



# The sanitation access to developing Asia: India's performance over 2001 and 2011

India's  
performance  
in sanitation

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## Abstract

**Purpose** – The purpose of this paper is to shed light on India's performance in sanitation over the last decade as it strives to meet the Millennium Development Goal target.

**Design/methodology/approach** – In doing so, both qualitative and quantitative analyses are employed. The latter method includes a regression analysis. Income and income inequality variables have been included in the analysis.

**Findings** – Whilst India has made progress towards achieving access to sanitation for its people, the nation continues to perform relatively poorly to its neighbours and on a comparative global basis. At the national level, substantial rural-urban and income disparities are linked to a reduced level of sanitation access. Both forms of analysis support the view that income inequality in India is directly related to a lack of sanitation facilities.

**Research limitations/implications** – The study is based on secondary data gathered from WHO and UNICEF sources. These are national data gathered by these agencies in two periods. These are aggregated data.

**Practical implications** – The study has major practical implications in policy formation in the area of sanitation access to both rural and urban India. The state level data analysed by the study will also be useful to make policies at disaggregated level. India, indeed, needs to improve the conditions on an urgent basis. Even in South Asia standard, this nation is behind from almost all other nations of the region.

**Social implications** – The social implications are to make people particularly poor aware about the sanitation issue lack of which contributes to health hazards and gastro condition for children and old. The sanitation related diseases contribute to huge loss of working hours in both rural and urban communities.

**Originality/value** – The study contributes original ideas and demonstrates with a simple regression analysis how sanitation depends on income and income inequality of the poor.

**Keywords** India, Poverty, Rural, Inequality, Sanitation, MDG

**Paper type** Research paper

## 1. Introduction

The UN Millennium Declaration in 2000, under its Millennium Development Goals (MDGs) programme included eight goals. Goal seven covers the environmental sustainability issue with one of the explicit targets being to “halve by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation” (UN, 2010). In assessing the progress towards that goal, in regard to sanitation the UN made the following three distinct observations:

- (1) with half the population of developing regions without sanitation, the 2015 target appears to be out of reach;
- (2) disparities in urban and rural sanitation coverage remain daunting; and
- (3) improvements in sanitation are bypassing the poor.



Recently, the UN Secretary-General, Ban Ki-moon, also asserted that “even though 1.8 billion people have gained access to improved sanitation since 1990, the world remains off track for the sanitation target” (UNICEF and WHO, 2012, p. iv).

All these outcomes are relevant to the Indian context. However, it is timely to note that just as India is geographically diverse in terms of ethnicity, level of economic development and numerous other factors, the sanitation picture also shows great diversity across the nation. Whilst that inherent diversity is reflected in national disparities on a rural-urban basis, it is also reflected in differences in levels of sanitation access between regions and states. The assertion of disparities in levels of sanitation access both at rural-urban basis and between states is supported by data analysis as presented in the paper. Along with the internal disparities, India performs poorly on a comparative basis on both global and regional context. However, it also needs to be acknowledged that India has been making strides towards sanitation improvement. Furthermore, given the size and diversity of the nation, the challenges for policy makers and those implementing programmes are enormous.

Thus, the major aim of this paper is to investigate the achievements and the non-achievements in meeting this important sanitation target of the MDGs in India since 2000 and future prospects to 2015, the terminal year for achieving the MDGs for policy purposes. The investigation of this study supports the view that India as a whole and particularly within certain regions has much to do to provide its people with universal access to sanitation. In doing so though, the aim of this paper is not to be a critique but rather to provide a picture of the national sanitation situation that may inform actors of the broader condition, both within the nation and on a global scale. To achieve this, the paper has adopted both qualitative and quantitative analyses to attain this objective.

In order to adequately address this public health problem and given the scope of the issues covered, this paper has five sections. Section 2 provides a brief discussion of what constitutes an “improved sanitation facility” for the purpose of the UN MDGs along with an overview of some major aspects of sanitation access in India such as the rural-urban disparity. Section 3 deals with comparative performance in sanitation accessibility between several Asian nations and the gap between rural and urban access within India. Section 4 examines the Indian sanitation issue with a model regressing sanitation access against the state level data on population, rate of growth and Gini ratio and Section 5 concludes the paper.

## **2. The MDGs and sanitation access in India**

Given that UNICEF and WHO data are used throughout this paper, for the purposes of consistency and clarity, it should be pointed out that the UNESCAP also provides comparative data for south and southeast Asia keeping in mind the definition of an “improved sanitation facility” is based on that employed in the MDGs framework. UNESCAP (2009) state that “improved sanitation” facilities:

[...] include household toilets or latrines connected to piped sewage systems and also septic tanks and ventilated improved pit latrines. People without these facilities usually defecate in fields or dispose of faeces in plastic bags, bucket latrines or rivers.

