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## Article

# Analysing the aid effectiveness on the living standard: A check-up on Southeast Asian countries

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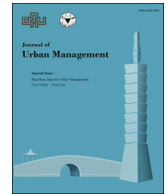
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## Research Article

## Analysing the aid effectiveness on the living standard: A check-up on Southeast Asian countries



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## ABSTRACT

The present research work aims to analyse the effect that the disaggregated developmental aid has had on the health status and the standard of living in the urban sector after the Millennium Development Goals (MDGs) were established. Infant Mortality and Improved sanitation facilities are taken as indicators for health status and urbanisation respectively; and the relationship between disaggregated health aid with Infant Mortality Rate (IMR) and disaggregated aid for water and sanitation with improved sanitation facilities was analysed for the years from 2002–2012 using data from India, Indonesia, Thailand, Malaysia, Philippines, Cambodia, Vietnam and Lao PDR of Southeast Asia through the dynamic panel data modelling using the Generalized Methods of Moments (GMMs). Findings suggest that the developmental aid has not been effective in both the health sector and urbanisation sector. Moreover, improvement in health status has been growth driven. With the advent of the Sustainable Development Goals (SDGs); the most important thing to ensure is that the disbursed aid is used effectively to achieve the very purposes it is being given for and to reduce the gaps in various classes of developing countries in the region.

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## 1. Introduction

With the end of the 20th century approaching; it had been realised that given the fact that most of the countries had become independent of colonisations which had given rise to emergence of various under-developed and developing economies. Hence, economists started to realise that it was the quality of life led on an average in a country which determines whether a country is developed, developing or under-developed. The view of development goals shifted from mere economic growth to improvement of living standards in a country. [Stiglitz \(1998\)](#) contributed to shift the development goals set by governments in developing countries to wider objectives like improvement in income distribution, health and education. “To maximise income growth, environmental consideration were left to languish on the side-lines; the standard

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of living was often allowed to slide; large inequalities between classes, regions, and genders were ignored; and poverty was tolerated more than it should have been in rush to generate maximum growth (Basu, 2000).

Hence it was at the millennium summit 2000, that a declaration concerned mainly about development was adopted which envisioned eight goals (Appendix A), called as, *Millennium development goals*. The Millennium Development Goals consisted of eight international goals with 21 measurable targets, and a series of measurable health and economic indicators for each target which were agreed upon by all member states and at least 23 international organisations to be achieved by 2015. Originally the MDGs were meant to serve two purposes: rescue millennium declaration from oblivion and broaden the development narrative beyond the growth narrative.

One of the pre-dominant characteristics of the transitioning economies (under-developed to developing and developing to developed) became rapid *urbanisation* in the wake of better employment and education opportunities. But, this did not necessarily improve the standards of living rather led to new problems of which predominant were health, sanitation and water.

Life expectancy and IMR have been generally considered the best representatives of the health status of a country (Mishra & Newhouse, 2009). Often, high life expectancy and low mortality has been linked to higher income; however, an argument is often made about the non-linear relationship between infant mortality or life expectancy with income. Further, better sanitation facilities have been often linked to lower infant and maternal mortality rates (Cheng, Wallace, Watt, Newbold, & Mente, 2012; Newell & Gazeley, 2012). Moreover, the disparities in infant mortality between different countries and within the same country have been observed as inequalities in socio-economic groups (Gray, Hollowell, Brocklehurst, Graham, & Kurinczuk, 2009; MacDorman & Mathews 2011).

The study area of the present analysis includes the developing countries of South-east Asia namely – India, Indonesia, Thailand, Malaysia, Philippines, Cambodia, Vietnam and Lao PDR. The purpose of the study is to shed some light on how far the MDGs have been able to achieve better health statuses and standard of living in these countries and whether the major driver of this achievement was – economic growth as some critiques of the MDGs point out or it has been the Official Development Assistance (ODA) or are there any other major drivers which effect the health and standard of living in these countries. Further, with the advent of the SDGs, the paper seeks to make some suggestions for the same. The study seeks to do the same by building two econometric models so as to assess the effectiveness of health aid and aid for water and sanitation on the health and standard of living which is analysed using the generalized methods of moments as formulated by Roodman (2009).

