THE ECONOMIC DETERMINANTS OF SOCIAL INDICATORS IN THE ARAB REGION

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1. Introduction

Welfare of citizens is the ultimate objective of economic activities and policies at the country level. This is one of the basic facts which everyone accepts, irrespective of the ideological school one may belong to. How this is to be achieved and how to measure this has been an issue of intense debates. In fact, the former has been a subject of intense debate since early 1970s when it was realized that the neo-classical policies that were adopted in 1950s and 1960s and that made the policy-makers focus exclusively on the growth of per capita national income and assumed that the benefits of such growth would automatically **trickle down** to every citizen/groups in the society. However, the outcome of such strategy did not prove to be correct as it has led to large inequalities in both incomes as well as levels of social sector development across the nations and sub-nations. This has led to the emergence of development economics that focuses more on improving the living standards of the people. Since then there have been debates, and now there is almost ubiquitous acceptance for the premise that in order to make the growth process beneficial to every citizen in the society there is a need for broader economic policies that balance growth as well as the social sector development. The adoption of United Nations’ Millennium Development Goals (MDG) in the late 1990s as the policy priority only suggests that trickle down hypothesis may not be empirically valid and balancing growth and development may need more than growth-promoting policies.

That brings one to a critical question: what needs to be done in addition to pursuing pure growth policies? While pure growth policies might help in increasing the per capita incomes, the distribution of the increase in incomes has been found to be skewed. This skewed distribution could be due to various reasons such as the growth strategy itself as well as uneven initial conditions in terms of capabilities and human development. This clearly calls for redistributive policies as well as **inclusive growth** strategy rather than the pure neo-classical growth. Now the issue is what is the focus of redistributive policies? The objectives of redistributive policies are mainly to reduce poverty, inequality, improve access to education, health facilities, better living environments, intergenerational equality, among others. Measures required for attainment of these objectives are then suggested based on theoretical and empirical studies.

This study focuses on these issues in the context of the countries in the Arab Region. This region consists of 17 countries, which together account for more than 5 % of World’s total output and are home to about 4.3 % of World’s population. In addition to analysing at the region level, an attempt has also been made to look at sub-regional level: GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates), Mashreq (Egypt, Iraq, Jordan, Lebanon, Palestine and Syrian Arab Republic), Maghreb and Arab Least Developed Countries (ALDCs, i.e., Sudan and Tunisia). Such analysis could help in understanding divergences, if any, in terms of development outcomes. A preliminary analysis using panel data suggest that although per capita income is an important determinant of the development in terms of social indicators for this region, income alone is not sufficient in improving living standards. Public policy intervention in terms of expenditure on

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1GDP PPP current US$, on the basis of data from WDI.
health, education, access to sanitation, improving female participation in labour force etc., appear to play major role in determination of these indicators.

The paper is organized as follows. We start by a brief discussion of the structure of the Arab economies in terms of contribution of the broad sectors in GDP in Section 2. In Section 3 we discuss the status of social development in the Arab region in terms of key social indicators. This is followed by a discussion of analytical framework to understand the possible linkages among economic and social indicators in Section 4. In Section 5 we discuss the data and methodology used in this paper, followed by discussion of results in Section 6. Section 7 contains policy implications of the results and some broad conclusions.

2. Economic Structure of the Arab Region

In this section, a brief discussion about the structure of the Arab region is undertaken largely to understand the drivers of the individual countries. Broadly, the economy is decomposed into five sectors namely (i) Agriculture, Hunting, Forestry and Fishing (AHFF) (ii) Mining and Quarrying (MQ) (iii) Manufacturing (MAN) (iv) Electricity-Gas-and-Water-Supply (EGW) (v) Services. This decomposition broadly follows traditional decomposition as primary, secondary and the tertiary sectors, while looking at the components of secondary sector separately. This type of disaggregation is relevant for this region, given the fact that oil and gas sector is an important production sector in this region, thus giving mining and quarrying an important role within the secondary sector.

In Fig. 1 the shares of each sector in overall GDP across the countries of the Arab region are presented. It is clear that in terms of dominance in production there are two types of countries in this region: first, those where mining and quarrying has the largest share, and second, where the services have the largest share. This is in line with the well-recognised divide (in terms of economic structure) in this region between oil-and-gas-rich and non-oil-and-gas rich countries. Looking at sub-regional level, among the GCC countries (Fig. 2) for all the countries mining and quarrying has a very large share in total GDP. With the exception of Bahrain and UAE, this sector accounts for more than half of GDP. In Kuwait the share of this sector is close to two-thirds. Services sector is the other sector, accounting for about a half of the GDP in Bahrain. Among the Mashreq countries, on the other hand, it is the services sector that dominates, with its share in GDP ranging from about 40 % in Syrian Arab Republic to more than 80 % in Lebanon (Fig. 3). In Iraq and the Syrian Arab Republic mining and quarrying too has a large share. In fact, in Iraq, this sector accounts for almost half of GDP. Egypt is the other country in this group where mining and quarrying has a significant share, with this sector accounting for about one-fifth of total GDP. Finally, in the Maghreb and the Arab Least Developed economies (Fig. 4), in all the economies, with the exception of Libya, services have the largest share in GDP. Libyan economy is dominated by the MQ sector, with this sector accounting for more than four-fifths of GDP. Unlike the other groups, this group has a

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2 This includes the following: (i) Construction (ii) Wholesale and Retail Trade, Restaurants and Hotels, (iii) Transport, Storage and Communication, (iv) Financial Institutions and Insurance (v) Real Estate and Business Services, and (vi) Community, Social and Personal Services.

3 See, e.g., Sarangi and Abu-Ismail, 2015.
significant share of the Agriculture, Hunting, Forestry and Fishing sector too, with the share of this sector ranging from almost zero in Libya and about 10% in Tunisia to more than one-third in Sudan.

3. Key Social Indicators in Arab Countries

Before we attempt to examine the economic determinants of the social variables, we discuss the broad trends of social indicators in this region depending upon the availability of data. We discuss indicators on mortality; school enrolment at primary and secondary levels; access to improved water and sanitation; and prevalence of malnutrition.

3.1 Infant and Child Mortality

The Arab countries have high levels of infant and child mortality. The summary statistics presented in Table 1 show that in 2013, the average IMR in these countries was 17.3 per 1000 live births. Though this is just half of the average for the World, this is more than double the figure for OECD countries. However, this is substantial improvement since the onset of the millennium, as the rate stood at 27.27 in 2000. Within the region one finds wide disparities with respect to infant mortality, with the average IMR in GCC countries being less than one-fifth of that in the Arab Least Developed countries (ALDCs). While the rate in Bahrain is smaller than even the average for OECD countries, the rate in Sudan and Yemen exceed the world average. Picture is more or less similar even when looking at the child mortality rate (Table 2). At 21.58, the average child mortality rate in the region in 2013 was less than half of the world average (45.6), but was about three times the figure in OECD countries (7.63). Again there are wide disparities with the region, with the average rate in the ALDCs being about seven times that in the GCC countries. However, there is substantial improvement since 2000, with the levels having come down in all the sub-group which is a substantial improvement over the average rate in 2000 (27.3).

