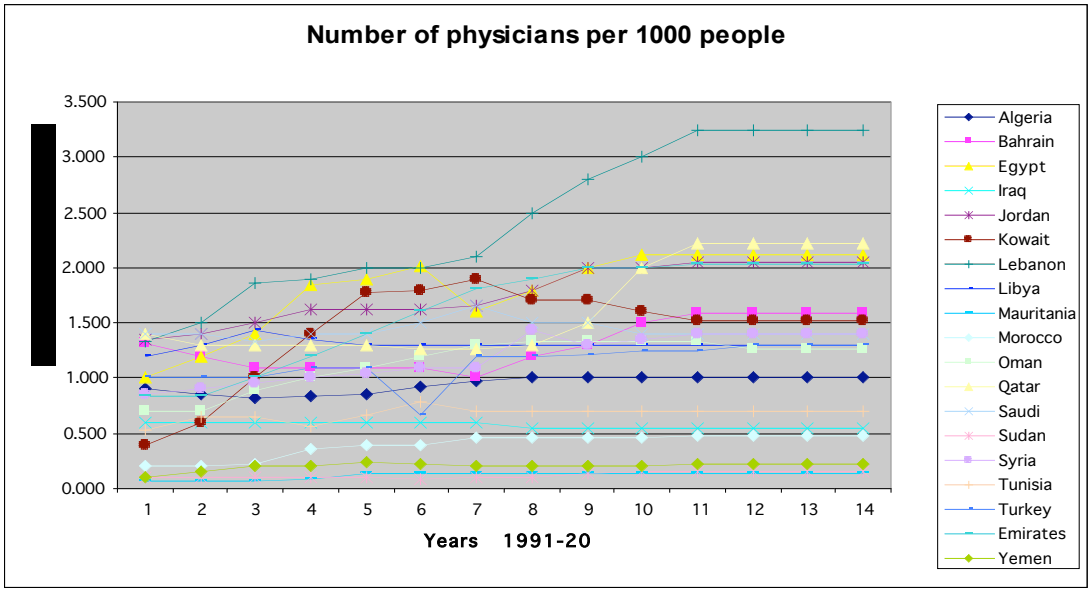


The table below confirms the 1991-2004 trends expressed by each country included in the sample. The first observation is that the decreases are low. The second observation is that these trends are obtained from net emigration rates and may also be related to other factors that are outside the willingness of these countries to retain their medical doctors.

Annual trends of emigration rates of physicians

Country	R^2	Intercept	t-stat Intercept	Coeff	t-stat coeff	Observations
Algeria	0.84	0.005	1.860	0.003	8.000	14
Bahrain	0.78	0.008	7.550	0.001	6.590	14
Egypt	0.61	0.033	16.720	-0.001	-4.330	14
Iraq	0.96	0.060	24.960	0.005	17.140	14
Jordan	0.88	0.088	46.880	-0.002	-9.240	14
Kuwait	0.29	0.035	5.600	-0.002	-2.230	14
Lebanon	0.86	0.160	27.210	-0.007	-8.410	14
Libya	0.90	0.050	29.560	0.002	10.370	14
Mauritania	0.39	0.008	12.050	0.000	-2.770	14
Morocco	0.55	0.110	12.410	-0.005	-3.850	14
Oman	0.09	0.002	6.150	0.000	1.200	14
Qatar	0.66	0.053	17.870	-0.002	-4.870	14
Saudi A.	0.34	0.010	12.370	-0.002	-2.470	14
Sudan	0.06	0.094	22.240	-0.001	-0.860	14
Syria	0.64	0.125	29.280	-0.003	-4.630	14
Tunisia	0.17	0.047	35.590	0.000	-1.580	14
Turkey	0.30	0.032	12.810	-0.001	-2.260	14
Emirates	0.71	0.084	13.230	-0.005	-5.390	14
Yemen	0.28	0.025	10.280	-0.001	-2.190	14

But the emigration rate has to be viewed with the domestic availability of medical doctors. When this latter variable is measured by the number of physicians per 1000 people for each country, large variations appear. The following graphic shows how Lebanon has been leading both annually and throughout the study period 1991-2004 with almost 3.5 doctors for 1000 people. It is followed by Egypt that attains a level above 2. The other countries are largely below 2 doctors per 1000 people with most of them being between 1 and 1.5.



But, the most important element in this analysis is the trend pursued by each country with regard to the domestic availability of doctors. The following table shows the annual trends for each country. These trends are most of the time statistically different except between Sudan and Mauritania where both have low annual trends. Iraq is also and exception as it shows a negative annual trend. The highest rate of annual improvement is attained by Lebanon (0.16). It is followed by United Arab Emirates (0.10), Qatar (0.09), Egypt (0.08), Jordan (0.06), Kuwait (0.06), Oman (0.05), Syria (0.05) and Bahrain (0.04). The other countries have lower and slower annual changes ranging from 0 (Saudi Arabia and Libya) to 0.03 (Turkey). The other countries have annual rates of 0.01 (Tunisia, Mauritania and Sudan) and 0.02 (Algeria and Morocco). The estimated rate for Yemen is 0.005. Also all the countries in the sample have statistically significant intercepts that are generally high at the exception of Yemen, Sudan and Mauritania.

Country annual trends in number of physicians per 1000 people

	R squared	Intercept	t-stat constant	Coefficient	t-stat coefficient	Observations
Algeria	0.70	0.84	40.12	0.02	5.31	14
Bahrain	0.58	1.04	13.57	0.04	4.11	14
Egypt	0.71	1.32	12.59	0.08	5.49	14
Iraq	0.79	0.61	86.72	-0.01	-6.80	14
Jordan	0.93	1.38	37.86	0.06	12.60	14
Kuwait	0.35	1.01	5.31	0.06	2.56	14
Lebanon	0.95	1.37	16.97	0.16	15.43	14
Libya	0.02	1.31	49.78	0.00	-0.51	14
Mauritania	0.63	0.08	7.12	0.01	4.51	14
Morocco	0.77	0.24	8.89	0.02	6.40	14
Oman	0.68	0.85	12.27	0.05	5.01	14
Qatar	0.72	1.06	8.84	0.09	5.53	14
Saudi A.	0.00	1.43	33.50	0.00	0.12	14
Sudan	0.77	0.08	11.84	0.01	6.40	14

Syria	0.87	0.87	21.58	0.05	9.09	14
Tunisia	0.35	0.62	23.29	0.01	2.54	14
Turkey	0.48	0.94	14.18	0.03	3.36	14
Emirates	0.87	0.94	10.36	0.10	8.84	14
Yemen	0.33	0.17	10.76	0.005	2.45	14

From the above descriptive statistical analyzes, it can be inferred that there are variations among countries in the South Mediterranean region with regard to the likely effect of medical brain drain. All these countries have significant emigration rates of physicians. In 2004, countries such as Iraq, Syria, Lebanon, Libya Jordan, Sudan, Morocco and Jordan had emigration rates of physicians higher than 7 percent. At the exception of Mauritania (0.6 %), Oman (0.13 %) and Saudi Arabia (0.8 %), the other countries in the sample have rates that are between 2 and 4 percent.

But over the period 1991-2004, the annual trends estimated for the rate of emigration and for the number of physicians per 1000 people, show signals that are in favor of reduction (RBD), increase (IBD) and constant brain drain (CBD). The following table summarizes the country ranking with respect to each variable respectively. This table clearly suggests that accounting for both variables shows that Lebanon, Emirates, Jordan, Syria, Morocco, Egypt, Kuwait, Qatar and Turkey have been pursuing a strategy of net brain drain reduction. Sudan is also in the above category but the rates of improvements are slower. Countries like Tunisia while improving its number of physicians could also benefit from further reduction of its emigration rate. While Algeria is benefiting from the increase of its medical stock, it is facing the increase of the emigration rate. On the other extreme, Libya and Iraq have appeared to be faced with the medical brain drain.

Ranking of countries

Emigration rates of physicians			Number of physicians per 1000 people		
	Coeff			Coeff	
Lebanon	-0.007	RBD	Lebanon	0.16	RBD
Morocco	-0.005	RBD	Emirates	0.1	RBD
Emirates	-0.005	RBD	Qatar	0.09	RBD
Syria	-0.003	RBD	Egypt	0.08	RBD
Jordan	-0.002	RBD	Jordan	0.06	RBD
Kuwait	-0.002	RBD	Kuwait	0.06	RBD
Qatar	-0.002	RBD	Oman	0.05	RBD
Saudi	-0.002	RBD	Syria	0.05	RBD
Egypt	-0.001	RBD	Bahrain	0.04	RBD
Sudan	-0.001	RBD	Turkey	0.03	RBD
Turkey	-0.001	RBD	Algeria	0.02	RBD
Yemen	-0.001	RBD	Morocco	0.02	RBD
Mauritania	0	CBD	Mauritania	0.01	RBD
Oman	0	CBD	Sudan	0.01	RBD
Tunisia	0	CBD	Tunisia	0.01	RBD
Bahrain	0.001	IBD	Yemen	0.005	RBD
Libya	0.002	IBD	Libya	0	CBD
Algeria	0.003	IBD	Saudi A.	0	CBD
Iraq	0.005	IBD	Iraq	-0.01	IBD

The emigration of medical skilled labor affects also the domestic availability of nurses and technicians. The available documents and publications show that the South Mediterranean countries are also concerned by this type of emigration. With the limited number of reports and studies dealing with the specific determinants of nurse emigration, it is assumed that the overall economic, social and political environment of the region do have a major impact on the decisions to emigrate. Given the number of female nurses in the overall stock of medical staff, the status of women in the region may also play an important role in these decisions. This adds more pressure on the domestic medical training system and relates consequently the problem to the necessary reforms of education in these countries. Research and medical research are also important inputs for the enhancement of the efficiency of the health system. This is again constrained by the brain drain of medical staff including researchers.
The risk related to brain drain is an important issue to be considered when formulating and implementing integrated economic and social policies devoted to the enhancement of the well being of the populations in the region.

Conclusion

This chapter has been focusing on some special topics that are directly related to the magnitude and extent of interdependencies of health, education and poverty. These issues have covered the brain drain, the gender, the rural/urban besides the topic of handicaps. Further results have been consequently attained from the above concerns.
If health were an important matter in the region of study, important risks as that of brain drain may affect the supply of adequate health care under the pressure of limited human resources. These limitations are emphasized when focusing on the role of women and children with their central economic and social roles in different economies. In the context of SMCs further improvements are shown to be needed in relation to the inclusion of women in these economies and societies given the potential gains that each country can attain. Under the pressure of rural versus urban pressures, both men and women suffer relatively from higher levels of deficits in rural areas but urbanization does not reduce the deficits if decent inclusion policies were absent. While handicaps originate not only from genetic concerns, these latter appear to be important and require further identification and communication with the poor segments of the population.

References

- A. Bener and K.A.Alali (2004). “Consanguineous Marriage in a Newly Developed Country: The Qatari Population”
- Ahmed Driouchi, Thierry Baudassé, Cristina Boboc and Nada Zouag (2007). "New Economics of Brain Drain and Risk aversion: Theory and Empirical Evidence", Laboratoire d'Economie d'Orléans
- Akala, F. A. and S. El-Saharty (2006). “Public Health Challenges in the Middle East and North Africa,” Lancet, 367 (9515): 961-4.
- Boussard et al, 2005 Jean Marc Boussard JM, Gérard F, Piketty MG. « Libéraliser l’agriculture? Théorie, modèles et réalité” 2005.
- D. Tabutin et B. Schoumaker, 2005 : La démographie du monde arabe et du Moyen-Orient des années 1950 aux années 2000. Synthèse des changements et bilan statistique, Institut National d’Etudes Démographiques | Population2005/5-6 - 60e année, P : 25-26,
- Donbak Lale (2004). “Consanguinity in Kahramanmaras city, Turkey, and its medical impact”, Saudi medical journal
- Elizabeth I. Ransom and Leslie K. Elder (2003). "Nutrition of Women and Adolescent Girls: Why it matters"
- F. Docquier and H. Rapoport (2003, 2005, 2007). "The Economics of Migrants Remittances"
- F. Docquier, O. Lohest and A. Marfouk (2005, 2007). "Brain drain in developing regions (1990-2000)", IZA, Discussion Paper