The Joint Monitoring Programme for Water Supply and Sanitation by WHO and UNICEF defined improved sanitation facilities as all of the UNESCAP (2009) plus:

- pit latrine with slab; and
- composting toilet.

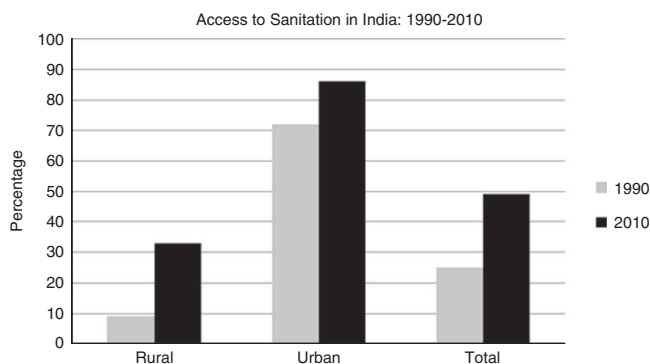
The scope of the definition is important as it can largely explain variances and discrepancies that may exist between the UNESCAP data and other data collated by other agencies. For example, the above definition excludes relatively crude defecation facilities such as bucket latrines and plastic bags.

Recently, Sen (2013) has argued that India's public health is in major crisis having only 1.2 per cent of GDP spent in public health service as against 2.7 per cent by China and the European countries with 7.9 per cent. The low spending in public health services caused India to suffer from ill health among the workforce which in turn made economic development weak. The low budget per capita in health care not only brought to India scarcity in public health services, but also contributed to India's relative poor level of sanitation services compared to almost all other Asian nations.

In 2012, the UNICEF and the WHO published a progress report (update) on the drinking water and sanitation in 2012 based on the MDG target in drinking water and sanitation. This report claims that the world is not on track to meet the MDG sanitation target by 2015. According to this report the world would reach 67 per cent coverage in 2015 while a target of 75 per cent was predicted in the start of the MDG programme. With the current trend the MDG target may be met in 2026. There are also major differences in access to various regions of the world. More than half of the 2.5 billion people of India and China have no improved sanitation facility. Out of this population, without improved sanitation one-third live in India. The overwhelming majority of them practicing open defecation in rural India (UNICEF and WHO, 2012). Figure 1 presents the percentage of population having sanitation access in India by rural and urban areas and improvement between 1990 and 2010.

The rural-urban disparity in sanitation coverage can be illustrated by the current official data. For example, as of 2010, whilst 86 per cent of India's urban residents had access to sanitation as against only 33 per cent of rural population with sanitation access (UNICEF and WHO, 2012). Whilst this stark rural-urban contrast is confronting, even measured on an aggregate national basis (rural and urban combined), overall only 49 per cent (less than a half) of Indians have access to sanitation facilities, something that lends weight to the UN's pessimism regarding the achievement of the MDG target on sanitation (UNICEF and WHO, 2012).

Apart from the specific goal related to sanitation though, there is also a correlation to Goal 4 of the MDGs which calls for a reduction by two-thirds of the



Source: WHO and UNICEF (2012)

**Figure 1.**  
Sanitation access  
in India, 1990-2010  
(percentage)

child mortality rate between 1990 and 2015. The correlation between sanitation has been explicitly noted by UN agencies and the ADB such that poor sanitation is directly correlated to the children being “underweight” and it has a high partial correlation to incidence of both childhood and maternal mortality rates (UNDP *et al.*, 2012).

One of the explicit goals of the Government of India (2012) National Rural Health Mission plan for the period 2005-2012 was that the infant mortality rate would be reduced to 30 per 1,000 live births (Ministry of Health and Family Welfare (MOHFW), 2012). Whilst progress has been made, by 2010 the infant mortality rate was around twice the target. In respect to this goal, utilising data from the District Level Household Survey 3, a study by Kumar and Vollmer (2012, p. 410) specifically focused on quantifying the impact of improved access to sanitation and incidence of childhood diarrhoea, and concludes that improved sanitation led to an approximate reduction of 0.8 episodes of diarrhoea per household per year.