3.2 Enrolment at primary, secondary and tertiary levels

To have an idea about the state of progress towards education, we look at the gross enrolment ratios at primary, secondary and tertiary levels. These ratios measure total enrolment in primary/secondary/tertiary education, regardless of age, expressed as a ratio to population of official primary/secondary/tertiary education age\(^4\). In 2012, the average gross enrolment ratio at primary level for this region was 103.99 (Table 3). This level is not much different from the corresponding figure for the OECD countries (101.77), and shows very little change since 2000. While the GCC countries have a high ratio, there are wide disparities in other groups. For many countries the figure is more than 100, which could be an indication of the overage students in the primary classes. The figure is as high as 122 for the Syrian Arab Republic. At secondary level, however, the picture is slightly different (Table 4). The average gross enrolment ratio over the entire Arab region is 82.44. This figure is far less than that for the OECD countries, and is not much higher than the corresponding figure in 2000. Further there are widespread disparities. The average for Maghreb

\(^4\) GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition.)
countries and ALDCs is much lower as compared to the GCC countries. The ratio is less than 50% for Yemen. The situation is much worse in tertiary enrolment (Table 5). The average for the Arab countries (31.38) is less than half of that of the OECD countries. Within the region, this average is the highest for Mashreq countries. With the exception of Palestine for which the ratio was 51% for all the other countries it was less than 50%.

3.3 Access to improved water and sanitation facilities

Improved water and sanitation are basic facilities, and constitute the basic minimum that the authorities would want to provide to their citizens. However, as per the data available, about 10% of world’s population was without improved drinking water\(^5\) and about 36% population did not have access to sanitation facilities in 2012 (Tables 6 and 7). Within the Arab region, though the performance of the GCC and Mashreq countries is far better than the World-average, the situation is worse in the Maghreb countries and the ALDCs. In Libya, Sudan and Yemen, only about 55% population had access to improved water during this period. In Sudan less than a quarter of the population had access to sanitation facilities. In Yemen, though this proportion is much higher and improving, still about half of the population do not have access to sanitation facilities. Morocco has made significant progress during the last decade, with the proportion of population to sanitation facilities having risen from about 64% in 2000 to more than three-quarter in 2012.

3.4 Malnutrition

In terms of malnutrition this region fares much better (Table 8). In the GCC sub-group, in all the countries the prevalence of malnutrition is below or at 5%\(^6\). Among the Mashreq countries, all the countries, with the exception of Iraq and Palestine, have the rate of malnutrition at 5% or less. In Iraq the rate is more or less stable with a mean of 24.8%. For Palestine the rate declined sharply to 16.2% in 2003, but has been rising since then and crossed 30% in 2011. Among the other countries too, all the countries with the exception of Sudan and Yemen have achieved the level of 5%. Yemen has been witnessing a very gradual but secular decline since 2000 (though still more than a quarter of the population is undernourished). In Sudan the level has been rising for a major part since 2000, and in 2011 almost two-fifths of the population was undernourished.

From the discussion above it is clear that within the Arab region there are widespread disparities regarding the level of social development as measured by different indicators.

4 Determinants of Social Indicators: Theoretical Background

The discussion in the previous section makes it amply clear that within the Arab region there are wide disparities with respect to the level of social development. This naturally raises a question, what causes such differences, i.e., what makes the level of social development so different in

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\(^{5}\) Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 litres a person a day from a source within one kilometre of the dwelling.

\(^{6}\) For Bahrain, Oman and Qatar no data are available.
countries which have very similar geographical and socio-cultural traits. In this section we take a brief look at the relevant theoretical issues.

The first question in this connection: Do high levels of national income (or per capital income) automatically lead to better social outcomes? The belief in this led to emphasis on high growth alone till 1960s. With high growth not translating into better standard of living for an average citizen, in 1970s, some economists questioned the adequacy of growth of per capita income levels for social development, and suggested that other policies to attack social underdevelopment. After the 1970s oil shocks, the focus again shifted to policy frameworks that gave centre stage to macroeconomic stabilization policies keeping growth at the centre stage completely disregarding the social development in 1980s. As it turned out such policies had in fact led to no improvement and, in some cases worsening of social outcomes, thus leading for a strategy that addresses the social sector development directly. The UN’s Human Development Reports (HDRs) have helped immensely in this process to sensitize the national and sub-national governments in terms of evolving social sector policies to improving the human development. Most of these reports have recommended the set of sectoral policies that address the social issues directly.

This brings us to the second question: What types of direct interventions are required to achieve specific goals in the Arab region? In order to answer this question, we looked at some of the empirical studies available. Given that most of the studies focus on any one particular aspect of poverty and deprivation, one needs to look at several strands of literature. We discuss below the factors which have been found to be affecting the performance of economies with respect to these indicators.

**Mortality Rates (Infant and Child)**

Regarding the indicators of health, literature suggests that several factors: from demand side, supply side, environmental etc., which have important role in explaining the indicators:

(i) Levels of income: Income has been identified as a major factor with the idea that an economy with higher level of income per capita would be in a situation to spend more on facilities which lead to better health outcomes, e.g., food, safe drinking water, sanitation, housing, medical care, education, etc. However, as discussed above, there are questions regarding the adequacy of high level of income alone to ensure these facilities.

(ii) Female education: It has been argued that education of mothers enable them to have greater awareness about sanitation, hygiene, way of living, eating, providing nutritious food, to use health care facilities, and family planning measures. In addition, it has been argued, educated mothers are in a better position to absorb and use the information from other sources, e.g., media, about health issues. Increased schooling delays child-bearing

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7 See UNDP (1996) for a nice discussion of evolution of debate on this issue. Sen (1983) is an early paper discussing the issues with the neoclassical theory and the tradition development economics.

8 See, e.g., Fuchs et al., 2010; Bhargava and Yu, 1997; Flagg, 1982; Fry and Field, 2000; Amonker and Brinker, 1997; Arik and Arik, 2009; Suwal, 2001; and Rodgers, 2002; among others.

9 Of course, this factor becomes more important with age of the child, as the child’s susceptibility to disease and injury becomes increasingly linked to decisions regarding nutrition, environmental exposures and treatment of diseases or injury.
into adulthood, reducing risk of infant mortality due to physical immaturity of the mother. In fact, education provides confidence to women to resist tradition rules, e.g., child-marriage, which will lead to better health outcomes. Education also contributes to health outcomes through income. It has been argued that more education leads to higher income by increasing access to higher paid employment or enabling self-employment to be more productive. This higher income leads to easier access to health-promoting resources (better food, environment, living conditions, preventive and curative medical care, etc., as discussed above).