## 2. Literature review

Huge disparities in terms of socio-economic conditions can be found in most of the South-east Asian countries and also between the rural and urban areas within the same country.

### 2.1. Status of health and sanitation in india and south-east asian economies

The WHO report (2013) mentioned that though the progress in reducing the infant mortality rates accelerated, still large gaps persisted among and within the countries. Further, the report mentioned that the South-east Asia region carried the highest burden of mortality rate due to diseases like pneumonia and diarrhoea. The report also mentioned that there was progress in access to safe drinking water facilities; however huge disparities in the access still existed. On one hand 1900 million people gained the access to sanitation facilities and on the other hand 2500 lacked these facilities.

Before 2005, Cambodia had the highest mortality rates in Southeast region only less than Lao PDR but made a significant improvement during that period and reduced the rates below India. In India, the overall mortality rates have not been very high as compared to these countries but the reduction has been very low. The main reason for the same are four states- Uttar Pradesh, Rajasthan, Bihar and Madhya Pradesh which account for half of these deaths and is a showcase for within country disparities in the socio-economic situation (Sahoo, 2011).

### 2.2. Demographic and epidemiological transition and its linkages with economic development

Cervellati and Sunde (2009) investigated the causal effect of life expectancy on economic growth by explicitly accounting for the demographic transition. The study observed that reductions in mortality result in high populations but only before the onset of demographic transition and turns negative for post-transitional economies. It also illustrated the smaller increase in population for the countries in post-transitional period than pre-transitional period. Life expectancy was found to be weakly associated with GDP in pre-transitional countries whereas it was positive and highly significant for countries in post-transitional period. Moreover, another study by Cervellati and Sunde (2013) argued that the economy finally converges endogenously to a sustained growth path and minimal child mortality. Mornand (2004) showed the existence of two different health regimes by an epidemiological transition and mapped the same into the standard growth neoclassical model. The paper concluded that increased longevity induces the agents to spend more on capital which acts as an accelerator to the economic growth. The paper also derived an important hypothesis that a health transition can help a country switch from a neo-classical growth regime to a modern growth regime.

### 2.3. The role of developmental aid

The central theoretical backbone in aid effectiveness literature can be traced back to the two-gap model (Chenery & Strout, 1966) according to which developing countries are facing budget constraints on its resource flows that subsequently hamper investment and growth, here, aid flows are meant to fill the gap between investment needs and domestic savings. The paper had provided principles for both early aid policies and model specifications of many empirical papers which focused on relationship between aid and growth and aid and savings.

McGillivray (2004) had concluded that an increase in aid promotes growth along with reduction in poverty. Along with McGillivray (2004), Mishra and Newhouse (2009) have emphasised that better policies would result in more effective aid. Further Baulch (2006) and Dreher, Gehring, and Klasen (2014) and Hailu and Tsukada (2012) give some evidence that aid donation was affected by the performance on the indicators. Jones (2006) emphasizes the role of United Nations Development Programme (UNDP) in shaping up of the educational development and examines the rationale of abandoning education as a priority sector by UNDP. Clemens, Kenny, and Moss (2007) mention that aid can cover only the necessary costs of MDG and not the sufficient costs, hence it could be blamed for false failures.

### 2.4. Effectiveness of health aid

There has been quite a debate about the effects that health aid has on infant mortality; harmful and insignificant effects of aid and infant mortality has been observed by Boone (1996) and Burnside and Dollar (2000). However, Fielding et al. (2005) find a statistically significant and beneficial relationship between overall aid and mortality. The first study where effectiveness of foreign aid on the health status was analysed had been undertaken by Williamson (2008). However, her results in fact indicated that foreign aid was ineffective at increasing overall health which could be because the amounts given as a percentage of overall foreign aid were small.