- F. ***Docquier*** and ***K. Sekkat*** **(*2006*)** "Brain Drain, What Do We Know?" Working Paper No.31,. Agence française de développement
- F. Docquier, B. Lindsay Lowell and Abdeslam Marfouk, (2007)."Measuring Brain Drain by Gender"**,** research at the World Bank.
- Gustav Ranis, Yale University (2007). "Migration, Trade, Capital and Development: Substitutes, Complements and Policies", Center discussion paper N°. 950
- H.Flsloglu (2002)." Consanguineous Marriage and Marital Adjustment in Turkey".
- ***Hung-Ju Chen (2006)***. "International migration and economic growth: a source country perspective," Journal of Population Economics, Springer, vol. 19(4)
- I. Dutta & A. Mishra, 2004. "Corruption and Competition in the Presence of Inequality and Market Imperfections," Working papers 123, Centre for Development Economics, Delhi School of Economics.
- J. Talbi, A. Khadmaoui, A. Soulaymani and A. Chafik, 2007: Study of Consanguinity in Moroccan population. Influence on the profile of health
- Kym Anderson, Will Martin and Dominique van der Mensbrugghe (2006) "Would Multilateral Trade Reform Benefit Sub-Saharan Africans"
- Krueger AO, M. Schiff et A. Valdes (1988). "Agricultural Incentives in Developing Countries: Measuring the Effects of Sectoral and Economy Wide Policies". World Bank Economic Review, Sept 1988, Vol. 2, No 3, September.
- Lina Abu Habib (1997)." Gender and disability: women's experiences in the Middle East", Oxfam
- Marie-Claude Martin (2008)." Individual and Collective Resources and Health in Morocco", WIDER Research Paper, Volume: 2008/21
- Michel Beine, Fréderic Docquier, Hillel Rapoport (2001, 2003, 2006)."Brain Drain and Economic Growth:Theory and Evidence*",* Journal of Development Economics, Volume 64,Issue 1, February 2001
- Noujai A; Lfarakh A (1999). "Enquete Nationale sur la Sante de la Mere et de l'Enfant », Ministere de la Sante, Direction de la Planification et des Ressources Financieres, Service des Etudes et de l'Information Sanitaire, Royaume du Maroc
- Peter Schaeffer (2005). "Human Capital, Migration Strategy, and the Brain Drain.", Journal of International Trade and Economic Development
- Ravallion, Martin, 2006. "Looking beyond averages in the trade and poverty debate," World Development
- Robert L.Metts (2004)." Background paper prepared for the !disability and development Research Agenda Meeting in the World Bank
- Roudi-Fahimi, Farzaneh (2003). "Women's Reproductive Health in the Middle East and North Africa." Population Reference Bureau. MENA Policy Brief.
- Roudi-Fahimi, Farzaneh (2005). "Achieving the MDGs in the Middle East: Why improved Reproductive Health is Key," Population Reference Bureau, at: http://www.prb.org/Articles/2005/AchievingtheMDGsintheMiddleEastWhyImprovedReproductiveHealthisKey.aspx
- Roudi-Fahimi, Farzaneh (2007). "Gender and Equity in Access to Health Care Services in the Middle East and North Africa," Population Reference Bureau, at: http://www.prb.org/Articles/2006/GenderandEquityinAccesstoHealthCareServicesintheMiddleEastandNorthAfrica.aspx
- Schieber, George, Akiko Maeda and N. Klingen (2007). "Health Reforms in the MENA Region."
- Siddiq Osmani, & Amartya Sen (2003). "The hidden penalties of gender inequality: fetal origins of ill-health,"
- UK Save the Children, (2008). "The Child Development Index Holding governments to account for children's wellbeing", by St John's Lane London EC1M 4AR UK

Chapter VII: Economic & Social Policies accounting for Interdependencies of Health, Education and Poverty

The results attained in the current study show clearly the extent and magnitude of the levels of interdependencies between different series of socio-economic variables at both regional and country levels in the South Mediterranean area. This strengthens the validity of the multidimensional approach to poverty and to wealth as supported by the empirical analyzes conducted using series of the variables pertaining to economic, social and other dimensions directly related to the region of study. The interdependencies assessed within the framework of the current study show also that further and meaningful gains can be implicitly expected from the existence and from the consideration of these relationships. Economic and social policies that have been pursued in the region and in each of its countries can therefore benefit from more integration and coordination at local, national, regional and international levels. Major reforms have been undertaken to cover economic, education and health policies besides the further move in democratization in the region. But, these reforms have not addressed the depth of integration and further coordination among different public organizations and institutions in the economic and social spheres and sectors. Even the development of non-governmental agencies and the inclusion of private sectors in social policies do still appear to be sector specific and is not all the time fully contributing to the transversal nature of the policies that are needed by the population of the region. While transversal and interdependent needs are easily understood and well perceived by every individual, especially in situation of poverty, these perceptions and signs of the necessary gains from interdependencies are not expressed at the global and macroeconomic levels. Besides that, there are still missing factors and needs that are not identified by individuals that are in situation of vulnerability and poverty. These missing signals and still hidden components, lead to socio-economic policies that suffer from imperfections and inefficiencies with regard to the achievement of social goals that focus on poverty alleviation. Social policies and related poverty programs have been most of the time treated as another sector that compete with the other traditional public sectors. Coordination with other economic and social players (NGOs) can be also conducted within this type of framework increasing thus the likely gains that can be attained from issuing and strengthening transversal policies.

With the amount and the quality of social and economic investigations related to interdependencies among different sectors in different economies and with the specific focuses on the roles of education and health, a large body of knowledge has been accumulated with most of the outcomes of this literature have been reviewed in this study. As a consequence of these accumulations, integrated international policies have been promoted and have led to the Millennium Development Goals (MDGs). These goals were set on the basis of multidisciplinary poverty as it was conceived at that time from a macroeconomic perspective with the perspective of producing homogeneous and internationally comparable monitoring systems. But, poverty has been occurring under several dimensions that have not been all the time identified as further missing components still have to be revealed. These deficits in both the limitations of the macroeconomic frameworks and the means to pursue measurements are likely to be among the factors that have limited the attainment of some goals in some countries. The further missing dimensions of poverty may also have had negative impacts on the attainment of the objectives. Further research is then needed to overcome the difficulties of not achieving partially or totally the planned goals. But, the MDG is a policy framework that embodies higher level of integration

and coordination of policies that account not only for income poverty but also for health, education and other components.

Human development policies are sets of strategic and practical means devoted at the level of each country and region to the assessment of the progress made in monitoring social issues that include poverty and other social deficits. The national programs and strategies need further coordination and integration in order to capture and achieve realistic results.

But, few countries are pursuing localized policies and programs that are globally coordinated at the national and international levels. The multiplicity of players including the role of NGOs besides the involvement of the private and public sectors have often led to inefficiencies.

These three directions of economic and social policies are submitted for further strengthening within the context of this report.

There are two major inter-related levels at which economic and social policies accounting for interdependencies between health, education and economic performance are promoted. The first level is international and is led by organizations such as United Nations, World Bank and others. The second level is directly related to the country with and without localized actions. In the context of this work, the first level has been playing a leading role in promoting national programs that have been focusing on interdependencies. The Millennium Development Goals (MDG) and the Human Development Programs are the most important frameworks that have been developed during the last years and that are still benefiting from further improvements.

1. The Millennium Development Goals

The eight Millennium Development Goals (MDGs) are interdependent objectives that were set in 1990 by most governments under the leadership of the United Nations. Most goals are expected to be attained by 2015. As it can be seen from the following table each goal is translated into targets in order to ensure the monitoring and evaluation of the achievements using 1990 as a reference year.

The region under investigation has been showing variations in the levels of achievements of MDGs. Large variations across countries and within the same country have been observed. The persistence of urban rural disparities besides gender differences do still exist. Studies report that the relative poor performance in achieving the goals can be directly related to the low economic growth observed throughout the region during 1990-2000. The following table introduces both the goals and the level of achievements.

Source: MDG reports, UNDP

MDG's	Achievement
Goal 1: Eradicate Extreme Poverty and Hunger	In 2000, poverty has slightly increased compared to that of 1990. The countries that intensively concerned are Yemen but the other countries have not had a high decrease in poverty.
Goal 2: Achieve Universal Primary Education	Between 1990 and 2002, net enrolment rates in primary education rose by 8%, In 2002, some 20% of children of primary school age were not enrolled.

Goal 3: Promote Gender Equality and Empower Women	Literacy rate increased in 2002, but 44mn adult women (aged over 15 years), representing almost half of the female population, could not read or write. Of the 13mn illiterate young people (aged 15-24 years) in the region, 8.5mn were women.. Between 1990 and 2002, the gender parity index (GPI) increased at all levels of education: from 0.79 to 0.90 in primary education, from 0.76 to 0.91 in secondary education, and from 0.60 to 0.85 in tertiary education.
Goal 4: Reduce Child Mortality	Between 1990 and 2003, under-five child mortality in the Arab region declined from 91 to 70 deaths per 1,000 live births. With the exception of the LDCs, Arab countries are on track to achieve the target of reducing child mortality by one third In 2003 in the Mashreq, the under-five child mortality rate declined from 78 deaths per 1,000 live births in 1990 to 56. There has been a dramatic reduction in child mortality in the Maghreb, where child mortality rates have decreased by more than half since 1990, reaching 37 in 2003. Child mortality is lowest in the GCC countries: 23 in 2003, down from 39 in 1990.8 Conflict, extreme poverty and low investment in social services, including health, education, water and sanitation, are some of the basic causes for child mortality. Under-five child mortality is highest in countries affected by chronic conflict and/or underdevelopment, namely, Djibouti, Iraq, Mauritania, Somalia, Sudan and Yemen. In those countries, close to or more than 1 in 10 children die before the age of five. In the LDCs alone, child mortality represents more than half of the total for the entire Arab region. In those countries, child mortality is closely tied to high levels of malnutrition, poor access to health services, poor nutrition and mothers' lack of education.
Goal 5: Improve Maternal Health	Notwithstanding the progress that has been made, current maternal mortality rates (MMRs) and data on natal care indicate that the region is not on track to meet maternal health-related targets. In 2002, there were 377 maternal deaths per 100,000 live births, compared to 465 in 1990.9 The greatest decline in MMRs was in the Arab LDCs, where they decreased by 2.2 times their 1995 level. There is, however, significant variation between the sub-regions. In 2000, MMRs in the GCC region were 29.8, compared to 144.8 and 165.5 in the Mashreq and Maghreb regions respectively. In the Arab LDCs, there were 716.7 maternal fatalities per 100,000 live births. Poor obstetric care services and lack of access to ante-natal services are often cited as key causes of high maternal mortality, in addition to poor referral systems and insufficient emergency obstetric care. In the period 1995-2001, only 67% of all Arab women gave birth assisted by skilled health personnel.10 During that period, over 90% of deliveries in GCC countries were attended by skilled health personnel, whereas only slightly more than half of those in LDCs had such access. In the Mashreq and Maghreb regions, the proportion of births attended by skilled health personnel was 67.1% and 71.7% respectively.
Goal 6: Combat HIV/AIDS, malaria, and other diseases	While HIV/AIDS is not highly prevalent in the Arab region, the number of cases is on the increase. Between 1990 and 2003 the number of reported AIDS cases rose by some 42% to 13,865. Over half of those cases are in the LDCs, where more than 1% of the sub-region's population aged between 15 and 45 is HIV-positive. However, there may be under-reporting of HIV/AIDS, because of the inadequacy of data collection, monitoring and reporting systems. Consequently, much uncertainty surrounds the extent to which the virus has spread among the principal at-risk groups. Data on the HIV status of pregnant women are also insufficient. Effort is required to create an early warning system and improve surveillance, monitoring and reporting, in order to contain the disease before it becomes a problem for the region.
Goal 7: Ensure Environmental Sustainability	Progress has been made in many countries of the region in addressing the challenges of sustainable development. A number of political forums have been established at the regional level, including the Arab Initiative for Sustainable Development, advanced by the League of Arab States in 2002, with a view to improving governance, defining goals and priority action areas and adopting such integrated approaches to sustainable development as the Abu Dhabi Declaration of 2003. However, the achievement of environmental sustainability will require more concerted efforts to protect and conserve natural resources, particularly energy, water and soil resources, improved efficiency in the use of non-renewable energy and water resources, and the correction of market failures and distortions by including the environment in national accounts. Despite the vast energy resources of the region, in 2003 only 78.6% of the Arab population had access to electricity, ranging from almost 100% in the GCC countries to under 8% in LDCs. The region's overall energy efficiency (kilogram (kg) oil equivalent per $1,000 GDP (PPP)) has improved unevenly in the past decade. In 2002, the GCC countries reported the highest energy use (504 kg oil equivalent per $1,000 PPP), followed by those of the Mashreq (262 kg oil equivalent per $1,000 PPP) and the Maghreb (some 137 kg oil equivalent per $1,000 PPP). Data available data on energy use in the Arab LDCs are inadequate.
Goal 8: Develop a Global Partnership For Development	The achievement of Goal 8 is directly related to the creation of an enabling environment for pro-poor development at the national, regional and global levels. That pre-supposes a commitment by developed countries to assist developing countries to grow and participate effectively in the global economy. At the same time, developing countries should adopt policies that promote growth and development and socioeconomic integration and confront the challenges of globalization. One major problem facing the Arab region is that it is still perceived by many donors as being resource-rich, a perception which is strengthened by the classification of many Arab countries as middle-income countries and therefore not a priority for official development assistance (ODA).

2. Major Findings from Global, Regional and National Engagement in Human Development

Health, education, unemployment, and poverty are deficits that prevail in the region. These deficits are the sources of the low performance of most countries of the region. Besides, the data provided yearly by World Human Development reports, special reports focusing on the Arab World have also shown the extent and important of such social deficits. Most of the information provided below is obtained from these reports. Morocco has produced a human development report that covers the situation of the past 50 years (RDH50). Besides these reports, there are national human development reports.