(iii) Women’s participation in labour force: This factor can have both positive and negative effects on infant and child mortality rates. On one hand, women in paid jobs contribute to family income, and as discussed above, that enables families to spend more on factors affecting health. On the other hand, reduced time to breast-feeding and other forms of child care will cause an adverse effect on child’s health. However, the latter can be addressed with the help of better provision of facilities such as day-care centres for children.

(iv) Access to water and sanitation facilities: literature shows that lack of proper drinking water and sanitation facilities are an important reason for mortality, in particular among infants and among children. The regions with poor access to these facilities are found to have higher rates of mortality than those with better access. The bacteria entering children’s bodies through unsafe drinking water and from open excreta cause several life-threatening diseases e.g., diarrhoea. In addition, these also lead to lower food intake and absorption, which further contributes to poor health.

(v) Government expenditure on health: Access to health care facilities at all levels: pre-natal, post-natal and general level, plays an important role in reducing mortality in particular and better health outcomes in general. While some people may not have enough purchasing power to access the facilities available (due to high prices in case these are provided by the private sector), even if one has purchasing power, one may not have quick access to them, e.g., in rural areas. In such situations, government expenditure on health infrastructure and other related factors becomes a crucial determinant of health outcomes. In addition, government spending on providing safe drinking water and sanitation facilities too will lead to lower mortality rates.

School enrolment

For school enrolment, the literature\(^1\) focuses on three types of factors: (i) supply side (ii) demand side and (iii) government policy.

(i) Supply side: On supply side important factors are (a) availability of schools within a reasonable distance from home (b) availability of other resources within school, including teachers, etc.

\(^{1}\)See, e.g., Arif et al., 1999; Burney and Irfan, 1991; Connelly and Zhang, 2003; Handa, 2002; Lincove, 2009; Siddhu, 2011; Suryadarma et al., 2006 and Tansel, 2002.
(ii) Demand side: On demand side factors are the ones which affect the choice of a student or his/her family regarding whether to go to school or not. These include factors such as (a) family income (b) cost (and opportunity cost) of going to school (c) expected benefits from going to school (d) parents’ education, etc. Family income is expected to have a positive relation with enrolment, since a family with very low income may not be able to spare money to spend on children’s education, and is therefore less likely to send children to school. Cost includes expenses on schooling such as school fee, books, transportation, uniform, etc. Opportunity cost of schooling is the income foregone by sending the child to school instead of making him/her work for supplementing family income. Expected benefits from going to school include, most importantly higher income one would be able to earn after having attained education. Finally, parents’ education has been seen as one important factor in determinant of school enrolment. Within this some studies have emphasized the role of mothers’ education. The idea is that educated parents are in a better position to understand the importance of education.

(iii) Government policy: Public policy has a very important role to play in raising enrolment ratios. On supply side governments can prepare infrastructure such as schools, and provide other facilities there to ensure availability of schools with good quality, within easy access to all children in the school going age. This type of measures will also take care of the demand-side issue of high cost of education, which may prevent children from accessing schools, despite awareness about the same.

Access to Sanitation Facilities

Here again there are demand and supply side factors, with government playing role on both the sides.

(i) Supply side: There are issues of availability and cost of new toilets. There needs to be technology which can provide affordable toilets according to the geographical conditions.

(ii) Demand side: Demand side includes factors that affect an individual’s choice to have better sanitation facilities. These include, primarily, (a) income and (b) awareness about harms of open defecation. While income determines an individual’s ability to pay for construction and proper maintenance of toilets, awareness determines an individual’s demand given his/her purchasing power. This determines how much an individual will be willing to pay for toilets, as against using his/her savings elsewhere/ spending on other heads.

(iii) Government policy: Again government can play an effective role on both the sides. Government can provide information about the type of affordable toilets given the local geographical conditions. In addition, it can also provide subsidy for those who cannot afford to construct toilets. Finally government can launch campaigns to create awareness about problems arising due to open defecation.

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Prevalence of Undernourishment

For undernourishment several types of factors have been discussed in the literature. These include factors reflecting availability of food, food prices (affordability), education levels particularly among females and access to water and sanitation, apart from income.

Income: as discussed above, a nation with higher per capita income will be in a better position to spend on everything for welfare of its citizens, including food, shelter and medical care.

Food availability: availability of food is an important variable. Despite high income, there may be enough food available in the economy to cater to the needs of the entire population.

Food prices: availability of food alone is not sufficient, people should be in a position to buy enough food. Therefore, food prices too are an important factor.

Education levels: awareness among people about the nutritional requirements and the sources from which such requirement can be fulfilled is an important factor determining undernourishment. Awareness about such issues among females plays a crucial role in undernourishment among family members in general and among children in particular.

Sanitation and safe water: even after food with adequate nutrients is made available to an individual it can play the required role only if the individual is in a condition to take it and his/her body is in a position to absorb it. Diarrheal and other diseases caused by organisms entering a person’s body unsafe drinking water and open excreta lead to lower food intake as well as impaired food intake, thus causing undernourishment. Unsanitary environments also contribute to malnutrition by challenging children’s immune systems; nutrients that would otherwise support growth go instead towards supporting the immune response.

It may be noted that in all the cases, the existing literature suggest that growth (per capita income) alone is not sufficient enough to improve the developmental indicators such as health and education. There is a need for other supportive policies such as fiscal (sectoral) policy to address the goals. It may also be noted that there are clear endogeneity among the three social indicators that are chosen, reflecting the inter-relationships in social indicators. In the following sections, we discuss the database and methodology that is used in analysing the impact of economic and sectoral policies on the social indicators.

5 Database and Methodology

In the literature, the studies on Arab countries are very scanty and the major reason for such limited studies is the huge limitations with the database. We have realized that there is no (or limited)

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12 See, e.g., Anriquez et al., 2013; Bharati et al., 2010; Caputo et al., 2003; Headey et al., 2015; Smith and Haddad, 2000 and 2015; Spears, 2013 and Tharakan and Suchindran, 1999, among others.
13 See, e.g., Bartlett (2005).
14 It has been suggested that government expenditures will affect the social outcomes with lags since there are delays in utilization of facilities by people, especially the uneducated poor (see, e.g., Bhargava and Yu, 1997). Similarly it can be expected that the changes in per capita income would also affect the social outcomes with lags.
information regarding poverty, which is the most crucial social indicator for any region. Hence, here the analysis is limited to only four indicators. Even for these indicators we have considered data only from the year 2000 and up to the latest point available for 17 countries in the Arab region. The data have been collected for the social indicators as well as its likely determinants as suggested by the review of literature. The details of the variables with source are given in Table 9.

For each variable we have data for some subset of 17 countries and between 1-14 observations for a single country. However, there are many gaps in the data. There are variables for which data are available only for 2-3 for years or are not available at all, for one or more countries. In such a situation analysis for individual countries is either impossible or even when it is possible, it leaves one with so few degrees of freedom that one can hardly rely on the estimates. Therefore, we conduct our analysis using pooled data for all countries.