Mishra and Newhouse (2009) found the doubling of health aid is associated with a 7 percent increase in health expenditure. The estimates suggested that the effect of doubling health aid on infant mortality was small relative to goals envisioned by the MDGs. Wilson (2011) again concluded that developmental aid to health (DAH) had no effect on infant mortality. On the other hand, economic growth had a stronger negative effect on infant mortality. It was observed that the countries receiving high levels of DAH were doing no better than the countries receiving low levels of the same.

### 2.5. Effectiveness of aid for water and sanitation

Not many studies have been done to see the effect of aid particularly given to this sector on improvement of sanitation facilities. In fact only one study done in Africa could be found and has been reviewed here.

Salami, Stampini, Kamara, Sullivan, and Namara (2011) observed the lack of clarity about whether the provision of sustainable access to safe drinking water and basic sanitation had been given requisite financial and other support by Sub-Saharan Africa (SSA) policymakers and donors. It was observed that over the period of 1990 to 2008 improved water source increased by a marginal amount of less than 1% per year. To meet the MDG target, the rate had to double and for sanitation, the coverage rate had to increase four-fold. Moreover, largest proportion of people without improved drinking water and sanitation services were the poor people. However, the performance was seen to be heterogeneous across the countries.

On the basis of previous literature on the effectiveness of disaggregated aid for Health and education sector, the present study aims to develop an econometric model i) to assess the effectiveness of the health aid for the improvement in health status of the country using GMM method of moments ii) to develop the same for the aid for water and sanitation for the improvement of sanitation facilities in the country representing the urbanisation sector iii) to draw some conclusions about the effectiveness of the ODA.

## 3. Empirical framework

The econometric methodology draws on precedent of analysis developed for sectors of education and health. In the given study, a dynamic panel data model is estimated using the Generalized Method of Moments (GMMs) as formulated by Roodman (2009) given the endogeneity of the variables and the presence of autocorrelation. However, an issue still faced was a small sample which consisted of 8 countries over 10 years.

Our baseline dynamic panel data model would take the form:

$$\text{Log } Z_{it} = \alpha \text{log } A_{it-1} + \gamma \text{log } Z_{it-1} + \beta \text{log } X_{it-1} + \mu Y_{it} + \varepsilon_{it} \quad (1)$$

where  $\text{Log } Z_{it}$  represents the log of the variable is the main indicator of the health and the urbanisation sector respectively,  $\text{log } A_{it-1}$  is the lagged log of disaggregated aid per capita (health aid in case of health sector model and aid for water and sanitation facilities in urbanisation sector),  $X_{it-1}$  is the vector of log of control variables like Gross Domestic Product (GDP), population etc. and  $Y_{it}$  is the vector of other control variables if included in the model.

### 3.1. Model specification

We seek to build two models in the given study: one of which analyses the effectiveness of disaggregated health aid on health sector and the other which analyses the effectiveness of disaggregated aid for water and sanitation on the urbanisation sector.

### 3.2. Disaggregated aid effectiveness in health sector

Mishra and Newhouse (2009) give four reasons why IMR represents the best indicator for the health status of a country. Moreover Boone (1996) and Mishra and Newhouse (2009) have said that greater sensitivity of IMR to changes in economic conditions makes it suitable to be considered as a flash indicator of the health conditions of the poor and hence, it has been taken in the study to be the dependent variable for the health sector model.

For the Health sector model, again two different models have been constructed- one with GDP as a control variable and the other with health expenditure as a control variable. This has been done since it is generally presumed that countries with higher GDP would have better health facilities and infrastructure. GDP is generally considered to be a good proxy to indicate the expenditure on health. However, we would want to see the different ways in which the GDP and health expenditure affect the infant mortality. Apart from the reason that GDP captures how money is spent on the health sector, most of the initial studies have analysed the aid effectiveness in the background of economic growth.