The evaluation of national health systems of 191 countries indicated that Kuwait, Qatar and the United Arab Emirates scored the best among Arab countries in terms of goodness (ranking between 26 and 30) while Libya and United Arab Emirates scored the best in terms of fairness (ranking between 3 and 22). Indeed, the performance of health care systems, in terms of fairness, depends heavily on geographical locations of the patients (UNDP, 2002). Besides that, health care is not evenly distributed between countries and even within countries. The rural population is less likely to access health care than its urban counterpart. The lack of resources and the lack of transportation impede health care development in rural areas. It has been also recognized that illiteracy is another problem that prevents rural population from accessing health care facilities (UNDP, 2002). Life expectancy at birth differs from a country to another depending mainly on income level of the country. The United Arab Emirates have higher life expectancy reaching 77.9 years (UNDP, 2005). Since 1956, life expectancy at birth in Morocco, has jumped from 47 years of age in beginning 1960s to 71 years of age today (72.5 years for females and 68.5 years for males) (RDH 50, 2006). On average, the indicator of life expectancy at birth in Arab countries has significantly increased from 52.1 years in 1970s to 66.5 years in the first five years of the new century. This average is slightly higher than the average indicator for developing countries (64.9 years) and lower than the one of middle income countries (70.1 years) (UNDP, 2005).

Studies have found that disease and disability reduce life expectancy by 5 to 11 years. Life expectancy is reduced by 9 years due to disability in almost one third of Arab countries. In fact, countries with high survival rates do not always have low disability rates. Kuwait, Qatar, and Oman are examples of countries with low mortality rates that lose more than 9 years in disability. Years of life lost to disease in these countries are higher than the average international standard, for comparable countries, which is 6 to 7 years. Internationally, 20% of adults suffer from a longstanding illness or disability (UNDP, 2002).

Arab women are even more likely to have disabilities at birth and lose more years to disease than men. “The proportion of females reporting long-standing illness exceeds that of males by more than 6 per cent and can be up to 8.5 per cent higher.” For women, the number of years lost to disease is not necessarily related to income-level but to differences in lifestyle and gender discrimination (UNDP, 2002).

In Morocco, the health system has known a considerable improvement since independence. The Moroccan government has improved primary health care, training medical and paramedical personnel, and has facilitated access to health services. The current number of health care establishments exceeds 2460 compared to 394 in 1960. The country has a resident-to-bed ratio of 1 bed for 1000 residents. The doctor-to-resident ratio increased from 1 doctor for 12,120 residents in 1967 to 1 doctor for 1900 residents in 2004 (RDH 50, 2006).

In Egypt, Bahrain, Jordan, and Tunisia, there is a high degree of ill health among the old age population. More than 50% of the elderly have health problems. Almost 30% of these people perceive their health conditions to be very poor (UNDP, 2002).
Other causes that affect health are tobacco/alcohol/drug use and road accidents. Studies have shown that tobacco use is quite high in the region and there is an increasing trend of women smoking. In 1998, around 182,000 people died from tobacco use. Alcohol and drug use is also spreading at a high pace among the young (UNDP, 2002).
Infant mortality rate (IMR) and under-five mortality in Arab countries range from 1.02% to 7.53% and 2% to 10%, respectively (UNDP, 2002). The Global Human Development Report 2002 states that Arab countries have made a rapid improvement in reducing infant and under-five mortality. They reduced under-five mortality from 20% in 1970 to 6% in 2002. The lowest rate of infant mortality was recorded in Qatar while the highest rate is in Yemen. The lowest rate of under-five age mortality is the one of Bahrain, Kuwait, Qatar, and United Arab Emirates while the highest rate was shown in Mauritania, Sudan, Yemen, and Iraq (after the Gulf War). Oil-rich countries, in general, experience lower rates of mortality because they improved their health system to increase life expectancy and decrease child mortality.
Nevertheless, there are other middle-income Arab countries that have known a rapid progress too. Tunisia was one of the 10 countries that made the fastest improvement in raising life expectancy and Yemen did a remarkable progress in decreasing under-five mortality (UNDP, 2002). Morocco succeeded in decreasing infant mortality from 14.9% (17% in rural areas and 10% in urban areas) in 1962 to 4.79% (5.67% in rural areas and 3.86% in urban areas) in 2004 thanks to children vaccination campaign (RDH50, 2006). The Global Human Development Report 2003 adds that "Egypt achieved the largest reduction in under-five mortality rates, from around 10% to 4%. But other countries are being left behind. In Iraq the under-five mortality rate almost tripled in the 1990s, to 13%."
Maternal mortality is another serious health challenge facing Arab countries. More than half the Arab countries have a maternal mortality ratio (MMR) higher than 75 per 100,000 live births and almost a third of the countries have an MMR of 200 per 100,000 live births (UNDP, 2002). The Global Human Development Report 2002 states that lifetime chance of dying in pregnancy or childbirth is 1 in 55 among SMC compared to 1 in 157 and 1 in 283 in Latin American/Caribbean and East Asia/the Pacific, respectively. Gulf countries have shown lower rates of maternal mortality. Kuwait and United Arab Emirates were able to decrease their MMR to only 5 per 100,000 live births. Other countries like Saudi Arabia, Qatar, and Oman, can also be considered in the lower level of maternal mortality compared to the rest of the Arab world. Their MMRs range between 10 and 20 per 100,000 live births. However, these countries did not reach yet the low level of maternal mortality of countries with "comparable command over economic resources" (UNDP, 2002).
Another health problem that is starting to threaten the Arab world is AIDS. Albeit Arab countries have reported relatively lower levels of HIV/AIDS, the virus is spreading among the population at high pace. On average, Arab states have only 0.3% of the population carrying HIV while developing countries have an average of 1.3% and middle income countries have an average of 0.8% (UNDP, 2005).

Some countries, however, enjoy better economic capabilities but suffer from significant nutritional problems such as Egypt, Morocco, Kuwait, Syria, Saudi Arabia, Libya, Oman, and United Arab Emirates. Having levels of stunting between 15% and 25%, these countries are

considered to be "richer than developed" (UNDP, 2002). In Yemen, the percentage of underweight children rose from 30% in 1992 to 46% in 1997 (UNDP, 2003).

The second challenge facing the Arab world is education. Knowledge and education constitute the road to development in the era of globalization. Since the middle of the twentieth century, Arab countries have made a significant progress in fighting illiteracy. Illiteracy rate among Arab adult decreased from 60% in 1980 to 43% in 1990s (UNDP, 2002). In 2004, the average literacy rate in the Arab world reached 69.9%, but this rate is still lower than the average literacy rate in the developing countries which is 78.9%. These rates are lower in Arab countries than the average rates in developing countries where 71.7% of women are literate and the rate of literate women represents 84% of that of men (UNDP, 2006)[35]. Some countries like Jordan and Palestine have succeeded in increasing literacy among women reaching 85% literacy rate. Other countries, however, like Morocco, Yemen, Sudan, Mauritania, and Sudan have a literacy rate of women lower than 50% (UNDP, 2005).

According to UNDP (2002), "the number of illiterate people is still increasing to the extent that Arab countries embark upon the twenty-first century burdened by over 60 million illiterate adults, the majority of whom are women." More disparities are identified in rural areas where women and the poor are very unlikely to reach higher education levels. This is mainly due to the low enrolment rates in basic education of these categories of society. The UNDP report adds that illiteracy among males in the Arab world will persist at least till 2025 while illiteracy among females is expected to continue to exist until 2040. Morocco has one of the highest illiteracy rates in the world. Despite the small and slow improvement noted in this domain, the number of illiterate Moroccans, in absolute terms, more than doubled between 1960 and 2004. It increased from 6 million to 12.8 million persons (RDH50, 2006).

Since 1980, the number of students enrolled in the three levels of education (primary, secondary, and tertiary) has substantially increased from 31 million to reach 56 million in 1995. This increase was much higher in 1980s than in the first five years of 1990s. In the Arab world, the proportion of children enrolled in primary level reached 77% during the 1990s compared to 79% in South Asia and more than 90% in East Asia/Pacific, Latin American/Caribbean, and CIS (UNDP, 2003). In Morocco, the same indicator jumped from 17% in the mid 1950s to 47% in 1964 before it reaches 92% in 2004 (RHD50, 2006). In the mid 1990s, the average enrolment rates, in Arab countries, for the secondary (54%) and tertiary levels (13%) exceeded the average enrolment rates of developing countries (49% in secondary level and 9% in tertiary level) (UNDP, 2002). The number of students enrolled in primary and secondary levels in Morocco moved from 366,000 in 1956 to 5.8 million in 2004 (RDH50, 2006). Among Arab states, only one country has achieved universal primary education while six countries are still on track and four countries are far behind (UNDP, 2002).

Although females have lower access to education in most countries of the Arab world, there are some exceptions in certain regions. Jordan, Lebanon, Palestine, and oil-producing countries have a higher enrolment rates for females than for males. Still, Arab countries are lagging far behind industrialized countries in terms of education and enrolment. The average enrolment rate in industrialized countries, in the same period, was 106% for second level and 60% for the third level. These levels of education which were reported for 1995 are not expected to be reached by Arab countries till 2030 (UNDP, 2002).

[35] Statistics for the year 2004, from the Human Development Report 2006

Based on the finding of UNESCO report of 2005, "the Arab child on average is provided with 0.4 years of pre-schooling compared to 1.6 years in Latin America and the Caribbean, 1.8 years in Central and Eastern Europe and 2.2 years in North America and Western Europe." Arab countries have an enrolment rate at the pre-schooling level lower than 20%. Saudi Arabia, Oman, Djibouti, Algeria, and Yemen have the lowest pre-schooling enrolment rates of only 5% while UAE, Kuwait, and Lebanon have the highest rates reaching 70%. Most countries rely on private institutions and women organizations to provide this level of education with "a belief that the support of small children is considered basically a women's issue and not a public priority." (UNDP, 2005)

Gender inequality has been reduced at this level of education since female enrolment rates is at least 90% of male enrolment rates in most Arab countries except Morocco, Yemen, and the Comoros (UNDP, 2005). The Global Human Development Report 2002 describes Arab countries' performance in decreasing gender inequality in primary education to be the best in the world while Sub-Saharan Africa's performance is the lowest. Only one Arab country has achieved gender equality in primary education while twelve are still on track and one country is far behind.

The last deficit to be tackled is poverty. The analysis of poverty in Arab countries is limited by the lack of comprehensive and comparable data sets, reluctance of some official sources to provide data, irregular patterns in data collection, and publication at the level of the individual country. As a result, poverty and income indicators in Arab countries are underestimated.

In 1999, The GDP of all Arab countries combined did not exceed $531.2 billion which is less than the GDP of one European country like Spain ($595.5 billion) (UNDP, 2002). The Global Human Development Report 2003 states that the annual per capita income growth during 1990s in the SMC was 1% while the percentage point reduction in poverty was -0.1%. Concerning the real GDP, its average growth between 1975 and 1998 was slightly higher (3.3%) than the world average (2.9%). However, this period of time was marked by a strong economic growth in the region along with a very high demographic growth of 2.8%. Hence, the real per capita income during this period knew a very small increase of 0.5% per year compared to 1.3% as global average (UNDP, 2002). The Global Human Development Report 2005 confirms that most Middle Eastern countries and Latin American countries experienced a minor increase in average income.

This situation of quasi-stagnation reflects deterioration in the average standard of living in Arab countries compared to the rest of the world. In terms of GDP growth, Arab countries lagged behind Latin America and Caribbean (1% growth), South Asia (3%), and East Asia and Pacific (5.9%).

Previous studies on the available data for the period 1970-2000 have shown that "SMC have had the lowest regional incidence of extreme poverty in recent years, with less than 2.5 per cent of the population living on or below the $1/day income level for dire poverty adopted for the Millennium Development Goals." The study explains that this situation may be due to "egalitarian income-distribution practices and to the ability of the region's poor to capitalize on periods of economic growth, particularly between 1970 and 1985" (UNDP, 2002).

Although the region is considered to have one of the lowest poverty rates in the world, it has one of the lowest drops in the percentage of extremely poor people. The percentage of people in SMC living on less than $1 a day has barely changed in the 1990s (from 2.4% in 1990 to 2.3% in 1999) while the same indicator has moved considerably in other regions like East Asia and the Pacific

(from 27.6% to 14.2%). The number of extremely poor people in the Arab world moved from 6 million to 7 million in the period 1990-1999 (UNDP, 2002).
Despite the low proportion (2.4%) of Arabs living below $1 a day in the period 1990-2001, some countries like Yemen had a significantly high percentage of extremely poor people reaching 15.7% (UNDP, 2003). In Morocco, The rate of relative poverty dropped from 56% in 1960 to 14.2% in 2006. "However, due to the demographic growth, the absolute number of poor people remained at an average of 5 million; three quarters of whom live in rural areas." Indeed, 4 million Moroccans live in extreme poverty (spending less than 3,235Dhs annually in urban areas and less than 2,989Dhs in rural ones) and 25% of the population spends less than 4,500dhs annually. Poverty in Morocco is usually more present among women, children, youth, and people with special needs (RDH50, 2006).
According to the UNDP, a study on seven Arab countries has found that the ratio of the income share of the richest to the poorest population is relatively low; meaning that inequality in income distribution is low in the region. The average ratio of income share in the Arab world is 10% compared to 24.6% in Mexico, 19.3% in Kenya, and 14.2% in Turkey. This can be explained by the role of migration and remittances in terms of sending money to their households and helping create new jobs. A less optimistic picture has been given by an ESCWA study showing an increase of the income share ratio in Egypt, Iraq and Jordan. In Egypt, for instance, the ratio of richest/poorest in the period 1980-1990 has increased from 27% to 28%. Other countries like Yemen had a rural household income less than two thirds the one of their urban counterparts in 1992.
The Arab human Development Report of 2003 revealed an increase in poverty and inequality in income distribution in the region. In the 1990s, the rate of poverty in Egypt varied between 30% and 40% making poverty in Egypt alone constitute 10% of the total rate in the Arab world. During the same period, poverty rates in the region varied from "21% in Jordan to 30% in Yemen, 45% in Djibouti and 85% in the Sudan." In Palestine, almost three fourths of the population lives in poverty with an income of less than US $2 a day.
The Arab Human Development Report of 2005 indicates that "the spread of income poverty generally leads to women's disenfranchisement in the areas of parliamentary participation, professional and technical employment, and control of economic resources." Poverty, hence, widens marginalization and disempowerment of women. A study done on Morocco, Tunisia, Egypt, Jordan, and Yemen has shown that there is no evidence of "feminization of poverty". The same report adds that under situations of poverty, "women have the least access to food, health, education, training and opportunities for employment and other needs." Based on income and expenditure indicators, poverty levels are not higher among women than among men. However, when considering women's limited access to capacities (health, knowledge, and income), human poverty levels are proved to be higher among women.
"Poverty is the antithesis of human development depriving people of the opportunity to acquire capabilities and to utilize them effectively to achieve a descent life" (UNDP, 2004). Low income or expenditure and failure to meet basic needs are just few aspects of poverty. It is the inability to access and control all human, physical, financial and social assets that define "human poverty" as synonymous to powerlessness (UNDP, 2002). Among the 103 developing countries, Palestine, Qatar, Jordan, and Lebanon ranked in the top 20 in the Human Poverty Index list with HPI-1 ranks of 7, 10, 11, and 18, respectively. Mauritania is the Arab country that had the lowest rank (79) among developing countries (UNDP, 2003).