Given the diversity with this region one needs to study the relationships at the sub-region level if not at country level. Therefore, for each variable we estimate the relationships separately for three groups of countries: (i) GCC countries (ii) Mashreq countries (iii) Maghreb and Arab Least Developed countries.

In pooling data, one needs to control for the country-specific effects. Therefore, we begin by computing simple fixed effects and random effect estimators for each variable. These are computed using least-square-dummy variable estimation and GLS, respectively. We then compare the two estimators using Hausman test. If the null hypothesis of this test is rejected, we report the fixed effects estimator, since the rejection of this hypothesis implies that the random effects estimators are not consistent. However, if this test does not reject the null hypothesis, we report the random effects estimators, since in such a situation though both fixed effects and random effects estimators are consistent, the random effects estimators are more efficient. This becomes particularly important for us given the small number of observations in many cases.

One problem with such estimators is that in the presence of regressors which are correlated with the error term, these estimators are inconsistent. This can happen, e.g., when there is reverse causality from the dependent variable to one or more of the regressors. In our analysis it can be argued that per capita income is affected by the levels of social indicators. Similarly if the governments respond to the levels of social development, there can be reverse causality from social indicators to the expenditure variable. In such situations simple fixed effects and random effects estimators will become inconsistent. Therefore, we re-estimate the equations estimated in the first part using the fixed effects 2SLS (or Within-2SLS) and Error Correction 2SLS (EC2SLS)\textsuperscript{15}. We use, for the per capita income and the expenditure variables, their first lags as their respective instruments. Once again these two estimators are compared using the Hausman test. We report the FE2SLS estimators if this test rejects the null hypothesis, and EC2SLS estimators if it does not.

Finally, there has been discussion of the per capita income and the expenditure variables having a lagged effect on the social indicators. To account for this we estimate the equations taking lags of

\textsuperscript{15}See Baltagi, 2005.
these variables instead of contemporaneous values, keeping everything else unchanged in the specification. We obtained the fixed effects and random effects estimators for each equation and selected the equation to be reported on the basis of Hausman test, as discussed above.

Given the clear possibility of endogeneity of income and expenditure variables, we focus in the next section on the 2SLS estimators; and the estimators based on lagged per capita income and expenditure variables. The best model is chosen mainly on the basis of the relevant $R^2$ value (the ‘Between $R^2$’ for the fixed effects estimator and ‘Overall $R^2$’ for the random effects estimator).

Given the paucity of data we are for now able to study only four social indicators, namely mortality, school enrolment, access to basic facilities and malnutrition that fall broadly under four MDG goals. In mortality, we study infant and child mortality, in school enrolment we study the gross enrolment ratio at secondary level, and in access to basic facilities we study access to sanitation facilities, and in malnutrition we study the prevalence of undernourishment\(^{16}\). The equations estimated for these variables are as follows:

\[
\begin{align*}
LIMR_{it} &= f(LPCI_{it}, LHEPC_{it}, LSAN_{it}, LFLFPR_{it}) \\
LCMR_{it} &= f(LPCI_{it}, LHEPC_{it}, LSAN_{it}, LFLFPR_{it}, LLRYF_{it}) \\
LENS_{it} &= f(LPCI_{it}, LLRYT_{it}, LEEGDP_{it}) \\
LSAN_{it} &= f(LPCI_{it}, LLRYT_{it}, LGEGDP_{it}) \\
LMALN_{it} &= f(LPCI_{it}, LDESA_{it}, LFP_{it}, LIFPV_{it}, LLRYF_{it}, LSAN_{it})
\end{align*}
\]

As discussed above, in addition to the equations with contemporaneous values of $PCI$ and the expenditure variables ($HEPC, EEGDP, GEGDP$) we estimate equations with their lagged values too.

6 Empirical Results

6.1 Infant and Child Mortality (IMR and CMR)

Preliminary analysis were carried out by plotting outcome indicators against per capita income, to see whether there is any correlation between these indicators and per capita income, as would be expected on the basis of the trickle-down theory. Then the relations of these indicators with other explanatory variables are also studied\(^{17}\).

For IMR, the scatter plot (Fig. 5) shows that there is clear negative correlation between the per capita income and IMR for countries in this region. Looking at sub-regions, this correlation seems to be the strongest for the Maghreb and Arab Least Developed countries\(^{18}\). This is supported by the

\(^{16}\)Due to non-availability of data we are not able to carry out similar analysis for poverty. However, we estimated elasticities of poverty with respect of unemployment rate, per capita GDP and social expenditure, for the whole World. These details are presented in the Appendix.

\(^{17}\)All the variables were converted to natural log, and an ‘$L$’ is prefixed to the name of the variable concerned to denote the log of that variable.

\(^{18}\)Given the qualitatively similar nature of patterns the sub-region-wise plots are not being given here, in order to save space.
results of regression analysis (Table-10). The estimated model (random effects model estimated with the help of EC2SLS) shows that there is a significant negative relation between PCI and IMR (Table 10). The elasticity of IMR with respect to PCI is about -0.13. In addition to this, Health expenditure per capita (HEPC), access to sanitation (SAN) and female labour force participation rate (FLFPR) too have significant negative effects on IMR. In fact the elasticity is highest for access to sanitation: one percent change in access to sanitation corresponds to about 0.75 % change in IMR. This seems to support the premise that the diseases spreading due to unsafe drinking water and exposure to open excreta; along with the malnutrition that this causes, could be one important reason for infant and child deaths in this region.

Looking at the sub-region results, we find that for GCC countries, the elasticity of IMR is highest with respect to female labour force participation rate (FLFPR): a one percent change in this variable corresponds to about half-a-percent change in IMR. No other variable is significant for this region, though per capita income (PCI) and per capita health expenditure (HEPC) have positive coefficients. For the Mashreq region, on the other hand, female labour force participation rate (FLFPR) is not significant even at 10 %, even though the coefficient is negative. Elasticities with respect to per capita income (PCI) and access to sanitation (SAN) are highly significant. The highest value of elasticity is with respect to access to sanitation, and the estimated value of elasticity is more than 3. Finally, in the Maghreb and Arab Least Developed Countries, per capita income (PCI) and female labour force participation rate (FLFPR) have significant negative elasticities. The effect of health expenditure per capita (HEPC) is negative but insignificant. The value of elasticity is highest for female labour force participation rate (FLFPR), a one percent rise in female labour force participation corresponds to about 1.5% decline in IMR. In contrast to the other two sub-regions, for this region the model with lagged value of per capita income appears to be robust as compared to the one with contemporaneous value (and estimated using 2SLS).

Thus, in addition to per capita income, access to sanitation facilities and female labour force participation rate appear to be important determinants of IMR in the region, while health expenditure has played a significant role only in the GCC countries. In the Mashreq countries, access to sanitation facilities has played the most important role.