Yousuf (2009) mentions the possibility that higher aid might have been given to the countries with higher prevalence of Human Immunodeficiency Virus (HIV). This would help us to rule out the chances that health aid coefficient would be affected through exerting short-term influence on HIV. The lagged IMRs and the fertility rates are included to capture the country's initial health status. The literature of effectiveness of disaggregated aid has quite often evidenced the fungibility of developmental aid (Wagstaff, 2011; Rajan & Subramaniam, 2005; Mishra & Newhouse, 2009) owing to lack of a defined sense of direction of the aid to a particular sector. Hence, we tried to include the other types of disaggregated aid variables as the control variables in our analysis. However, only the aid for social security and services came out to be significant.

The general approach to the dynamic specification is to use the Generalized Method of Moments (GMM) approach. The following regressions are estimated using a system GMM specification:

$$\begin{aligned} \text{Log } IM_{rt} &= \alpha \log A_{rt-1} + \gamma \log IM_{rt-1} + \beta \log X_{rt-1} + \mu Y_{rt} + \varepsilon_{it} \\ \Delta(\text{Log } (IM_{rt})) &= \alpha \Delta \log (A_{rt-1}) + \gamma \Delta \log (IM_{rt-1}) + \beta \Delta \log (X_{rt-1}) + \mu \Delta Y_{rt} + \varepsilon_{it} \end{aligned} \quad (2)$$

The only difference from the baseline model being that  $Y_{rt}$  is replaced by  $IM_{rt}$  since the the main indicator of the health sector is the infant mortality rate.  $\log A_{rt-1}$  would mean the log of health aid per capita.

### 3.3. Disaggregated aid effectiveness in urbanisation sector

One thing that should be noted is that we are trying to put forward a question that how is the status of living in the urban sector improved with the aid for water and sanitation given the importance of proper sanitation facilities as an important basic infrastructure facilities required to gain a decent standard of living and most sensitive to the changes in urbanisation or development, we have taken improved sanitation facilities to be our main indicator for the standard of living in the urbanisation sector. The aid for water and sanitation consequently becomes our main explanatory variable for the urbanisation sector model. Again, given the importance of income-aid effectiveness relationship and on the basis of previous literature on aid effectiveness studies we include GDP to be one of the control variables.

We tried to include both IMR and the health aid, health aid because of the fungibility issue as we had discussed above, and infant mortality rate since it indicates for the initial health status. However, because of the linear relationship between the IMR and the health aid we had to drop IMR from our set of control variables. The following came out to be the regression equations that we estimate using a system GMM specification:

$$\begin{aligned} \text{Log } ISF_{rt} &= \alpha \log A_{rt-1} + \gamma \log ISF_{rt-1} + \beta \log X_{rt-1} + \mu Y_{rt} + \varepsilon_{it} \\ \Delta(\text{Log } (ISF_{rt})) &= \alpha \Delta \log (A_{rt-1}) + \gamma \Delta \log (ISF_{rt-1}) + \beta \Delta \log (X_{rt-1}) + \mu \Delta Y_{rt} + \varepsilon_{it} \end{aligned} \quad (3)$$

here, our  $Y_{rt}$  is  $ISF_{rt}$  i.e. the main indicator of the urbanisation sector and  $A_{rt-1}$  represents disaggregated aid for water and sanitation. Also the vector  $X_{rt-1}$  consists of different set of control variables.

## 4. Data description

A critique in effectiveness studies has been that both developed and developing countries are taken (Wilson, 2011). Hence, in the present paper, in order to ensure homogeneity in basic health and income statuses of India, Indonesia, Thailand, Malaysia, Philippines, Cambodia, Vietnam and Lao PDR of the Southeast Asia (all except Brunei, Singapore and Malaysia) were selected for the period of 2002–2012 i.e. after the Millennium Development Goals were established. Brunei and Singapore were dropped as they belong to the high-income category (UN-DESA, 2014) and Myanmar was dropped on