The attempts made by both international, regional and national organizations to account for the interdependencies of health, education and socio-economic performance, have been also made by different segments of civil society. This latter engagement has been taken earlier and ahead of governments because of the nature of actions of non-governmental organizations. They pursue field work where links between health, education and poverty are most of the time easy to observe in localized situations. But, the weaknesses in both accounting fully for the interdependencies and the performance of the economies under study have been related to the limitations in the type of governance pursued and the participation of the population to the design, implementation and evaluation of health, education and other economic programs (Akala & El-Saharty, 2006). Through the change in the demographic profile, with the new epidemiological trends and the new life styles, new types of pressures induced new attitudes. Higher demand for health care with consequences on education and the performance of the economies of the region have been expected. The interdependencies between health, education and economic performance do require public and private responses that account for the nature and magnitudes of these demands. The present study has placed emphasis on the relationships between health, education and economic performance in order to show how both sector and multi-sector development are necessary to capture the changes in population needs that are more integrated. As emphasized in Akala & El-Saharty (2006) and in other publications by international organizations, the region has the means and the potential to respond effectively to the health challenges and their effects on each economy in the region.

The results attained so far have shown largely the existence of patterns of interdependencies among socioeconomic, health and education variables. These interdependencies would have been certainly captured better with further microeconomic data. But with the available information, the relationships between different variables related to health, education, poverty and economic performance of the region have been assessed. Furthermore and most of the time, the magnitudes interdependencies are too important that economic and social policies in the region of study cannot omit the potential gains from these interactions. The implied economic, political and social policies are required consequently to be more integrated while accounting for different sector and global policies.

This section starts with reviewing the reforms undertaken before tackling the issues of sector policies and integration respectively in the second and third parts.

3. Domestic Social & Economic Policies:

3.1 Overall Political, Economic & Social Reforms

The region has been traditionally characterized by its limited integration with the world economy, the predominance o public sectors, and limited private investment (Mitha, 2007). Besides their closed economies and the substantial state intervention, countries of the region faced major challenges in different sectors. This includes the effects of rapid urbanization, attraction of foreign investment, restoring economic growth, controlling demographic growth, improving the education system, decreasing unemployment rate, building democracy, saving natural resources, and ensuring food at accessible prices (Richards, 2001). By the middle of the 1980s, the region has experienced many changes and reforms that are described below as political, economic and social.

3.1.1. Political Reforms:

Some countries in the region have been witnessing wars, conflicts, and tensions causing economic losses and also lack of coordination among economic, political and social players. Even within this difficult environment, economic, political and social reforms have been undertaken (Poortman, 2006). But, different authors have identified the limiting factors that negatively can affect the outcomes of these reforms (Mitha, 2007). Among these factors, excessive regulations, corruption and lack of transparency are largely cited. The responses provided in this area include regular open elections, extension of the number of political parties and unions besides the number and the areas covered by civil society with emphasis on the development of media. While these are internal and domestic responses to initiate further freedom in these societies, external events and pressures have also contributed to these changes. Almost all countries in the region have been concerned with the adhesion to new international arrangements suggested by international and regional organizations.

3.1.2. Economic and Financial Reforms:

In their evaluation of the economic reforms undertaken in the region, Dasgupta et al. (2001) have identified important moves related to achieving economic stabilization by lessening inflation rates, reducing black market in exchange rates, reducing government spending and government deficit, and closing the balance-of-payments gap. As can be observed from the index of economic freedom (Heritage Foundation reports, 2000 and 2007), Egypt, Jordan, Morocco and Tunisia were among the top countries in macroeconomic stabilization. But, the countries in this region have been described as late reformers in comparison with Latin American and East Asian countries. They have also shown signs of limited integration to world markets (Page, 2003). Privatization and liberalization may have also contributed to increasing unemployment (Eva Bellin, 2004) because of the limited time response of the private sector and the economy.

Besides that, the region appears to be among those economies that are lagging in the three areas considered in the competitivity index. Other more qualitative studies confirm that the region had slower rates of reforms (Cameron and Rhein, 2005). Most countries in the region engaged in privatization programs with the progressive reduction of the role of the public sector in some productive sectors of the economy. Egypt and Morocco led this process that started in the 1990's with a larger diversified portfolio for Morocco (Kikeri and Nellis, 2002). Series of public monopolies were reformed with partial or total involvement of the private sector. This process has concerned manufacturing, banks, telecommunication, energy besides sectors like tobacco and cement. The proceeds have been engaged in public provision of infrastructure and other development projects. They attained the overall level of 18.9 billion US dollars for the period 1990-2003 but this level is still limited in comparison with other regions in the world (Nells, 2006).

But the impacts of these economic reforms have appeared to be limited (Nabli & Véganzounès-Varodakis, 2004). It is further shown that the political economy in the region exhibits constraints that may reduce the extent of these reforms (Nabli et al, 2005).

3.1.3. Social Reforms:

While social policies were important components of public policies before the area of structural adjustments, these policies have not been given the priority with the beginning of the political and economic reforms (Richards, 2001; Dolorez, 1996). The social reforms have been introduced later with the pressure of international organizations and with the development of Non

governmental organizations. These reforms have focused mainly on poverty reduction, participation, gender issues and focus on the youth and children. But a clear orientation on human development is not fully considered in all the countries of the region. Some countries started to work on improving women rights while lagging behind the traditional status of women (Arab Human Development Report, 2004).

Other social reforms concern health care, child care, and poverty reduction. Some reforms are also realized through income transfers pensions, social security payments and insurance. Actually, the World Bank initiated some reform programs focusing on social protection and human development. Also some countries initiated improvements in the education system in terms of quality and coverage besides health-care services.

4. Need of further Policy coordination and Integration:

4.1 The Overall framework:

The current framework introduces major directions of coordination that appear to be critical in relation to poverty alleviation in the region of study. The framework starts with the insistence on the participation of the population and their representatives (non governmental agencies and elected institutions). With the other players that include central and local governments, private businesses and the NGOs, policy formation, selection and implementation is taking place to meet the basic needs of the population. These needs are viewed in relation to the constraints and risks facing the choices of individuals and groups. The following summary of needs, constraints and risks besides the directions of policy recommendations, introduces some examples that help understand the necessary dynamics needed for more coordination and integration.

Interconnections of population needs and requirement of further policy coordination & integration

	Constraints	**Risks**	**Players**	**Coordination and Integration of Policies**
Food	- Constrained by liquidity; - Buy at a very retail; - Limited access to wholesale markets; - Constrained by storage, risks, and markets. - Travel distance; - Location of grocery and chain stores; - Availability of needed items; - Storage costs - Limited income spent on other expenditures - Time spent in the operation of purchasing	-Nutritional risks related to the diet requirements; - Risks associated with health	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	- Production and trade, - Quality control, - Needs of special groups, - Special regions, - Health, -Education -Security -Economy & Finance
Clothing	- Constraint of income; - Location of chain and grocery stores - Travel distance; - Availability of alternatives; - Storage and cleaning costs - Limited income for other expenditures;	- Health infection problems	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Quality control, -Production, -Trade, -Health, -Education -Security -Economy & Finance

Education	- Constrained by income; - Satisfaction of other needs; - Time allocated to schooling - Travel distance; - Availability of education; - Location of education centers; - Maintaining the flow of education - Foregone Payoffs from other activities	- Shortages of inputs; - Employment possibilities; - Long term impoverishment	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Education, -Health, -Employment, -Social and youth, -Sports -Security -Economy & Finance
Health	- Constrained by income; - Competition of needs; - Degree of illness and the type of health problems; - User fees for public services - Travel distance; - Availability of healthcare; - Availability of alternatives; - Maintaining the flow of health care - Time spent to look for health care	- Health problems aggravation; - Long term impoverishment - Aggravation of the current poverty level.	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Health, -Housing, -Infrastructure, -Family, -Social, -Employment, -Education, -Sports -Security -Economy & Finance
Energy	- Affordability to be connected to the electricity system; - Constrained by income; - Obligation to buy other energy means from local shops and in small quantities. - Travel Distance; - Existence of other energy means and the possibility to obtain them - Availability of substitutes; - Repair and maintenance of energy equipment - Outcomes from other activities; - Time spent on obtaining other energy means; - Impact on work or study at night	- Fire and wood collection risks; - Health infection risks; - Long term impoverishment.	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Energy, - Forests, - Commerce, - Housing, -Health, -Education, -Water -Security -Economy & Finance
Water	- Affordability to be connected to the piped water system; - Constraint of income; - Travel distance; - Availability of water supply; - Availability of other free means of water supply - Repair and maintenance of water equipment - Time spent for water collection; - Physical efforts to collect water from unpiped sources	- Health effects of water collection; - Possibility to attract diseases; - Long term impoverishment	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Water, - Energy, -Health, -Agriculture, -Environment, -Infrastructure -Security -Economy & Finance
Housing	- Inability to pay high rents; - Constraint of income - Availability of housing opportunities; - Travel distance between work and home; - Cleaning, painting, and repairing - Time spent to look for shelter; - Lost income because of low productivity impacted by living conditions.	- Incidence of ill health and infection because of poor living conditions	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Housing, -Infrastructure, -Water, -Energy, -Environment, -Health, -Education -Security -Economy & Finance
Transportation	- Constraint of income; - Inability to buy a personal vehicle; - Access of public transportation - Travel distance; - Availability of transportation means; - Maintaining the flow of transportation - Lost income from other activities that can be performed during the lost time	- Health infection problems; - Transportation is not always insured (absenteeism).	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Transportation, -Energy, -Water, -Commerce, -Infrastructure, -Health, -Security -Economy & Finance

Judicial system	- Limited information, - Location of the court systems in cities, - Illiteracy, - Fuzzy property rights - Travel time, - Complexity of mechanisms, - Costs related to lodging and food when away; - Follow up of the judicial conflict. - Lost income from other activities that can be performed during the lost time	Risks of loosing the case and other risks related to new conflicts	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Justice -Education -Infrastructure -Human Rights -Security -Economy & Finance
Credit System	- Amount to be borrowed; - Guaranty required; - Availability of financial institutions; - Availability of individual lenders; - Very high interest rates. - Costs related to loan files; - Transportation costs; - Follow up of the credit mechanism - Lost income from other activities that can be performed during the lost time	Insolvability of the grantee and incapability to pay back the loan and interests	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Economy & Finance - Banking - Security -Education
Employment	-Qualification and education, -Age, -Health, -Gender, -Wage, -Other benefits	-Related to the enterprise, -Related to employees, - Related to the economic environment	Government, Local government, Public Agencies, Private businesses, Non-governmental organizations, Unions & Political parties.	-Industry and commerce, -Employment, -Economy and Finance, -Education, -Health, -Insurance, -Security.

4.2 Strengthening Social policies towards further inclusion of women

The implementation of transversal and integrated policies requires specific sector policies that include economic, health, education and employment policies for the region and for each country. It is well known that a large body of publications and reports has been devoted to the diagnosis and the necessary changes that are needed in the region.

Series of documents including those of the "Population Reference Bureau" including Roudi-Fahimi Farzaneh and Valentine M. Moghadam (2003) offer sound arguments for the role of policies focusing on further inclusion of women. The above study shows that further benefits can be attained through women's education. This is based on the evidence that there are links between education and fertility and employment as the structures of the economies and the conservative culture in the region lead to lower levels of women education than in other places with similar income levels. Education is linked to fertility as education is the most important determinant of age at first marriage and age at first birth in these countries. Furthermore, educated women are more likely to use reproductive health and family planning information and have smaller family size. Education also affects health as women with more education have healthier families. The remaining concerns are that illiteracy remains high in some of these countries, that there are still large gender gaps in literacy and school enrollment and that the quality of education is low and led to mismatch between the labor market needs and graduates skills. Policies emphasizing the inclusion of girls and women in education are likely to generate the outcomes needed to accelerate development. While sector policies are also needed, they may not be sufficient as transversal policies are needed to sustain the reduction of income gaps and gender differences (Roudi-Fahimi Farzaneh, 2004).