For CMR, youth female literacy rate (LRYF) has been added to the set of factors considered for IMR, and find that it has a significant negative elasticity (Table-11). The value of elasticity is about -0.76, indicating that a 1 % rise in female youth literacy corresponds to about 0.75 % decline in CMR. This supports the role that mother’s education can play in the first five years of child’s life, as has been highlighted by some of the studies mentioned in the previous section. This is despite controlling for the female labour force participation rate, and could be an indication of the fact that the effect of mother’s education does not come only through (possible) higher labour force participation that education might lead to. Per capita income too has a significant negative elasticity. This again highlights the fact that though the income is important, that alone may not be sufficient. Instead, direct intervention by the government in the form of raising literacy and encouraging female participation in labour force is required to have higher incomes effect on child mortality.
Here we have discussed results from the IV estimation, since for all the sub-region we found the equations estimated using IV to be better. However, comparing the two equations estimated for the region as a whole, the equation containing lagged value of LPCI appears to be better. This equation differs from the one discussed above only in two respects: one, the coefficient of LFLFPR is significant even at 1%, and same is true for the coefficient of LSAN. Given much larger number of observations when one is considering the whole region together, and the efficiency that comes with the RE estimators, there is a reason to consider this set of results compared to the other models. It does give an indication that though the region-wise equations (discussed below) do not indicate lagged effect of per capita income, the effect may actually be lagged. Further, it indicates a significant role for sanitation facilities.

Looking at the sub-regional level, for GCC countries, access to sanitation (SAN) and youth female literacy rates (LRYF) do not appear in the estimated equation as their coefficients had wrong signs. Among the three remaining variables, only LFLFPR is significant, only at 10%, though the coefficients of the other two variables are also negative. Looking at the magnitudes of elasticity, it is highest for FLFPR, close to 0.5. In Mashreq countries, the access to sanitation (SAN) and youth female literacy (LRYF) have largest elasticities, exceeding unity in each case, though the former is significant only at 10%. In addition, per capita income too has significant negative elasticity. Finally, for the Maghreb and Arab Least Developed countries, only per capita income has significant coefficient at 5% level. Though youth female literacy rate and female labour force participation rates have higher elasticities than per capita income, their coefficients are not significant even at 15%.

Thus, it may be concluded that while in the GCC economies the female labour force participation has the most important effect, in the other two sub-regions it is the per capita income. In Mashreq countries access to sanitation and female labour force participation too have significant elasticities.

6.2 Gross Enrolment Ratio at secondary level (ENS)

For education, we considered the gross enrolment ratio at secondary level. Fig. 6 clearly shows a positive correlation between per capita income and enrolment at secondary level. The results of regression show that in addition to income, the total youth literacy rate and government expenditure on education also has significant relation with enrolment (Table-12). The specification chosen has first lag of both per capita income and government expenditure, showing that the lagged effect of both of these variables is significant. This highlights the role of direct intervention by the government in terms of health expenditure and awareness of parents, as important factors in determining secondary enrolment.

Looking at sub-regions, for the GCC region, only the government expenditure on education is found to be significant, and the specification chosen has contemporaneous values of this variable and per capita income. For the Mashreq region both PCI and GEGDP have positive coefficients, though neither of them is significant. In the Maghreb and ALDCs, total literacy and GEGDP (one year lag) both have significant positive coefficients. The elasticity w.r.t. total literacy is as high as close to 2.
Thus, government expenditure has significant role in all sub-regions except Mashreq, of which its effect is lagged in Maghreb and ALDCs. Total literacy rate has significant role in Maghreb and ALDCs only, but in that region its coefficient is very high.

6.3 Access to sanitation facilities (SAN)

On access to sanitation, in the all-country regression all the three variables included, namely, per capita income, total youth literacy and government expenses have positive coefficients, though only first two of these are significant (Table-13). For the GCC region, though per capita income is highly significant, government expenditure is significant only at 10%. For the Mashreq region, the coefficient of government expenditure is not significant; the effect of female literacy is highly significant. In fact, like the all-country regression, the elasticity is highest w.r.t. literacy. Finally, for the Maghreb and ALDCs, all the three variables, namely, per capita income, total literacy and government expenditure have significant positive elasticities, and the highest value of elasticity is for the government expenditure-GDP ratio. This variable appears with one-period lag, as does per capita income, for this region.

Thus, we can derive three important points regarding sanitation. First, per capita income matters for sanitation (its coefficient is significant in all three sub-regions) but other factors too play an important role. Second, focusing on total literacy alone may not be sufficient for sanitation, one needs to target female literacy too. Third, government expenditure plays an important role. Its effect is lagged in the Mashreq and ALDCs.

6.4 Prevalence of Undernourishment (MALN)

In the regressions involving all the countries, average dietary energy supply adequacy has an elasticity of close to 0.8, which is higher among all the variables (Table-14). From demand side, the food price index as well as food price volatility have positive and significant coefficients. Among the other variables, total literacy and access to sanitation both have negative elasticities though these are significant only at 10%.

However, as discussed earlier, the levels of undernourishment in many countries of this region is very low (5%) and has remained at that level for the entire period of study. Therefore, we look at regressions for the five countries which actually show prevalence of undernourishment. These countries are Iraq, Sudan, Yemen, Palestine and Morocco. The availability of relevant data is more severe a problem in these countries than other countries. With the limited data available, we find that only dietary energy supply adequacy has a significant coefficient, showing that among these countries the one with better availability of dietary energy is better.

Thus the results clearly show problems from demand side as well as supply side. In order to control prevalence of undernourishment, while raising dietary energy supply, governments need to control their prices so as to make them accessible to people. Sanitation and literacy too have a role to play and action to improve condition on these fronts too will lead to better outcomes with respect to malnutrition. Interestingly per capita income does not have a significant coefficient. This is not
surprising looking at the scatterplots given in Fig. 7 and 8. Further, the results clearly suggest that reducing malnourishment can happen majorly through government intervention only.

7 Conclusion and Policy Implications
Our discussion of social indicators in the Arab region shows wide variation in the levels of these indicators across the different countries and over time. On the basis of results of our regression analysis we are able to identify a few variables that have significant explanatory power for these indicators. These results have some clear implications for economic policies for improving the levels of these indicators:

(i) Economic growth in terms of per capita income has always been emphasized as the prime determinant of social development. Our results support this belief, and thus it can be concluded that higher growth of per capita incomes would lead to improvement in the levels of the indicators discussed here. However, the analysis suggests that per capita income alone is not a sufficient indicator, there is a need for other sectoral economic policies that could further social sector goals.

(ii) In the regressions for all the indicators, we find significant contribution to explanatory power coming from the government expenditure variables, even after controlling for per capita income. This shows that government expenditure on health, education and other heads of social development will help in raising the level of social development in these countries.