**Table 1**  
Descriptive statistics of variables included in health sector model.

| Variable                                   | Observations | Mean     | Std. Dev. | Min       | Max      |
|--|--------------|----------|-----------|-----------|----------|
| Infant mortality rate                      | 88           | 28.82    | 15.43     | 6.9       | 69       |
| Health aid                                 | 88           | 51.48    | 55.35     | 0.24      | 258.33   |
| GDP per capita                             | 88           | 2217.29  | 2262.60   | 317.06    | 10439.96 |
| Population                                 | 88           | 2.09e+08 | 3.67e+08  | 5,555,245 | 1.24e+09 |
| Prevalence of HIV                          | 88           | 0.52     | 0.42      | 0.1       | 1.7      |
| Fertility rate                             | 88           | 2.58     | 0.691     | 1.412     | 3.829    |
| Health expenditure                         | 88           | 4.27     | 1.24      | 2.236     | 7.318    |
| Aid for social infrastructure and services | 88           | 365.37   | 298.03    | 14.01     | 1112.01  |

grounds of non-availability of data. The initial data collected consisted of 60 indicators related to urbanisation and health for each of the 8 countries.

The data for disaggregated ODA were obtained from the Organisation for Economic Co-operation and Development (OECD) database which provides data on ODA commitments by purpose taken from the Creditor Reporting System (CRS). However, recently studies have started to collect the disaggregated ODA data from the AidData.org given the limitations of the CRS system like omission of many large and significant donors not found in the CRS database. It brings on board the non-OECD bilateral donors and a diverse variety of multilateral financial institutions including regional development banks, many of which are not accounted for by the CRS as well as the World Bank. Also, collecting the data from AidData may have had a potential bias by the aid donors who potentially might chose to inflate their reports of the foreign aid programmes (Yousuf, 2012). Hence, giving more weight to the reliability of data the study took the data from OECD-CRS system only.

#### 4.1. Descriptive statistics

The Tables 1 and 2 could be used to make some broad conclusions about the variables. It can be observed that the value of mean of aid for water and sanitation is not very high as compared to that of health aid and that the aid for social infrastructure and services has the highest mean. For all the four types of aid, the descriptive statistics convey huge differences, for instance the range of health aid is 0.24–258.33 and that of aid for social infrastructure and services is 14.01–1112.01. However, the range of life expectancy in these countries (62.87–75.61) is not that large which might indicate similar health status but another indicator which often denotes health status of a country, i.e. the IMR has a large variation in range values (6.9–69).

## 5. Results and discussion

Tables 3 and 4 give a brief summary of the results. The coefficient of the main independent variables, log of health aid and log of aid for water and sanitation comes out to be insignificant which tells us that the ODA has not had a significance impact on IMR which seems plausible because till there are important changes in more directly impacting factors, only providing more aid for a particular sector would not have any effect. However, the sign of health aid co-efficient is negative whereas that of aid for water and sanitation is positive which is again in accordance with the expectations, more health aid should facilitate reduction in infant mortality and a higher aid for water and sanitation should facilitate improved sanitation facilities. The value of the GMM coefficient for lagged water and sanitation aid is quite low, 0.002 which means that increase by 1% in current aid for water and sanitation, the sanitation facilities would improve only by 0.002%. Moreover, the coefficients show that both of the aid for health and water and sanitation are ineffective. Further, the coefficients of lagged dependent variable for both IMR and improved sanitation facilities are very high, 0.99 and 0.96, respectively which show a high level of persistence and that both the series are nearly a random walk and hence justify the usage of the system GMM estimator.