Conclusion

It is definitely clear that the situation of the poorer segments of the population in SMCs can improve if further policy coordination and integration is pursued. The directions of further coordination appear to have been provided by the international framework that accounts on achieving MDGs by 2015. It is also provided by the orientations focusing on human development. The recent reforms undertaken seem to be mainly focusing on economic and political components while accounting for social components as a residual sector that should be considered with the implementation of reforms. The overall policy schemes that are driven by both international organizations and by the domestic reforms, cannot lead to the needed policy integration if not based on ownership and domestic generalization of these policies to different country locations. Furthermore, specific transversal policies focusing on women, children and older segments of the population need further strengthening. More inclusive health and education policies with gender and rural focus can be promising in the region. Preventing and accounting for the existence of handicapped segments of the population are also dimensions that require inclusion within the socially coordinated policy packages.

References

- AYODEJI AKALA Francisca; EL-SAHARTY Sameh (2006). "Public-health challenges in the Middle East and North Africa" Lancet ISSN 0140-6736 CODEN LANCAO
- Cutler David M, Adriana Lleras-Muney, Tom Vogl (2008) "Socio economic Status and Health: Dimensions and Mechanisms" NBER Working Paper 14333
- Eva Bellin (2004)." The Political-Economic Conundrum: The Affinity of Economic and Political Reform in the Middle East and North Africa", Carnegie Paper No. 53
- Farooq A. Mitha (2007) "Economic Reform in the Middle East and North Africa (MENA)"
- Fraser Cameron and Eberhard Rhein (2005). "Promoting Political and Economic Reform in the Mediterranean and Middle East", EPC Issue Paper No. 33
- Heritage Foundation reports
- Human Development Report
- Kikeri, Sunita; Nellis, John (2002)." Privatization in competitive sectors: the record to date", Volume 1", Policy, Research working paper, N°WPS2860
- Martin Marie Claude (2008) "Individual and Collective Resources and Health in Morocco" UNU-WIDER Research Paper N° 2008/21
- Moroccan Human development Report (RDH)
- Mustapha Kamel Nabli, Marie-Ange Véganzonès-Varoudakis (2004). "Reform Complimentaries and Economic Growth in the Middle East and North Africa", World Bank, Université d'Auvergne - Clermont Ferrand; National Center for Scientific Research (CNRS)
- Mustapha Kamel Nabli ,Daniela Gressani, et Carlos Silva (2005). « Lancement du rapport sur les tendances et les perspectives économiques pour l'Afrique du Nord et le Moyen-orient »
- Roudi-Fahimi Farzaneh, 2004) "Progress toward the Millennium Development Goals in the Middle East and North Africa" Population Reference Bureau, Policy Brief
- Roudi-Fahimi Farzaneh and Valentine M. Moghadam (2003) "Empowering Women, Developing Society: Female Education in the Middle East and North Africa" Population Reference Bureau, Policy Brief
- Strauss John and Duncan Thomas (1998), "Health Nutrition and Economic Development" Journal of Economic Literature Vol. XXXVI pp.766-817
- Susmita Dasgupta, Kirk Hamilton, Stefano Pagiola* and David Wheeler (2001)." Environmental Economics at the World Bank"
- Strauss John and Duncan Thomas (1998), "Health Nutrition and Economic Development" Journal of Economic Literature Vol. XXXVI pp.766-81
- UNDP, Arab Human Development reports.
- UNDP: The United Nations development reports, 2000 to 2009.

Chapter VIII: Implications of the Findings, Report Limitations and Future Directions of Research

This last chapter builds on the knowledge accumulated while pursuing the realization of this report and extends its results and conclusions. It is based on the existence of important interdependencies between social and economic sectors in the South Mediterranean countries.

The issues dealt with here include all the results attained in all the past seven chapters. Besides the outcomes related to interdependencies, the other issues such as health, gender discrimination, urbanization in relation to rural migration and a number of demographic features related to handicaps are considered. This includes the issues discussed under socio-economic policies.

These findings are here looked at from the view point of their implications. The need of further multidisciplinary approaches to better assess the links between socio-economic status and health and to analyze the effects of exogenous risks and uncertainties appears to be a high priority issue. Further implications are related to the perception and implementation of poverty alleviation processes in global and local contexts besides the clear need for transversal economic and social policies. These different levels of implications are respectively reviewed in this chapter.

Finally, the limitations and the constraints faced are introduced besides some future directions for research related to the area of interdependencies of health, education and economic performance and their impact on the intergenerational transmission of poverty. These areas of both theoretical and empirical research are expected to become necessary with the acceleration and generalization of further economic and social development in South Mediterranean countries.

A. Report findings and their Implications

This part summarizes the most important results attained. Achievements include the results that are directly related to the topic at hand but also translate into recommendations related to poverty alleviation programs.

Emphasis is also placed on the role of local development in relation to the existence of interdependencies and on the central importance of health and education in the region of study. The need for further transversal and horizontal economic and social policies is also discussed.

1. Overall accomplishments

1.1: The data gathered:

This report has tried to use different sets of data that are all included in the appendix. The data include information that is published by international organizations and by countries. But most of the data used are from international organizations. Three subsets of socioeconomic data are from the World Bank and the United Nations. They concern the variables that are directly related to the study. Demographic health surveys data relative to Morocco, Egypt and Turkey have also

been used. Some specific data related to school drop-outs and consumption expenditures are from Morocco. A sample of CMBS data relative to two regions of Morocco has been introduced. The institutional profile data published by the Ministry of Finance (France) are also considered. The other quantitative information is obtained from different published reports.

1.2: The need of furthering multidisciplinary approaches

It is clear from this study that different dimensions have been covered but it was felt throughout the conduct of this report that many were still missing but could have improved the results. While the contribution of economics and statistics has been dominant, that of other social scientists would have enhanced the overall level of understanding. The need of health care, education and expertise in behavioural sciences and culture appears to be also important in determining further links among different variables and dimensions. The complex nature of the living condition of people in the special context of South Mediterranean countries would have required larger teams composed of different specialists that could contribute to the clarification of other dimensions not included in this report.

While this shows the limits of this work, it also underlines, the level effort invested by the team that contributed to this report. In this sense, the existing literature and reports that have been compiled have been including contributions from different disciplines. This exercise has been facilitated every time with the publications of demographers, medical doctors and sociologists besides other specialists that looked at theories and applications related to interdependencies. It has also been made easier with series of reports produced by international organizations. Some databases produced internationally for different countries have been also instrumental. But, multidisciplinary approaches are needed when addressing special economic and social contexts and topics that relate to the region studied in this report. Contributions of individual disciplines are also in demand to sustain these multidisciplinary investigations.

1.3: The direct findings attained

The results attained at both country and regional levels show clearly that major interdependencies exist between health, education, other socio economic status and economic performance. They are exacerbated within poor contexts and poorer countries. Knowledge about these interdependencies is likely to be an important source that can show both the impact of favourable and unfavourable economic and social conditions. The situation of women and especially those in poor urban neighbourhoods and in rural areas is at the same time critical but also an engine for the promotion of development in the region.

As the driving role of education and health has been largely underlined, access of women to both education and health can have larger positive consequences on the promotion of the South Mediterranean economies. The needed improvement in education to ameliorate health status appears to be very important; both men and women need to reach relatively high levels of education for health improvement to occur. Interestingly education has however rapid impact on health behaviour as even small improvements in education lead to important health behavioural change.

The rate of drop-out from primary and secondary schools, at least in the context of the Moroccan economy, has been related to poverty and to the health and nutrition. The increase of the level of education and the elimination of illiteracy require in this case that more global actions be undertaken. Girls have appeared to be more affected by this high level of drop-outs implying that the situation of women in the future may not be easily improved if no action is taken. Other variables that could explain this high rate for girls can be those described in the literature. They relate to early marriage with low level of education.

Other vulnerable segments such as the handicapped, children and the old can also value a better access to health and education as well as they can contribute to the worsening of the situation under lack of action. The likely impacts on these societies of an improved access of women are expected to generate higher positive social effects given the multiplicity of their roles in households and in these economies. The mechanisms of transmission are supported by the estimated levels of interdependencies but also by the social positions occupied by women. Under these considerations, supplies of education and health in different locations are likely to accelerate the engines of economic and social improvements. These supplies can start with the provision of minimal education (literacy) and minimal health (health protection) but need to recognise that a rapid increase in the number of years of education is as important as an increase in this limited access.

These supplies are likely to suffer from the shortages of human resources that can provide and implement the supplementary minimal programs. Among the constraints, the brain drain of medical staff can have delaying effects if no further policies are introduced to reduce the negative effects of this type of emigration in the region.

The strength and importance of interdependencies between socio economic status and health and the specificities of different categories of the population call for the necessary involvement of not only the public and private sectors but also the populations through their non governmental organizations given the extent and the magnitude of the likely gains to be achieved from social actions and related programs.

Other indirect results of the report can be underlined. They include methodological benefits related to the promotion of further multidisciplinary approaches to tackle socioeconomic issues in the region. They also concern the deepening of the understanding of poverty, the effects of hazards and the role of early warnings besides the importance of local and proximity development.

2. Gains towards understanding and evaluating poverty alleviation programs

The knowledge of the extent of interdependencies and their incorporation in the design of poverty alleviation program can largely benefit the vulnerable and deprived people in the society and can raise social cohesion.

Two important issues are considered below to show the level of likely gains to be attained when accounting for interdependencies. It is well known that poverty has never benefited from the attention of policy makers until recently as it was a taboo and that household survey data are either not conducted or not shared in most of these countries (Farrukh Iqbal, 2006). It is also common knowledge that income poverty measures lead to showing that the region has poverty levels that are below those prevailing in other countries, but the existence of such a hall even in the oil producing and exporting countries needs major attention. There are though major variations among countries and within countries as is revealed by the data collected in countries such as Algeria, Morocco, Tunisia, Egypt and Yemen. But, further knowledge need to be added, especially that in relation to the non-income components, in order to enrich the knowledge about poverty in the region. Applied research on these matters on the region needs to be accelerated in order to provide more detailed supports to economic and social policies. Two major issues can be discussed in relation to the findings contained in the present report. They include the effects of incidental risks, those hazards and exogenous shocks and the missing dimensions that need to be included in the context of poverty alleviation.

Effects of incidental risks and poverty in the region

The existence of these interdependencies at the household level in each country of the region can also be a major source of vulnerability and can lead to the intergenerational transmission of deprivation when accounting for different risks and uncertainties that can affect any element of chain of poverty causation.

Even when historically, means of adjustments have been developed and implemented in these cases, further attention is to be devoted to the poor segments of the population. Higher vulnerabilities are expected to exist among women, girls, children, handicapped and older segments of the population in this region. The social status of each member of these segments is such that any degradation in one of the elements of the interdependent chain does affect the other components. Health accidents, deaths, sudden unemployment and job loss, price increase among others do drastically affect the survival of households.

Current economic and development literature show consistently the impact of low income on the limited choices available to the poor. The accumulated evidence underlines the difficulty and sometimes the impossibility of poor segments of the population to access basic services that are provided by the public and private sectors. It is also widely accepted that these facts are largely observed in developing economies and in the region under study, given the extent of income poverty, illiteracy, market imperfections and the absence of safety nets.

This says that poor individuals and households face the dilemma of both low income and consequently implicit high costs of access to basic goods and services. These goods and services include education, health care, housing, water, energy, transportation, credit markets, legal systems and courts besides others. But this implicit high cost of access is not only faced at the level of basic services but also at the acquisition of food, clothing and other necessary goods. This is easily understood when accounting for the competitive needs and the pressure placed on a limited income especially in an environmental context with relatively higher fertility levels even

though a decrease in the number of children has been observed in recent international population surveys.

Under these pressures, occasional risks and uncertainties do affect the overall capacity of households, especially those vulnerable and poor segments. The impacts of such risks are exacerbated by the interdependencies between economic, social, health and educational situations of households. Further studies developed by World Bank, UNDP and other organizations are still pointing out several new issues that are to be addressed in the region in order to reduce the likely impacts of not just income poverty but multidimensional one.

Effects of hazards and other exogenous sources of deprivation

As different variables and sub-variables appeared to be largely interconnected, different favourable and unfavourable exogenous factors are likely to induce positive and negative effects on the situation of individual and households at the level of different localities, countries and the region.

These risks and uncertainties do induce highly unexpected negative effects on the most vulnerable segments of the population. Epidemics, natural hazards and also economic crises besides unfavourable policies are likely to generate new supplementary burdens of deprivations among the poorest and the most vulnerable segments of the population.

The investigations undertaken in this study have been showing the high level of vulnerabilities of women in general and mainly those in rural areas. Women are consequently likely to suffer more from any unexpected exogenous shock. Children as well as older people are also in the same category. While the previous analyzes did not look precisely at the situation of children and oldest segments of the population, it is expected that these categories do also suffer from the negative impacts of any hazard because their vulnerable situation at the level of the household, in each country and in all the South Mediterranean economies.

While medium term strategies can be developed by the vulnerable segments of the population to adapt to shocks that are progressive, those that are sudden have more critical and some times detrimental impacts. This is experienced in the region with the adjustments to droughts through rural migration and the development of non agricultural activities during low rainfall and unfavourable weather conditions. But sudden natural shocks such as floods and earthquakes have contributed to generate further losses, mainly in poor areas and among the poorest segments of the population.