(iii) We find significant role for total literacy rate among youth, in particular among females. In fact, the elasticities of social indicators are highest with respect to literacy rates, in many cases. Therefore, government investment in raising levels of literacy among the youth is expected to raise the levels of social development in this region. Further, results indicate that targeting overall literacy may not suffice; governments need to target female literacy specifically.

(iv) Female participation in labour force is found to have significant favourable effect on the indicators of mortality. Thus promoting participation of women in labour force is another area where the governments need to pay attention.

(v) For prevalence of undernourishment, availability and affordability of food matters most. In addition, access to sanitation facilities also plays a significant role.

(vi) There is evidence of lagged effect of per capita income and government expenditure variables, particularly in the Maghreb and ALDCs.
Selected References


Jenkins MW and B Scott (2007). Behavioural Indicators of Household Decision-making and Demand for Sanitation and Potential Gains from Social Marketing in Ghana, Social Science & Medicine, 64, 2427-2442.


Figures

Fig. 1: Contribution of various sectors to GDP (current prices) in Arab countries

Source: Author’s calculations based on ESCWA (2015).

Note: 1. The figures reported are for 2011 for the Syrian Arab Republic; for 2012 for Libya, Tunisia and Palestine; and for 2013 for all other countries. 2. AHFF: Agriculture, Hunting, Forestry and Fishing; MQ: Mining and Quarrying; MAN: Manufacturing; EGW: Electricity, Gas and Water Supply; and SERVICES: total of all the subsectors in services. This includes the following: (i) Construction (ii) Wholesale and Retail Trade, Restaurants and Hotels, (iii) Transport, Storage and Communication, (iv) Financial Institutions and Insurance (v) Real Estate and Business Services, and (vi) Community, Social and Personal Services.

Fig. 2: Contribution of various sectors to GDP in GCC countries
Fig. 3: Contribution of various sectors to GDP in Mashreq countries

![Mashreq Economies](image)

Fig. 4: Contribution of various sectors to GDP in Maghreb and Arab Least Developed countries

![Maghreb and Arab Least Developed Economies](image)
Fig. 5: Relation between PCI and IMR (expressed in natural log)

Fig. 6: Relation between Gross Enrolment at Secondary level and PCI
Fig. 7: Relation between prevalence of undernourishment and PCI, in countries where undernourishment is prevalent

Fig. 8: Relation between prevalence of malnutrition and PCI, in countries with high level of prevalence of undernourishment

Tables

22
Table 1: Infant mortality (per 1,000 live births) in Arab Countries

<table>
<thead>
<tr>
<th>Region</th>
<th>2000</th>
<th>2013</th>
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<tr>
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Source: Author’s calculations based on data from the World Development Indicators, World Bank.

Table 2: Child Mortality Rate (Under 5, per 1,000 live births) in Arab Countries

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Source: Author’s calculations based on data from the UN MDG Database.

Table 3: Gross Enrolment Ratio (%) at primary level in Arab Countries

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<td>MAGHREB+ALDC</td>
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<td>105.4</td>
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<tr>
<td>World</td>
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<td>98.22</td>
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<tr>
<td>OECD countries</td>
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<td>102.7</td>
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</tbody>
</table>

Source: Author’s calculations based on data from the World Development Indicators, World Bank.
Table 4: Gross Enrolment Ratio (%) at secondary level in Arab Countries

| Region             | 2000 | 2012 |          |          |          |          |          |          |
|--------------------|------|------|----------|----------|----------|----------|----------|
|                    | No.  | Mean | Std. Dev | Min     | Max      | No.      | Mean     | Std. Dev |
| GCC                | 4    | 95.07| 15.3     | 79.6     | 114      | 3        | 101.1    | 11.45    |
| MASHREQ            | 6    | 71.06| 23.97    | 37.3     | 92.8     | 5        | 81.07    | 6.52     |
| MAGHREB+ALDC      | 2    | 56.51| 26.01    | 38.1     | 74.9     | 2        | 57.87    | 15.56    |
| ALL                | 12   | 76.64| 24.51    | 37.3     | 114      | 10       | 82.44    | 18.06    |
| World              |      | 59.39|         |          |          |          |          |          |
| OECD countries     | 94.28|      |          |          |          |          |          |          |

Source: Author’s calculations based on data from the World Development Indicators, World Bank.

Table 5: Gross Enrolment Ratio (%) at Tertiary level in Arab Countries

| Region             | 2002 | 2011 |          |          |          |          |          |          |
|--------------------|------|------|----------|----------|----------|----------|----------|
|                    | No.  | Mean | Std. Dev | Min     | Max      | No.      | Mean     | Std. Dev |
| GCC                | 4    | 19.67| 4.57     | 15      | 23.8     | 4        | 29.89    | 13.6     |
| MASHREQ            | 6    | 26.85| 12.5     | 12.4    | 44.9     | 5        | 39.07    | 11.74    |
| MAGHREB+ALDC      | 4    | 25.67| 23.12    | 10.2    | 59.2     | 3        | 20.56    | 13.03    |
| ALL                | 14   | 24.46| 14.08    | 10.2    | 59.2     | 12       | 31.38    | 13.83    |
| World              |      | 21.53|         |          |          |          |          | 30.91    |
| OECD countries     | 55.87|      |          |          |          |          |          | 69.63    |

Source: Author’s calculations based on data from the World Development Indicators, World Bank.

Table 6: Access to Sanitation facilities (% of population) in Arab Countries

| Region             | 2000 | 2012 |          |          |          |          |          |          |
|--------------------|------|------|----------|----------|----------|----------|----------|
|                    | No.  | Mean | Std. Dev | Min     | Max      | No.      | Mean     | Std. Dev |
| GCC                | 6    | 97.05| 4.16     | 89      | 100      | 6        | 98.33    | 1.48     |
| MASHREQ            | 6    | 89.2 | 8.49     | 75.2    | 98.2     | 5        | 93.74    | 5.23     |
| MAGHREB+ALDC      | 4    | 70.43| 24.6     | 39.4    | 96.5     | 5        | 67.86    | 29.84    |
| ALL                | 16   | 87.45| 16.32    | 39.4    | 100      | 16       | 87.58    | 20.95    |
| World              | 55.7 |      | 63.7     |          |          |          |          |          |

Source: Author’s calculations based on the Food Security Indicators, FAO.
Table 7: Access to improved water (% of population) in the Arab Countries

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<th>2012</th>
<th></th>
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<td>Std. Dev</td>
<td>Min</td>
<td>Max</td>
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<td>7.28</td>
<td>80.1</td>
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<tr>
<td>World</td>
<td>82.5</td>
<td></td>
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<td></td>
<td></td>
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</table>

Source: Author’s calculations based on the Food Security Indicators, FAO.