**Table 2**  
Descriptive statistics of variables included in the urbanisation model.

| Variable                                   | Observations | Mean     | Std. Dev. | Min       | Max      |
|--|--------------|----------|-----------|-----------|----------|
| Improved sanitation facilities             | 88           | 61.25    | 24.29     | 19.7      | 95.7     |
| Aid for water and sanitation               | 88           | 69.03    | 83.897    | 0.96      | 360.82   |
| GDP per capita                             | 88           | 2217.29  | 2262.60   | 317.06    | 10439.96 |
| Population                                 | 88           | 2.09e+08 | 3.67e+08  | 5,555,245 | 1.24e+09 |
| Health aid                                 | 88           | 51.48    | 55.35     | 0.24      | 258.33   |
| Aid for social infrastructure and services | 88           | 365.37   | 298.03    | 14.01     | 1112.01  |
| Life expectancy                            | 88           | 69.68    | 3.83      | 62.87     | 75.61    |
| Infant mortality rate                      | 88           | 28.82    | 15.43     | 6.9       | 69       |

**Table 3**

Results of system GMM estimation for the health sector; with GDP as a control variable in one model and Health expenditure as a control variable in the other model.

| Dependent variable                                       | Log infant mortality rate (per 1000) |                   |
|--|--------------------------------------|-------------------|
|  | With health expenditure              | With GDP          |
| Lagged log infant mortality                              | 0.99 (0.006)***                      | 0.97 (0.002)***   |
| Lagged log health aid per capita                         | –0.006 (0.002)***                    | –0.004 (0.001)*** |
| Lagged log GDP per capita                                | –                                    | –0.05 (0.02)***   |
| Lagged log health expenditure                            | 0.007 (0.004)*                       | –                 |
| Lagged log fertility rate                                | –0.03 (0.01)***                      | –                 |
| Prevalence of HIV  | –0.02 (0.001)***                     | –0.01 (0.001)***  |
| Lagged log total Population                              | –                                    | 0.34 (0.14)***    |
| Lagged log of aid for social infrastructure and services | 0.01 (0.002)***                      | 0.01 (0.002)***   |
| Sargan Test ( <i>P</i> -value)                           | 0.415                                | 0.197             |
| AR1 test: <i>P</i> value                                 | 0.487                                | 0.745             |
| AR2 test: <i>P</i> value                                 | 0.163                                | 0.608             |
| Number of instruments                                    | 52                                   | 52                |
| Number of countries                                      | 8                                    | 8                 |
| Number of observations                                   | 80                                   | 80                |

**Table 4**

System GMM estimation results for the urbanisation sector; with both Health aid and infant mortality rates included in one model and only health aid included in the other model.

| Dependent variable                      | Improved sanitation facilities |                    |
|---|--------------------------------|--------------------|
|   | With Health aid and IMR        | With health aid    |
| Lagged log improved sanitation facility | 0.96 (0.006)***                | 0.96 (0.003)***    |
| Lagged log aid for water and sanitation | 0.002 (0.0006)***              | 0.002 (0.0006)***  |
| Lagged log GDP per capita               | –0.008 (0.002)***              | –0.008 (0.001)***  |
| Lagged log population                   | –0.008 (0.0005)***             | –0.008 (0.0004)*** |
| Lagged log health aid                   | –0.0005 (0.0008)               | –0.004 (0.0007)    |
| Lagged infant mortality rate            | 0.0014 (0.005)                 | –                  |
| Lagged log life expectancy              | 0.09 (0.008)                   | 0.093 (0.002)***   |
| Sargan test                             | 0.129                          | 0.155              |
| AR1 test: <i>P</i> value                | 0.421                          | 0.430              |
| AR2 test: <i>P</i> value                | 0.742                          | 0.749              |
| Number of instruments                   | 34                             | 34                 |
| Number of countries                     | 8                              | 8                  |
| Number of observations                  | 80                             | 80                 |

\* Significance at 10% level.

\*\* Significance at 5% level.

\*\*\* Significance at 1% level.

Also, the relationship of lagged population with IMR was positive and with improved sanitation facilities was which is quite obvious: higher populations showcase a lack of family planning and pressure on sanitation facilities which could indeed result in higher incidences of infant mortality rates and poorer sanitation facilities.

### 5.1. The health sector model

The coefficient (–0.006) in case of Health expenditure and (–0.004) in case of GDP would mean that a 1% increase in health aid would reduce the infant mortality rate by 0.006% or 0.004%. The contemporaneous effect of health aid when included in the model with lagged GDP as a control variable was seen to be insignificant and hence it was dropped out of both the models as can be seen from the Table 5.