The relative high frequency of conflicts and wars in some parts of the South Mediterranean region is also a source of important damages that affect the region and mainly the poorest segments of the populations. This has generated important flows of refugees and an important stock of displacements and population re-allocation in this region of the world. Under these types of circumstances, education and health besides the requirements of daily life become crucial with the growth of such natural and human hazards.

The importance of missing dimensions of poverty

The results attained in this study show also how larger series of variables on which no data are available, may have important explanatory powers in the extent and magnitudes of the levels of interdependencies. The on-going household surveys as well as the aggregate databases do not account for series of missing variables that may have important roles in identifying sources and extent of social and economic deficits. The missing information is now being tackled in series of projects (Alkire, S. and Foster, J., 2008, Alkire, S., 2008, 2007) that recognize also that poverty has determinants that vary with households, regions and countries. For international comparisons, larger lists of poverty and deprivation components have to be added with a subsequent index for poverty assessments.

The identification of these missing variables is likely to contribute not just to understanding of local deprivation but also the overall programs and measurement of poverty at the global levels. Besides the issue of missing women that has been extensively addressed in the literature of human development (Sen, A. and Siddiqi, A., 2006) and that can be an important issue in the South Mediterranean region, other hidden information can be useful in understanding poverty in the context of the countries composing the region. Even with the lack of rigorous knowledge about economic data, the countries of the region appear to have relatively low levels of income poverty and vulnerability as assessed by international organizations. But these levels do not all the time show the real extent of poverty as this latter is multidimensional and includes larger series of components that are not addressed most of the time for different reasons, including that of the perception of poverty by researchers and practitioners of development.

The South Mediterranean region with the different countries composing it appears to show that large sets of variables can be introduced. The interdependencies assessed mainly at the levels of households in Morocco, Turkey and Egypt support the existence of variables that are not currently in the databases. While examples of missing variables are already suggested in the literature (Solava, I. and Alkire, S., 2007), a series of components seem to be extensively behind poverty. This is the case of physical and social mobility and of variables related to the dimension of social capital and to the dominating culture in the region.

Physical mobility can be related to health issues (physical and mental) and can be a major source of absence and limited expression of capacity in movement and access to different goods and services at different and further distances. Even under a high level of supply of infrastructure, human mobility is directly related to the capacity to undertake movements and be capable of accessing facilities that are at given distances.

In the region and mainly in its rural areas, the situation of infrastructure is such that those with some health difficulties may not be relatively mobile. Also, the lack of information and the high level of illiteracy may also be behind the limited mobility. It is then clear that the vulnerable segments of the population are likely to be of limited mobility. Women, children, old people and handicapped besides those that are forced to be mobile within limited distances (prisons, refugee's camps) are segments that can be relatively immobile in the region.

The region can be also suffering from lack of social mobility as individuals are not all the time provided access to new and higher levels of employment, housing and access to better opportunities during their life spans. The interdependencies between socio economic status and health plays a role in this but the existing social, cultural and political implicit barriers of access and change of situations deprive individuals and large population segments from participation to the overall sharing of the outcomes of development.

3. The central role of education and health in poverty alleviation programs,

Even with limited time series data on variables related to health, education and poverty, both education and health have appeared to be important engines to promote development in South Mediterranean countries.

Important variations have appeared throughout countries with education having an important driving role in Morocco but with more emphasis placed on health in the cases of Turkey and Egypt.

The existing interdependencies shown under both country and regional analyzes, underline the importance of health and education in driving the economies and societies in the South Mediterranean region. Specific country results related to the likely determination of the continuation of schooling have shown the importance of the health and economic conditions in staying or leaving school. The rate of school drop out has appeared to be higher for girls at both primary and secondary levels in the case of Morocco. Variables directly related to health and nutrition besides economic components appeared to have major influences on school continuous attendance by children. As indicated in other publications, the drop-out from school can be related to the alternative of employment of children and to the early marriage of girls. This is pervasive in the regions even under the trend of increasing age of marriage and the constraints placed against the employment of children.

In traditional activities such as agriculture and handicrafts, learning opportunities are provided for some years before formal inclusion in these professions. But, some studies are questioning these types of learning on the ground that these are non-paid activities provided to children rather being real learning experiences. Major attempts to create better conditions for maintaining and increasing the number of children in schools have been made. They include the provision of public and communal transportation, food and housing. These actions are really accounting for the existence of major interdependencies but they need acceleration and development in order to further promote larger schooling.

Social new arrangements have also been provided in some countries in the region to ensure that girls can attend schools by increasing the age of marriage. But, again social practices and sometimes cultural values are still constraining these new social trends. The opening up of job markets for girls and women besides the promotion of the status of women through creating further incentives for their inclusion into the administrative, political and economic life are under way but the indices such as the Gender Empowerment Measure still indicate low performances for the countries of the region.

4. Importance of transversal policies with further coordination and integration

It is now clearly established that transversal policies and further coordination and integration of different sectors of the economy and society are likely to generate further positive effects on development. While the tradition of sector policies is important, that of transversal and horizontal approaches appears to be more promising for the process of inclusion and expansion of development.

The average picture of an economy and society in the South Mediterranean region indicates more closed and more centralized systems of decision making with a prominent role of Governments. All decisions and programs are expected to go through a public system of institutions where central ministries and parliaments play a central role. Social activities and poverty alleviation programs are also conducted most of the time on the same principles and practices. In almost all countries of the region, there are ministries of education and health with representations in different localities but most of the decisions related to health, education, employment and economic affairs are centrally taken.

On the other hand, households in different localities and regions in every country live and perceive the interdependencies that exist between different components that affect their daily living conditions. The needs of mainly those that are under stressed economic and social conditions are normally assumed to be considered within the framework of the locality, the region and the administrative entity to which they belong, but most of the time more resources and more administrative power is needed from the central entities.

The local representations require more resources and instruments to supply the needed services. Education and health as well as other sectors are most of the time under the respective central authorities. Further, these programs may not be consistent with the features and characteristics of a given region of implementation.

Coordination and integration within the horizontal and vertical meanings have been discussed for the South Mediterranean region over the last years implying that the development and furthering of this approach have been accelerated. The orientation for the achievement of the MDGs and the development of human development programs has been among the incentives that have pushed countries to achieve further integration. But this external means require further adoption within countries to promote local and global development. The reforms undertaken and the changes taking place in the economic, social and political spheres while necessary are not sufficient if these reforms do not include further coordination and integration including that with different localities.

B. Strengthening of Local development

The report and its findings indicate implicitly that there are different interdependent levels that can address and sustain development.

Consistency between global or macroeconomic and the needs of the populations cannot be achieved if microeconomic concerns are not addressed both locally and globally. This also says

that local development matters and might be the most important determinant of global development. That is why regions and localities in South Mediterranean countries have to be the engines of development.

The need for focus on local development has been observed for most of the countries composing the region under study. Most of these countries appear to be more centralized even though major political, social and political reforms have been undertaken. Within the context of a centrally harmonized local development, the interdependencies between health, education and economic performance can be the most important determinants in comparison with sector driven and centralized development.

Locally conducted poverty alleviation programs have the merit of accounting for household and local specificities, including the types of needs and deprivations rather than on global frameworks that define poverty and the average target population.

Further drivers including political, economic and social components can be mobilized efficiently in different countries of the region. The shift that is taking place in the United Arab Emirates and other traditional golf oil exporting countries can be examples of trends that can be developed in the entire region. These means are required to account for health and education besides the economic and financial components. The ownership of technologies that appeared from the report as directly related to the socioeconomic components is likely to constitute a major engine in enterprise and job creation.

C. Strengthening means to ensure enterprise and job creation

Health and education are the two most important forms of human capital. In the context of globalization both are strongly needed for individuals to perform in the job market and to achieve competitiveness of both small and large enterprises. Their interdependencies with employment make the required improvement even more pressing.

In South Mediterranean countries, as in a lot of developing economies, the creation of jobs has become more and more dependent on the development of small new and medium businesses. Such a relation is becoming essential for allowing self-employment and creating jobs through the mobilization of small investments supported by different public and banking programs. Such a strategy has been accelerated in the region, since 2000 with mainly the increase in the unemployment of young and skilled labor. These programs are also enhanced with the contributions of large businesses that have developed special programs and instruments which facilitate the level of small enterprise creation through outsourcing for example.

In a context of globalization and of evolution towards knowledge intensive products, proceeds and services, the competitiveness of all enterprises is realized through their technological leveling and the reinforcement of their innovation capacity. This is more confirmed given that obsolescence of knowledge and know-how that occurs at a higher speed in comparison with past periods. The creation and development of enterprises and job opportunities, although essential in a growth and development process, becomes more demanding in terms of new knowledge and innovations. The most important way that is also the most promising is the one that consists in

creating enterprises centered on benefit yielding innovations but most of these enterprises that are adapted to future markets are not yet created.

Nevertheless, during their education, students address series of domains that are often generators of ideas in terms of general knowledge but also in terms of enterprise creation practice and creation. Unfortunately, the last part is seldom valued in the education mechanisms despite trainings and projects. Trainings also are not mobilized in a functional manner. These facts would explain among others, why enterprise creation is not the major concern of schools and universities' graduates in the region of study. In the contrary, job research namely in the public sector remained the major expectation of many graduates despite the changes made at the level of the job market structures since 1990. Such prospect that was reinforced by the education system itself, among others, was progressively replaced by expectations more related to jobs created by the private sector. However, such concerns in terms of hiring have been quickly faced with the sector's limits and with the global dynamics of the economy.

Despite the fact that investment is the most important means for job creation, new enterprise creation is the first source of self employment before constituting a recruitment center. The self-employment related researches progressively showed the promising character of the creation process of a new type of enterprise. This latter would be integrated in the education and applied research logic, while facing the concerns about market needs in terms of innovating products and services. Another asset is related to investment extent, enterprise size and jobs and functions mobilized. Such integration is likely to create growth and progress regarding market concerns and satisfaction of needs. The examples offered by the new information technologies in the South Mediterranean countries and elsewhere, show clearly the effects of this integration in different areas. These examples confirm the importance of start-ups and small enterprises not only in terms of job creation but also regarding the creation of new wealth in the economy. This wealth accounts not only for the economic and financial components in the locality but also for the infrastructure and for the provision of the needs of the local population. This includes health and education. This is also strengthened through necessary synergies with large enterprises but also with the public sector and with non governmental agencies.

It is thus a matter of choosing new strategies aiming at the pursuit of new avenues through the mobilization of human resources able to identify and promote new ways but also to produce through the creation and promotion of enterprises. In a more practical way, it is a matter of creating favorable conditions so that students, by their graduation at most, can develop innovating enterprises. It is thus necessary that the education system accompany these students along the duration of the program in order to help them generate ideas and projects. The ideal case would be a process directly related to the valorization of achievements following applied researches conducted within education and training organisms. This is based on the existence of a deep relationship between education processes and investigations related to research and development. In the absence of such processes, the deep relationships held with existing enterprises and the accumulated experiences in different sectors, could supply more knowledge in terms of mechanisms able to constitute levers for innovating ideas among students. It is also necessary to install incubation processes likely to offer favorable conditions for the concretization of ideas through transforming them into promising enterprises. Finally, it is necessary to have access to mechanisms related to launching the enterprise within an incubator or

directly in the production structure. These latter are functional clusters such as defined in economic literature and development reports.

Several studies and reports related to the implementation and to the launching strategies of technological clusters. This is the case of European Union countries, namely France, Belgium, Germany and Luxembourg. Canada and the United States of America did not ignore this development strategy. Many international organizations and developed countries recommend the adoption of the strategy of clusters for developing countries. The literature in this subject is abundant and continues to develop during recent years. Some developing countries such as Turkey, Morocco and Brazil continue their attempts for the promotion of local competitive clusters. The related theories have been developed by series of authors including M.Porter (1990), G. Lipsey (2002), Steven Globerman (2001), Paul Belleflamme, Pierre Picard and Jacques-François Thisse (1999), Pierre M. Picard and Eric Toulemonde (2004) Thomas A. Hutton (2004) and Philippe Monfort and Rosella Nicolini, (2002) among others.

C. Limitations

Major objective limitations have appeared during the implementation of this project. These Limitations have concerned the scope, the coverage and extent of this research. That is why progressive changes have been operated during this study. But, some of the limitations have helped identify new research avenues directly related to this study.

The data limitations have contributed in reducing the scope and initial intentions placed on this work. While the geographical area of the South Mediterranean can be well delimited, the availability of information has imposed that the MSC include most of the time the Arab countries and Turkey as they have similar levels and patterns of development. These concerns are shared herein as limitations and warnings that need to be addressed in order to inform the readers about the limits within which this research was achieved. This also has shown the importance of future investigations related to the interdependencies between health, education and poverty.

One of the important findings of the research on the link between socio economic status and health is that the children economic status and or the early life status have very important implications for adult health. The data available in the South Mediterranean Countries does not allow us to test for such hypothesis. Evidence however suggests that this result probably holds in this part of the world as well. We will need to develop alternative hypothesis to test for this important finding.

Limitations and warnings

This report is not about the analysis of the sectors of health, education and economic performance and related sector policies in the South Mediterranean economies. It is dealing with the interferences of health, education and economic performance with their implied policies. This investigation is about the assessment of the interdependencies between health, education and economic performance. It aims at showing the existence, the extent and the eventual policy implications.