Table 8: Prevalence of undernourishment (% of population) in the Arab Countries

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<th>2000</th>
<th></th>
<th></th>
<th>2011</th>
<th></th>
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<td>Std. Dev</td>
<td>Min</td>
<td>Max</td>
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<td>GCC</td>
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<td>5</td>
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<td>MASHREQ</td>
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<td>9.08</td>
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Source: Author’s calculations based on the data from the UN MDG Indicators, updated by the ESCWA staff.
Table 9: Details of the variables used

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<tr>
<th>S. No.</th>
<th>Variable</th>
<th>Particulars</th>
<th>Source</th>
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<tr>
<td>1</td>
<td>CMR</td>
<td>Children under five mortality rate per 1,000 live births</td>
<td>UN MDG Database</td>
</tr>
<tr>
<td>2</td>
<td>DCPI</td>
<td>Inflation, consumer prices (annual %)</td>
<td>World Bank</td>
</tr>
<tr>
<td>3</td>
<td>DESA</td>
<td>Average dietary energy supply adequacy</td>
<td>FAO Food Security Indicators</td>
</tr>
<tr>
<td>4</td>
<td>DPY</td>
<td>Inflation, GDP deflator (annual %)</td>
<td>World Bank</td>
</tr>
<tr>
<td>5</td>
<td>EEGDP</td>
<td>Government expenditure on education, total (% of GDP)</td>
<td>World Bank</td>
</tr>
<tr>
<td>6</td>
<td>EEGE</td>
<td>Government expenditure on education, total (% of government expenditure)</td>
<td>World Bank</td>
</tr>
<tr>
<td>7</td>
<td>ENP</td>
<td>School enrolment, primary (% gross)</td>
<td>World Bank</td>
</tr>
<tr>
<td>8</td>
<td>ENS</td>
<td>School enrolment, secondary (% gross)</td>
<td>World Bank</td>
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<tr>
<td>9</td>
<td>ENT</td>
<td>School enrolment, tertiary (% gross)</td>
<td>World Bank</td>
</tr>
<tr>
<td>10</td>
<td>FLFPR</td>
<td>Labour force participation rate, female (% of female population ages 15+) (modelled ILO estimate)</td>
<td>World Bank</td>
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<td>11</td>
<td>FPI</td>
<td>Domestic food price level index</td>
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<td>GEGDP</td>
<td>Expense (% of GDP)</td>
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<td>HEPC</td>
<td>Health expenditure per capita (current US$)</td>
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<td>Domestic food price volatility index</td>
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<td>15</td>
<td>IMR</td>
<td>Infant mortality rate (0-1 year) per 1,000 live births</td>
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<td>Literacy rate, adult total (% of people ages 15 and above)</td>
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<tr>
<td>17</td>
<td>LRYF</td>
<td>Literacy rate, youth female (% of females ages 15-24)</td>
<td>World Bank</td>
</tr>
<tr>
<td>18</td>
<td>LRYM</td>
<td>Literacy rate, youth male (% of males ages 15-24)</td>
<td>World Bank</td>
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<td>19</td>
<td>LRYT</td>
<td>Literacy rate, youth total (% of people ages 15-24)</td>
<td>World Bank</td>
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<td>20</td>
<td>MALN</td>
<td>Population undernourished, percentage</td>
<td>UN MDG Database, supplemented by ESCWA staff</td>
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<td>PCI</td>
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<td>World Bank</td>
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<td>PY</td>
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<td>26</td>
<td>WAT</td>
<td>Percentage of population with access to improved water sources</td>
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Table 10: Regression results for IMR

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<td>166</td>
<td>72</td>
<td>56</td>
<td>65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimator</th>
<th>All</th>
<th>GCC</th>
<th>Mashreq</th>
<th>Maghreb and ALDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EC2SLS</td>
<td>FE2SLS</td>
<td>FE2SLS</td>
<td>FE</td>
</tr>
<tr>
<td>R²Within</td>
<td>0.6749</td>
<td>0.6897</td>
<td>0.7868</td>
<td>0.6469</td>
</tr>
<tr>
<td>R²Between</td>
<td>0.8933</td>
<td>0.36880</td>
<td>0.6330</td>
<td>0.4667</td>
</tr>
<tr>
<td>R²Overall</td>
<td>0.8826</td>
<td>0.6786</td>
<td>0.6223</td>
<td>0.4799</td>
</tr>
</tbody>
</table>

In 2SLS estimations, the one-year lags of LPCI and LHEPC were used as instruments

*: One-year lag of variable used as explanatory variable

Table 11: Regression results for CMR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coef</th>
<th>p-value</th>
<th>Coef</th>
<th>p-value</th>
<th>Coef</th>
<th>p-value</th>
<th>Coef</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPCI</td>
<td>-0.252</td>
<td>0.000</td>
<td>-0.086</td>
<td>0.392</td>
<td>-0.189</td>
<td>0.000</td>
<td>-0.297</td>
<td>0.000</td>
</tr>
<tr>
<td>LHEPC</td>
<td>-</td>
<td>-</td>
<td>-0.172</td>
<td>0.219</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LSAN</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.107</td>
<td>0.0758</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LLRYF</td>
<td>-0.763</td>
<td>0.000</td>
<td>-</td>
<td>-</td>
<td>-1.384</td>
<td>0.000</td>
<td>-0.379</td>
<td>0.153</td>
</tr>
<tr>
<td>LFLFPR</td>
<td>-0.191</td>
<td>0.097</td>
<td>-0.488</td>
<td>0.002</td>
<td>-0.031</td>
<td>0.648</td>
<td>-0.791</td>
<td>0.255</td>
</tr>
<tr>
<td>INPT</td>
<td>9.323</td>
<td>0.000</td>
<td>6.178</td>
<td>0.000</td>
<td>16.04</td>
<td>0.000</td>
<td>10.234</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>GCC</th>
<th>Mashreq</th>
<th>Maghreb and ALDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>186</td>
<td>72</td>
<td>51</td>
<td>65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimator</th>
<th>All</th>
<th>GCC</th>
<th>Mashreq</th>
<th>Maghreb and ALDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FE2SLS</td>
<td>FE2SLS</td>
<td>FE2SLS</td>
<td>FE2SLS</td>
</tr>
<tr>
<td>R²Within</td>
<td>0.6843</td>
<td>0.6934</td>
<td>0.9108</td>
<td>0.6655</td>
</tr>
<tr>
<td>R²Between</td>
<td>0.7588</td>
<td>0.6872</td>
<td>0.3188</td>
<td>0.6834</td>
</tr>
<tr>
<td>R²Overall</td>
<td>0.7768</td>
<td>0.6792</td>
<td>0.5018</td>
<td>0.6623</td>
</tr>
</tbody>
</table>

In 2SLS estimations, the one-year lags of LPCI and LHEPC were used as instruments
Table 12: Regression results for gross enrolment ratio at secondary level