The GMM coefficients of lagged health expenditure and lagged GDP are seen to have opposite signs, a negative coefficient of lagged GDP is consistent with the notion of previous literature of GDP having a strong effect on the infant mortality rate or the health status of the country. Higher incomes would mean better health infrastructure, better housing and sanitation facilities and better healthcare facilities and hence better health status. However, a curious outcome is a positive sign of health expenditure which could be indicative of the fact that with an improvement in infant mortality rates, there is a reduction in health expenditures. This might be the case since improving health status and increasing incomes call for reduced public spending and a diversion towards the private spending. Moreover, the developing countries like India are

**Table 5**  
System GMM estimation results with contemporaneous effect of health aid.

| Dependent variable                                       | Log infant mortality rate |
|--|---------------------------|
| Log of lagged infant mortality rate                      | 0.99 (0.007)***           |
| Log of health aid per capita                             | –0.003 (0.002)            |
| Log of lagged Health aid per capita                      | –0.005 (0.002)***         |
| Log of Lagged GDP per capita                             | –0.07 (0.02)***           |
| Log of lagged population                                 | 0.47 (0.15)***            |
| Log of lagged fertility rate                             | –0.03 (0.01)***           |
| Prevalence of HIV  | –0.02 (0.002)***          |
| Lagged aid for social infrastructure and services        | 0.0004 (0.004)            |
| Log of lagged aid for social infrastructure and services | 0.009 (0.003)***          |
| Sargan test ( <i>P</i> -value)                           | 0.570                     |
| AR1 test: <i>P</i> value                                 | 0.824                     |
| Number of instruments                                    | 52                        |
| Number of countries                                      | 8                         |
| Number of observations                                   | 80                        |

characterised by high out-of-pocket expenditures. Another study where effect of health spending is seen to be positive on infant mortality rate is by Kaldewei (2010) who interprets it in opposite way mentioning that an increase in health expenditure increase the infant mortality rate as there is targeting of underperforming governorates, higher spending is aimed at improving health outcomes in areas with relatively high infant mortality rates. Also we can observe that, the coefficient of lagged log health aid is higher in case of health expenditure than GDP, i.e. health aid is more effective in case where higher expenditures are done in the areas with high infant mortality rates.

It must be noted that different set of control variables have been used for the models with health expenditure and GDP as control variables, this has been done to eliminate endogeneity and get a valid set of instruments for the models. For example, if fertility rates were used to indicate the initial health status in the GDP model, there could have been some linear relationship between population and fertility rates. Hence, in this case the Sargan test, which is the test for valid instruments, was rejected and our main exogenous variables came out to be insignificant, however, when only one of them was included in both the models we got the appropriate results. The Table 6 evidences the argument made above.

The Health related control variables came out to be statistically significant; however, there signs were opposite to what could be generally expected, the GMM coefficients were negative implying a negative relationship between each of fertility rate and prevalence of HIV with Infant mortality rate. The effect of changes in fertility rate on infant mortality has been a subject of debate in the health literature with only a little evidence that decline in fertility has a positive impact on infant mortality (Le Grand & Phillips, 1996). A negative coefficient of HIV prevalence could be interpreted as an evidence of high differential between the rural and urban areas, high fertility rates and HIV prevalence is found majorly in rural areas, even the mortality rates are high in these areas but the decrease in mortality rates in urban areas have been much more than high mortality rates in these rural areas, giving the net effect of overall reduced mortality rates. In fact, the selected study area which comprised south-east Asian developing economies, a differential between educated and uneducated women could also be found.

A positive sign of coefficient of aid for social infrastructure and services with a higher value than that of the health aid was seen and it turned out to be statistically significant which shows that the areas with higher mortality rates have been given more aid to improve the social infrastructure and services. Also, it might be concluded that the social services for which the aid has been given has not included health services and hence there are high incidences of mortality rates.