Furthermore, the initial intent of this project was to look at the economic performance mainly for households faced with income poverty. But, no data were available for achieving this task. The only data used for this purpose is the CMBS database that related to the poorest zones of Essaouira and Bouaboud in Morocco. The DHS data are also used for the purpose of identifying interdependencies among poor segments of the population in Morocco, Turkey and Egypt. Otherwise, the regional analyzes were attempts to see how different aggregate data do show the existence of interdependencies.

C. Further Directions of research

The region needs more disciplinary and multidisciplinary research in the areas related to health, education and poverty. These directions of research could be better located in the countries of the South Mediterranean region in universities and research centers. These investigations are likely to enrich the development programs that are undertaken in different countries and in the region. The central role of women is an example of research area that is needed to support the promotion of gender issues in different areas. Governments, private initiatives and non governmental agencies can then enrich the content of their actions and programs. It is also the same for poverty alleviation and for related human development policies. Some research directions include:

1. Missing specific poverty dimensions in the region,
2. Causality and determinants of vulnerability and poverty in the context of the region,
3. Socio-economics of health and health issues,
4. Socio-economics of knowledge content and diffusion,
5. Measurement and quantitative issues with shared databases and tools,
6. Benchmarks within countries and between countries,
7. Local development versus global development,
8. Efficient means and institutions for the promotion of education,
9. Public versus private supplies of health and education,
10. Impacts of delays in reducing poverty and implications on North-South relationships.

References

- Belleflamme P., Picard P. and Thisse J.F. (1999), "An Economic Theory of Regional Clusters", Journal of Urban Economics.
- Cutler David M, Adriana Lleras-Muney, Tom Vogl (2008) “Socio economic Status and Health: Dimensions and Mechanisms” NBER Working Paper 14333
- Pierre Picard and Eric Toulemonde (2004). "Endogenous qualifications and firms' agglomeration," Journal of Urban Economics, Elsevier, vol. 55(3), pages 458-477, May
- Farrukh Iqbal (2006). "Sustaining Gains in Poverty Reduction and Human Development in the Middle East and North Africa", Orientations in Development Series, the International Bank for Reconstruction and Development / the World Bank
- Martin Marie Claude (2008) “Individual and Collective Resources and Health in Morocco” UNU-WIDER Research Paper N° 2008/21
- Philippe Monfort and Rosella Nicolini, (2002). "Regional Convergence and International Integration"
- Porter, M. (1990). "The Competitive Advantage of Nations", Free Press
- Richard G. Lipsey (2002). "Some Implications of Endogenous Technological Change for Technology Policies in Developing Countries”, The Economics of Innovation and New Technology (EINT), 2002, Vol 11 (4-5)
- Roudi-Fahimi Farzaneh, 2004) “Progress toward the Millennium Development Goals in the Middle East and North Africa” Population Reference Bureau, Policy Brief

- Roudi-Fahimi Farzaneh and Valentine M. Moghadam (2003) “Empowering Women, Developing Society: Female Education in the Middle East and North Africa” Population Reference Bureau, Policy Brief
- Sabina Alkire and James Foster (2008). "Counting and Multidimensional Poverty Measurement", OPHI Paper Working Series
- Sabina Alkire (2007). "Choosing Dimensions: the Capability Approach and Multidimensional Poverty", in (N.Kakwani and J.Silber, eds.), The many Dimensions of Poverty, New York: Palgrave-Mac Millan
- Sabina Alkire (2008). "The Capability approach: mapping measurement issues and choosing dimensions", in (N.Kakwani and
- J.Silber, eds.), The many Dimensions of Poverty, New York: Palgrave-Mac Millan
- Solava Ibrahim and Sabina Alkire (2007). "Agency and Empowerment: a proposal for internationally comparable indicators", OPHI working Papers Series
- Steven Globerman (2001). “La localisation des activités à plus grande valeur ajoutée,” Working Paper No 27, Western Washington University, April 2001
- Strauss John and Duncan Thomas (1998), “Health Nutrition and Economic Development” Journal of Economic Literature Vol. XXXVI pp.766-817.
- Thomas A. Hutton (2004) "The new economy of the inner city," *Cities,* Vol 21 (2): 89-108

Overall Conclusion

This report focused on showing the importance of interdependencies between health, education and economic performance mainly in situations of poverty. The South Mediterranean countries are considered as the field where these interdependencies are assessed. Important policy implications have emphasized in relation to the outcomes achieved in different analyzes conducted in this study. The analytical tools, even though limited with the type of data made available, concerned both some individual countries and the region. The undertaken analyzes include descriptive but also different variants of regression techniques. The data cover different international sources but also sometimes some country data. The Demographic and Health Surveys data were also used for the cases of Egypt, Turkey and Morocco.
Within the above context, the situation of South Mediterranean countries (SMC) as analyzed and discussed in different publications has benefited from a special attention in order to assess how the concerned specific interdependencies have been assessed. This has revealed and confirmed the importance of the topic at hand besides confirming the research avenues pursued. It has appeared that SMC are not fully accounting for the interdependencies of health, education and poverty and that their policy making models are most of the time sector oriented. The SMC economies even though can gain from the knowledge about the interdependencies; they can also reduce the existing constraints to allow further the access of the population to basic services. The current study has also shown that interdependencies are not fully valued in this context as cross-access to different components is still limited. Given the extent and magnitude of education, health and socio-economic deficits in the SMCs, the identification of the interdependencies generates new avenues for more integrated economic and social policies that can also gain from the reduction of barriers that reduce access to basic services such as health and education.

The results attained are mainly based on the assessment of different panels of data covering the overall region but also some specific countries. These data have originated from different sources that include international and sometimes national databases. Both descriptive statistics and regression analyzes are used to assess the directions and magnitudes of interdependencies. Both regional and country and databases have been used. While the regional databases accounted for different socio-economic variables as issued by the available World Bank and UN data, the microeconomic variables have been varying with the sources used. One specific piece of data related to drop out from different school levels has been added to investigate the link with health and economic variables in the 16 regions of Morocco. Other supplementary data include Demographic and Health Surveys (DHS) and other sources such as Country Profile data (Ministry of Finance, France) have been also investigated analyzed.

Overall References

Overall Political, Economic & Social Reforms

AHDR- Arab Human Development Report (2004). "Towards freedom in the Arab world," UNDP, Arab Fund for Economic and Social Development, Arab Gulf Programme for United Nations Development Organizations: http://www.pogar.org/publications/other/ahdr/ahdr2004e.pdf

Cameron F. and Rhein E, (2005). "Promoting Political and Economic Reform in the Mediterranean and Middle East", EPC issue paper 33.

Dasgupta, Dipak, Jennifer Keller and T. G. Srinivasan. "Reform and Elusive Growth in the Middle-East---What Has Happened in the 1990s?" 22 July 2001. *Economic Boundaries in the Middle East and North Africa*. 5 June 2007: http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/Keller-Dasgupta-Srinivasan/$File/Keller-Dasgupta-Srinivasan.pdf

Dolorez, Trevizio "The Dynamics of Domination". 1996. University of California. 8 June 2007: http://www.jstor.org/view/00943061/di974042/97p07327/0

Heritage Foundation Reports, 2000 & 2007: IDRC-CRDI (2004), "Reserch and capacity building on trade in health services in MENA region".

Kikeri, Sunita and John Nellis, (2002). "Privatization in Competitive Sectors: The Record to Date," June 2002; World Bank Policy Research Working Paper No. 2860 Available at SSRN: http://ssrn.com/abstract=636224

Mitha, Farooq A. "Economic Reform in the Middle East and North Africa". 2007 University of Florida Levin College of Law. 1 June 2007: http://works.bepress.com/cgi/viewcontent.cgi?article=1000&context=farooq_mitha

Richards, Alan. "The Political Economy of Economic Reform in the Middle East: The Challenge to Governance". May 10th, 2001. University of California: http://sccie.ucsc.edu/documents/working_papers/2001/challenge_econreform.pdf

Nabli, Mustapha Kamil and Marie-Ange Véganzonès-Varoudakis, (2004). "Reforms and growth in MENA countries: new empirical evidence," World Bank Working Paper 36, May 2004.

Nabli, M.K et al, (2005). "The Political Economy of Industrial Policy in the Middle East and North Africa," ECES conference, Egypt.

Nells, J., (2006). "Privatization: A summary assessment," Working paper 87, Center for Global Development.

Page, John. "Structural Reforms in the Middle East and North Africa". 2003. 4 June 2007: http://www.yemenembassy.org/economic/Reports/WEF/Page_62_78_Structural_Reforms.pdf

Poortman, Christiaan. "Reforms in the MENA Region". 6 April 2006. *World Bank MENA Development Forum 5*. World Bank. 4 June 2007: http://go.worldbank.org/CEX1H34N30

Health Insurance System Overview

Health Insurance in Oncology Encyclopedia by Answers.com, cited in: http://www.answers.com/topic/health-insurance?cat=biz-fin#top

Health Insurance in Britannica Concise Encyclopedia by Answers.com, cited in: http://www.answers.com/topic/health-insurance?cat=biz-fin#top

Social Insurance Reforms in the MENA countries

The World Bank (2004). MIDDLE EAST AND NORTH AFRICA (September), Retrieved July 25, 2007: http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/MNABrief2004/$File/MNA+BRIEF-ENG+2004AM.pdf

The World Bank Group (2004). Social protection in MENA (September), Retrieved July 24, 2007, from: http://lnweb18.worldbank.org/mna/mena.nsf/Attachments/Social+Protection-ENG/$File/SOCIAL+PROTECTION-ENG+2004AM.pdf

Case Study: Morocco

The Health Care System in Morocco in the National Library of Medicine and the National Institutes of Health by PubMed (1994), cited in: http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=PubMed&list_uids=8076199&dopt=AbstractPlus

Loi n 65-00 by l'ANAM, (October 2002), cited in http://www.assurancemaladie.ma/upload/document/CODE%20DE%20LA%20COUVERTURE%20MEDICALE%20DE%20BASE%20loi65-00.pdf

Missions by l'ANAM, (2006), cited in: http://www.assurancemaladie.ma/anam.php?id_espace=1&id_srub=2

Morocco in *Social Security Programs throughout the World: Africa, 2005* by Social Security Online: Office of Policy, cited in: http://www.ssa.gov/policy/docs/progdesc/ssptw/2004-2005/africa/morocco.html

Ruger, Jennifer Prah and Daniel Kress, Ruger Co-authors Paper Exploring Morocco's Expanded Health Insurance Coverage: and the Future Potential of Reducing Health Financing Gaps in Yale University: Office of Public Affairs (July 2007), cited in: http://www.yale.edu/opa/newsr/07-07-18-03.all.html

Soins & Remboursement in CNOPS, cited in: http://www.cnops.org.ma/index.php?option=com_content&task=view&id=23&Itemid=44

Case Study: Turkey

Basagaoglu, Ibrahim and Aysegul Demirhan Erdemir, The Development of Health Insurance in Turkey and its Importance from the Point of View of Medical Ethics by *Eubios Journal of Asian and International Bioethics* 14 (2004), pp:58-60, cited in: http://www.eubios.info/EJ142/ej142g.htm

Giray, Arslan Umit, Md, Health System in Turkey, 2002 by *Department of European Union Coordination*, (Ankara, 2003), pp: 1-21: http://www.saglik.gov.tr/EN/Tempdosyalar/409__0135_35.pdf

"Health" in *Health Services in Turkey*, in: http://www.enjoyturkey.com/info/facts/Health.htm

Sansal, Burak, "Health Care in Turkey", in: http://www.allaboutturkey.com/health.htm

"Turkey" in *Country Cooperation Strategy at Glance* by The World Health Organization (March 2007), cited in: http://www.who.int/countryfocus/resources/ccsbrief_turkey_2007_en.pdf

"Turkey" in *10 Health Questions* by World Health Organization, pp: 204-221, cited in: http://www.euro.who.int/Document/E88202_Turkey.pdf

Case Study: Tunisia

Blel, S., Health Insurance in Tunisia, Current and Future Perspectives in Pub Med by NCBI (May 2001): http://www.ncbi.nlm.nih.gov/sites/entrez?Db=PubMed&Cmd=ShowDetailView&TermToSearch=11515469&ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstractPlus

Chokri, Arfa and Achour Noureddine, National Health Accounts: Tunisia 2002 by the Ministry of Public Health and the National Institute of Public Health, pp: 1-40, cited in: http://www.who.int/nha/docs/en/Tunisia_NHA.pdf

Tunisia: Country Cooperation Strategy for WHO and Tunisia 2005-2009 by World Health Organization: Regional Office for the Eastern Mediterranean (Cairo 2006) pp: 1-80, cited in: http://www.who.int/countryfocus/cooperation_strategy/countries/ccs_final_tun_2005_en.pdf

Tunisia Health Sector by World Bank, (July 2006) cited in: http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21459570~menuPK:51062078~pagePK:34370~piPK:34424~theSitePK:4607,00.html

Case Study: Egypt

Egypt Health in Egypt by Encyclopedia of the Nations, cited in: http://www.nationsencyclopedia.com/Africa/Egypt-HEALTH.html

Fouad, Samir, "Egypt National Health Accounts 2001-02" by USAID from the American People (November 2005), pp: 1-97, cited in: http://www.phrplus.org/Pubs/WP013_fin.pdf