<table>
<thead>
<tr>
<th>Variable</th>
<th>All</th>
<th>GCC</th>
<th>Mashreq</th>
<th>Maghreb and ALDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef</td>
<td>p-value</td>
<td>Coef</td>
<td>p-value</td>
</tr>
<tr>
<td>LPCI</td>
<td>0.10728*</td>
<td>0.000</td>
<td>0.0006</td>
<td>0.998</td>
</tr>
<tr>
<td>LLRYT</td>
<td>1.548</td>
<td>0.000</td>
<td>0.0007</td>
<td>0.994</td>
</tr>
<tr>
<td>LEEGDP</td>
<td>0.18618*</td>
<td>0.000</td>
<td>5.180</td>
<td>0.007</td>
</tr>
<tr>
<td>CONS</td>
<td>-3.847</td>
<td>0.000</td>
<td>-19.207</td>
<td>0.022</td>
</tr>
</tbody>
</table>

| N        | 51        | 14        | 17        | 22               |
| Estimator| RE        | FE2SLS    | RE        | FE               |

\[ R^2 \text{Within} \] 0.7673 | 0.8173 | 0.0493 | 0.9320
\[ R^2 \text{Between} \] 0.8962 | 0.6800 | 0.8617 | 0.7519
\[ R^2 \text{Overall} \] 0.9304 | 0.7727 | 0.3953 | 0.8952

In 2SLS estimations, the one-year lags of LPCI and LEEGDP were used as instruments

*: One-year lag of variable used as explanatory variable

---

Table 13: Regression results for access to sanitation facilities

<table>
<thead>
<tr>
<th>Variable</th>
<th>All</th>
<th>GCC</th>
<th>Mashreq</th>
<th>Maghreb and ALDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef</td>
<td>p-value</td>
<td>Coef</td>
<td>p-value</td>
</tr>
<tr>
<td>LPCI</td>
<td>0.033</td>
<td>0.000</td>
<td>0.0148</td>
<td>0.005</td>
</tr>
<tr>
<td>LLRYT</td>
<td>0.493</td>
<td>0.000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LGEGDP</td>
<td>0.032</td>
<td>0.322</td>
<td>0.3378</td>
<td>0.062</td>
</tr>
<tr>
<td>CONS</td>
<td>1.889</td>
<td>0.000</td>
<td>2.893</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| N        | 85        | 61        | 30        | 22               |
| Estimator| FE2SLS    | FE2SLS    | FE2SLS    | FE               |

\[ R^2 \text{Within} \] 0.7492 | 0.3804 | 0.6458 | 0.9832
\[ R^2 \text{Between} \] 0.6031 | 0.1718 | 0.7589 | 1.0000
\[ R^2 \text{Overall} \] 0.6215 | 0.2604 | 0.8479 | 0.9194

In 2SLS estimations, the one-year lags of LPCI and LGEGDP were used as instruments

*: One-year lag of variable used as explanatory variable

---

19 For this subgroup female literacy rate was taken.
Table 14: Regression results for prevalence of undernourishment

<table>
<thead>
<tr>
<th>Variable</th>
<th>All</th>
<th>Countries with malnutrition&lt;sup&gt;20&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef</td>
<td>p-value</td>
</tr>
<tr>
<td>LPCI</td>
<td>-0.007*</td>
<td>0.609</td>
</tr>
<tr>
<td>LDESA</td>
<td>-0.8277</td>
<td>0.000</td>
</tr>
<tr>
<td>LFPI</td>
<td>0.1588</td>
<td>0.035</td>
</tr>
<tr>
<td>LIFPV</td>
<td>0.0266</td>
<td>0.004</td>
</tr>
<tr>
<td>LLRYF</td>
<td>-0.2642</td>
<td>0.055</td>
</tr>
<tr>
<td>LSAN</td>
<td>-0.5331</td>
<td>0.060</td>
</tr>
<tr>
<td>CONS</td>
<td>9.3789</td>
<td>0.000</td>
</tr>
<tr>
<td>N</td>
<td>81</td>
<td>21</td>
</tr>
<tr>
<td>Estimator</td>
<td>FE</td>
<td>FE</td>
</tr>
<tr>
<td>$R^2_{\text{Within}}$</td>
<td>0.7415</td>
<td>0.9839</td>
</tr>
<tr>
<td>$R^2_{\text{Between}}$</td>
<td>0.8416</td>
<td>1.0000</td>
</tr>
<tr>
<td>$R^2_{\text{Overall}}$</td>
<td>0.8040</td>
<td>0.9991</td>
</tr>
</tbody>
</table>

*: One-year lag of variable used as explanatory variable

<sup>20</sup> Iraq, Sudan, Yemen, Palestine, Morocco.
Appendix: Estimation of elasticities of poverty

As poverty is one of the key MDG indicators, we wanted to study the behaviour of poverty in ESCWA region also, in addition to the indicators discussed in the main body of the paper. However the data points for this variable are too few to allow any robust statistical analysis. Therefore we estimate the elasticities of poverty with respect to GDP per capita, unemployment rate, and social sector expenditure.

Data

The data\textsuperscript{21} on the variables given in Table A.1 were obtained from the World Development Indicators 2015, the World Bank, for 200 countries for the period 1960 to 2014.

Methodology and results

We regressed POV on GROWTH, GDPCAP, UNEMP AND EXPSOC (all variables except GROWTH in natural log) pooled OLS. The results are presented in table A.2. The results show that the elasticities with respect to GDPCAP and EXPSOC are both negative and are statistically significant at 5% and 1% respectively. This shows that while per capita income does matter for poverty reduction; direct intervention through social sector expenditure can play significant role in distribution of the effects of rise in income.

Table A.1: Variables used in estimation of elasticities of poverty

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>POV</td>
<td>Poverty headcount ratio at national poverty lines (% of population)</td>
</tr>
<tr>
<td>UNE</td>
<td>Unemployment, total (% of total labour force) (ILO estimate)</td>
</tr>
<tr>
<td>GDPCAP</td>
<td>GDP per capita (constant 2005 US$)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>Growth rate of GDP per capita (constant 2005 US$)</td>
</tr>
<tr>
<td>EXPSOC</td>
<td>Total social sector expenditure (% of GDP), calculated as sum of expenditure per student (% of GDP per capita) at primary secondary and tertiary levels, and health expenditure, total (% of GDP).</td>
</tr>
</tbody>
</table>

Table A.2: Results of estimation of elasticities of poverty

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coef</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROWTH</td>
<td>-1.156</td>
<td>0.167</td>
</tr>
<tr>
<td>LGDPCAP</td>
<td>-0.363</td>
<td>0.000</td>
</tr>
<tr>
<td>LUNEMP</td>
<td>0.059</td>
<td>0.355</td>
</tr>
<tr>
<td>LEXPSOC</td>
<td>-0.181</td>
<td>0.028</td>
</tr>
<tr>
<td>CONS</td>
<td>6.819</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| N        | 168   |
| Estimator| POOLED OLS |

\[ R^2 \] = 0.317

\textsuperscript{21}The authors are grateful to Jose Antonio Pedrosa-Garcia for help with the dataset for this part.