**Table 6**  
System GMM results for the health sector when both fertility rates and the population were included as control variables in the GDP model.

| Dependent variable                                 | Infant mortality rate |
|--|-----------------------|
| Lagged log infant mortality rate                   | 0.95 (0.003)***       |
| Lagged log of health aid                           | 0.002 (0.001)         |
| Lagged log of health Expenditure                   | –0.008 (0.003)**      |
| Lagged log of population                           | –0.01 (0.007)         |
| Lagged log of fertility rates                      | 0.04 (0.005)***       |
| Lagged log of aid for social security and services | 0.02 (0.002)***       |
| AR2 test: <i>P</i> -value                          | 0.245                 |
| Sargan test  | 0.000                 |
| Number of instruments                              | 57                    |
| Number of countries                                | 8                     |
| Number of observations                             | 80                    |

\* Significance at 10% level.

\*\* Significance at 5% level.

\*\*\* Significance at 1% level.



## 5.2. Urbanisation model

Moreover, the lagged GDP was surprisingly seen to have a negative relationship with the improved sanitation facilities which is consistent with the study by [Salami et al. \(2011\)](#) who explain this phenomenon saying that it reflects the subdued attention that sanitation sometimes gets in budgetary allocations.

Two separate models were constructed, one with both lagged health aid and lagged IMRs, in this model both health aid and IMR came out to be insignificant which could partly be due to the linear relationship present between the two. In the other model only the health aid was included. In this model, the health aid, though statistically significant was seen to have a negative relationship with improved sanitation facilities. However the effect of health aid on the improved sanitation facilities was seen to be very small. This could simply mean that like the GDP, health aid meant for improving the infrastructure for sanitation so as to finally result in improving health status has not been allocated effectively for the purpose.

The lagged log life expectancy as expected had a positive impact on the improved sanitation facilities. Life expectancy indicates the health status of a country; hence an increase in life expectancy would lead to better sanitation facilities which could be because of higher demand of better sanitation facilities with an increased health status.

## 5.3. The review tests for validity of the model

Finally, some review tests are required for unbiased and consistent estimation. The first one being the Sargan test of over identifying restrictions which has the null hypothesis of the instruments as a group are exogenous, a test that checks the validity of the instruments, the [Tables 3, 5 and 6](#) show that our p-value of these tests across all the models imply that we cannot reject the null hypothesis and hence, our instruments in GMM estimation are valid. The second is the Arellano–Bond test which analyses whether the model contains enough lags to control for possible autocorrelation with the null hypothesis of no serial correlation. Results contained in [Tables 3–6](#) show that the specification of the model is valid, we do not have a first or a second order autocorrelation in any of the models.

## 6. Conclusion

With the target date of Millennium Development Goals approaching and the soon upcoming ‘*Sustainable Development Goals*’, the previous literature and the present analysis suggests that a high importance to be put on effective use of aid and probably, a higher amount of aid for health and water and sanitation. Moreover, effective monitoring and reporting processes for the disbursed aid should be introduced so as to keep a check on how the developmental aid is being used (though, the cost for the same could be high but it would still be much lesser if compared to the costs of inefficient use of large developmental aid amounts disbursed). Finally, it must be emphasized that Sustainable Developmental Goals must fill the gap left by the MDGs, i.e. to broaden the development narrative beyond the growth perspective. Emphasis must also be put on reducing the gaps between various classes. The study must be concluded by observing that till there is a political will and effective employment of the developmental aid and government finances; the objective of development for all is hard to achieve.

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## Appendix A. The MDG indicators and targets

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Goal 1: Eradicate extreme hunger and poverty  
 Goal 2: Achieve universal primary education  
 Goal 3: Promote gender equality and empower women  
 Goal 4: Reduce child mortality rates  
 Goal 5: Improve maternal health  
 Goal 6: Combat HIV/AIDS, malaria and other diseases  
 Goal 7: Ensure environmental sustainability  
 Goal 8: Develop a global partnership for development

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