Gericke, Christian A. (2004), "Financing Health Care in Egypt: Current Issues and Options for Reform," (March), Berlin University of Technology, pp: 1-20, cited in: http://www.ww.tu-berlin.de/diskussionspapiere/2004/dp05-2004.pdf

Case Study: UAE

Kronfol, N. M., Perspectives on the Health Care System of the United Arab Emirates in Health Journal Back Issues by Eastern Mediterranean Health Journal (Volume 5, Issue 1, 1999, pp: 149-167), cited in: http://www.emro.who.int/Publications/EMHJ/0501/22.htm

Report on the Third Regional e-Health Symposium: Regional Office for the Eastern Mediterranean (Dubai: January 2003), pp: 1-38, in: http://www.emro.who.int/his/ehealth/UAEReport03.pdf

UAE International Health Insurance Advisor in UAE Health by GlobaSurance: Health Protection around the World, cited in: http://www.globalsurance.com/resources/uae/index.php

Case Study: Kuwait

Government Medical Insurance Policy in Warba Takaful Insurance Company, cited in: http://www.warbamedical.net/govt.htm

Health Insurance Problem continues, cited in: http://www.shopvisioncare.com/Health-insurance-problem-continues.html

Health Insurance Schemes in Health Services, Health Insurance and Clinics by Indians in Kuwait, cited in: http://www.indiansinkuwait.com/kinfo163.asp

Kuwait: Law No1 of 1999 on Alien Health Insurance and the Imposition of Fees Against Medical Services, Arab Law Quarterly, 2000, p : 423, cited in: http://links.jstor.org/sici?sici=0268-0556%282000%2915%3A4%3C423%3AKLN1O1%3E2.0.CO%3B2-Q&size=LARGE&origin=JSTOR-enlargePage

Kuwait Insurance Co, cited in: http://www.kic-kw.com/

Kuwait Reinsurance Company, cited in: http://www.kuwaitre.com/KRIWeb/

Insurance in Kuwait Insurance Co, cited in: http://www.kic-kw.com/epages/Insurance.htm

Case Study: Saudi Arabia

Hassan, Javid, Saudi Arabia: New Clinics Planned for Low-Income Expatriates in Business Correspondent by Saudi Election (June 2006) cited in: http://saudielection.com/en/forum/showthread.php?t=1662
Insurance in Saudi Arabia by MENA Business Guide (2004/2005), cited in: http://www.menabusinessguide.com/04_mena/095_098.htm
The New Saudi Arabian Health Care Market by Boozallen Hamilton (February 2007) cited in: http://www.boozallen.com/capabilities/Industries/industries_article/33599338
Saudi Arabia Extends Health Insurance in Middle East and North Africa Industry News by Pharma and Health Insights (February 2007) cited in: http://www.pharmaceuticalsinsight.com/file/43710/saudi-arabia-extends-health-insurance.html
Saudi Arabia: Health Insurance Mandatory from Jan. 1 in Arab News by Zawya (October 2005) cited in: http://www.zawya.com/Story.cfm/sidZAWYA20051025034746/SecIndustries/pagFinancial%20Services/lok034700051025
Turning to the Private Sector in Regional Profile by Middle East Health, cited in: http://www.middleeasthealthmag.com/may2005/feature1.htm

Case Study: Bahrain
Compulsory Health Insurance for non-Bahrainis in News by Ministry of Health, (2007) cited in: http://www.moh.gov.bh/News/NewsDetails.asp?NewsId=18
The Consolidation Act on Social Insurance in General Organization for Social Insurance (Article 1), cited in: http://www.gosibahrain.org/english/part1-chap1.htm
"Introduction: An Introduction to Healthcare in Bahrain" in *Health* by Just Landed Guide, cited in: http://www.justlanded.com/english/bahrain/tools/just_landed_guide/health/introduction
Newman, Sl., "A Guide to Private Health and Dental Insurance in Bahrain in Health and Wellness," by AC the People's Media Company (September 2001) cited in: http://www.associatedcontent.com/article/382685/a_guide_to_private_health_and_dental.html

Case Study: Israel
Coggan, Diane A., Health Care Delivery to Foreign Workers in Israel by Harvard School of Public Health (July 1998) cited in: http://www.hsph.harvard.edu/takemi/rp153.pdf
National Expenditure in Public Health in Israel by Jewish Virtual Library (August 2002) cited in: http://www.jewishvirtuallibrary.org/jsource/Health/public.html
National Health Insurance in MFA Library by Israel Ministry of Foreign Affairs (September 1995) cited in: http://www.israel.org/MFA/MFAArchive/1990_1999/1998/7/National%20Health%20Insurance
Shvarts, Shifra Dr, The Health Care System in Israel-An Historical Perspective in History of Israel: Israel at Fifty 1948-1998 by Israel Ministry of Foreign Affairs (June 2002), cited in: http://www.israel.org/MFA/History/Modern%20History/Israel%20at%2050/The%20Health%20Care%20System%20in%20Israel-%20An%20Historical%20Pe

Case Study: Syria
Al-Khatib, Bachar, Dr, Can Private Health Insurance Improve Health Care in Syria? in Syria: Private Health Insurance, Indiana University School of Medicine: MPH Program, Department of Public Health (April 2007), pp: 1-44, cited in: http://medicine.iu.edu/documents/DPHDocuments/Khatib,healthinsurance_21%5B1%5D.pdf
The Good News in Health Care in Syria by Viarecta (June 2007), cited in: http://viarecta.blogspot.com/2007/06/health-care-in-syria.html
Springer, Lothar, "Health Sector Modernization Programme (HSMP) in EU Projects in Syria," by the European Union, in: http://www.delsyr.ec.europa.eu/en/eu_and_syria/PROJECTS/3.htm

Case Study: Jordan
Jordan: Country Cooperation Strategy for WHO and Jordan 2003-2007 in Regional Office for the Eastern Mediterranean by World Health Organization (Cairo: 2006), pp: 5-55, cited in: http://www.who.int/countryfocus/cooperation_strategy/countries/ccs_final_jor_2003_en.pdf
Health Insurance Directorate, cited in: http://www.hid.gov.jo/UI/English/Default.aspx
Ishaqat, Basma, Jordan by Policy Project, in: http://www.policyproject.com/countries.cfm?country=Jordan
PM highlights role of the health insurance commission in News and Events by the Ministry of Foreign Affairs (November 2007), cited in: http://www.mfa.gov.jo/events_details.php?id=20168

Case Study: Algeria
Development Progress in Middle East and North Africa (MENA) Algeria by the World Bank Group, (March 2004) cited in: http://lnweb18.worldbank.org/mna/mena.nsf/Countries/Algeria/4EB0B560259833BA85256923005C5EA2?OpenDocument
Health and Welfare in Algeria by Country Studies, in: http://www.country-studies.com/algeria/health-and-welfare.html

Case Study: Lebanon

Ammar, Walid et al. (2000), "Lebanon National Health Accounts" by World Health Organization, World Bank and the Ministry of Health, pp: 1-94, (December 2000) cited in: http://www.who.int/nha/docs/en/Lebanon_NHA_report_english.pdf

Group Plan in Professional Advice by Globalsurance: http://www.globalsurance.com/products/group.php

International Health Insurance Advice, cited in: http://www.globalsurance.com/index.php

Individual Plan in Professional Advice by Globalsurance: http://www.globalsurance.com/products/individual.php

Travel Plan in Professional Advice by Globalsurance: http://www.globalsurance.com/products/travel.php

Case Study: Qatar

An Introduction to Healthcare in Qatar in Qatar by Just Landed, cited in: http://www.justlanded.com/english/qatar/tools/just_landed_guide/health/introduction

Family International Health Insurance in Family Plans by Global Health Insurance, cited in: http://www.global-health-insurance.com/family.php

Healthcare in Qatar Health by Ameinfo, cited in: http://www.ameinfo.com/qatar_health/

Group Medical in Group Plans by Global Health Insurance, in: http://www.global-health-insurance.com/group.php

Individual Overseas Health Insurance in Individual Plans by Global Health Insurance, cited in: http://www.global-health-insurance.com/enquiry/individualfamily/

International Travel Health Insurance in Travel Plans by Global Health Insurance, cited in: http://www.global-health-insurance.com/travel.php

Student Health Insurance in School of Foreign Service in Qatar by Georgetown University, cited in: http://www1.georgetown.edu/sfs/qatar/services/health/29614.html

Foreign Medical Insurance in Qatar: http://www.global-health-insurance.com/country/qatar/

Health Policies in the MENA Region

A. Maeda, "Health, Population and Nutrition in The Middle East and North Africa Region", World Bank, Washington D.C., forthcoming;

Abdelmajid, B.H. 1999. "Situation épidémiologique des maladies sexuellement Transmissibles". Chapter 1. Department of Preventive Medicine, Faculty of Medicine, Tunis. Mimeo;

Abdulrazak Abyad, "The growth of the health sector in the region" from Middle-East journal of businesses, 2003: http://www.mejb.com/upgrade_flash/Vol1_Issue1/Health-Sector-in-ME.htm

Pierre-Louis, Anne Maryse, Francisca Ayodeji Akala and Hadia Samaha Karam, 2004 (editors), "Public Health in the Middle East and North Africa - meeting the challenges of the twenty-first century" Chapter 1: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/06/02/000112742_20040602161309/Rendered/PDF/291630Public0Health0in0the0Middle0East.pdf

Ben Said, A. 2001. "National AIDS and STDs Program in Tunisia." Prepared for the WHO 11th Intercountry Meeting of National AIDS and STD Program Managers, Casablanca, July.

Bos, E., "Changing Epidemiology and Demography: The Need For Adapting Health Systems in the Middle East and North Africa Region", World Bank, Washington D.C., 1997. Unpublished paper for an analysis of the population structures and basic population policy issues facing the region.

Akala, F., S. El-Saharty, "Public-health challenges in the Middle East and North Africa", The Lancet, Volume 367,

Schieber, G. (ed), "Innovations in Health Care Financing". Proceedings of a World Bank Conference, March 10-11 1997, World Bank, Washington D.C., 1997.

Schieber, George, Akiko Maeda and Nicole Klingen; "Health Reform in the MENA Region", 1998;

IDRC, "RESERCH AND CAPACITY BUILDING ON TRADE IN HEALTH SERVICES IN MENA REGION" IDRC, Project Number: 102257 Project Timeline: March 2004 –September 2006: http://reseau.crdi.ca/es/ev-98273-201-1-DO_TOPIC.html

Salhab, Nisrine and Juliana Yartey; "Public Health in the Middle East and North Africa", 2004,

Population Reference Bureau. "Population trends and challenges in the Middle East and North Africa. October", 2001: http://www.prb.org/pdf/PoptrendsMiddleEast.pdf

Prabhat, P., Ransom MK, Nguyen SN & Yach D. "Estimates of global and regional smoking prevalence in 1995 by age and sex". Am J Public Health 2002;

Public health in Middle East and North Africa: a situational analysis, Washington, DC: World Bank;

Tawilah, J. 2001. "HIV/AIDS Epidemic in the EMR." PowerPoint presentation, October.

The World Bank, Middle East and North Africa Region. "Sustaining gains in poverty reduction and human development in the Middle East and North Africa". Washington, DC: World Bank.

"World Bank's Fight against HIV/AIDS Spreads to MENA" http://siteresources.worldbank.org/INTLEBANON/News%20and%20Events/20800531/AIDSinMENA.pdf

World Bank Health, Nutrition and Population Sector Strategy, World Bank, Washington D.C., 1997;

World Bank Sector (2007), "Evaluation of the World Bank's Assistance for Health Nutrition and

Population":
http://lnweb18.worldbank.org/oed/oeddoclib.nsf/DocUNIDViewForJavaSearch/8D71FAA54679B57485257377004870 58/$file/hnp_app_paper.pdf.
World Development Indicators (2000). "Total Fertility Rate," World Bank,
World Development Indicators (2003), World Bank,
World Health Organization (2008).

Health Policies in the MENA Region

Fatma El-Zanaty "Egypt Demographic and Health Survey 2005"
http://www.measuredhs.com/pubs/pub_details.cfm?ID=586&ctry_id=10&SrchTp=ctry
Macro International Inc. "Yemen Demographic and maternal and child health survey 1997".
http://www.measuredhs.com/pubs/pub_details.cfm?ID=136&ctry_id=46&SrchTp=ctry
ORC Macro, "Jordan Population and Family Health Survey 2002"
http://www.measuredhs.com/pubs/pub_details.cfm?ID=411&ctry_id=18&SrchTp=ctry
ORC Macro, « ENQUÊTE SUR LA POPULATION ET LA SANTÉ FAMILIALE (EPSF) 2003-2004 Maroc»
http://www.measuredhs.com/pubs/pub_details.cfm?ID=524&ctry_id=27&SrchTp=ctry
Touhami Aloui, Mohamed Ayad, Habib Fourati, « Enquête Démographique et de Santé en Tunisie 1988 »
http://www.measuredhs.com/countries/metadata.cfm?surv_id=26&ctry_id=43&SrvyTp=ctry

http://www.measuredhs.com/accesssurveys/start.cfm

Middle East Economic Survey, 2006. Progress Towards The Millennium Development Goals In The Arab Region 2005. VOL. XLIX, No 4
http://www.mees.com/postedarticles/oped/v49n04-5OD01.htm