The authors point out that whilst the figure in itself seems modest, childhood diarrhoea is the second leading cause of childhood mortality in India with an average of 3.9 cases per household per year (Kumar and Vollmer, 2012, p. 6). Given this, the reduction in diarrhoea cases due to improved sanitation is crucial in the overall fight for adequate sanitation in rural areas. However, Kumar and Vollmer (2012, p. 426) note the need for “continuing improvements in sanitation infrastructure” to be coupled with “complementing policies for behaviour change through community participation, education, awareness and health promotion activities” to make significant steps towards reduction in childhood diarrhoea in “India and elsewhere”.

At the broader level of rural/urban disparity, Figure 2 presents a picture in terms of improvement in three categories. Almost one-fifth of the coverage has improved condition in 2010. This condition exists for more than half of the urban residence.

3. Comparative performance

As can be seen in Figure 3, India’s comparative performance in the broader Asian region is relatively poor. Of the regional countries for which the UNICEF and WHO data for 2010 was available, only Lao PDR had a lower level of improved sanitation coverage than India on a national basis. Only around 26 per cent of people have access to improved sanitation in Lao PDR at an aggregate national level as against India’s 34 per cent (UNICEF and WHO, 2012).

Similarly, at rural level, Lao PDR has the lowest levels of access to improved sanitation, with only 15 per cent of people having access. Again, India has the third lowest level with only 23 per cent.

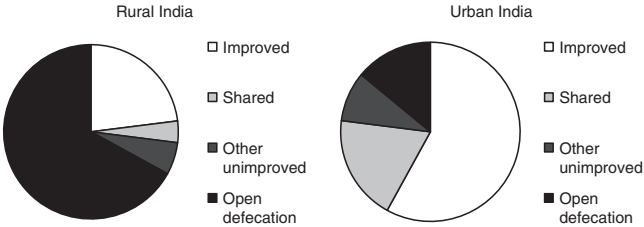
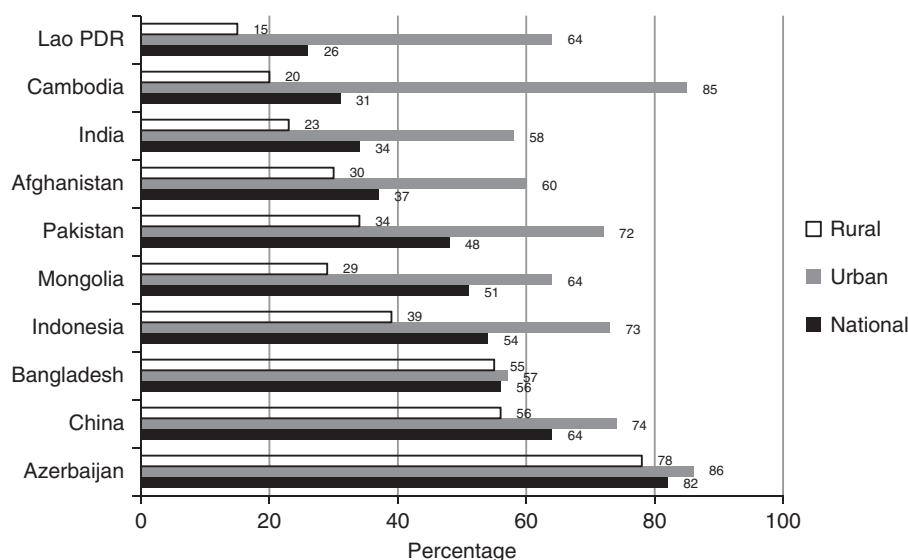


Figure 2.  
Rural vs urban  
sanitation by  
category, 2010

Source: WHO and UNICEF (2012)



Source: UNICEF and WHO (2012)

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**Figure 3.**  
Access to improved  
sanitation for selected  
Asian countries

As could be expected, the percentages for urban sanitation access are generally far higher than rural access throughout the region and the difference between the best and worst performers is not as great in urban areas as it is in rural areas. At the urban level, it is still notable that India's performance is the second lowest of the Asian region which is around 58 per cent in 2010. This is only marginally higher than Bangladesh (59 per cent) (UNICEF and WHO, 2012).

### 3.1 India and its neighbours

Compared to its immediate neighbours, on an aggregate nationally, India also performs relatively poorly. For example, India, with 53 per cent access (improved plus shared facilities) to sanitation performs poorly relative to Pakistan (54 per cent) and Bangladesh (81 per cent) in 2010 (UNICEF and WHO, 2012). Comparing this national performance in rural and urban terms, the difference at urban level in India (77 per cent) is lower against Bangladesh (83 per cent) and Pakistan at 78 per cent.

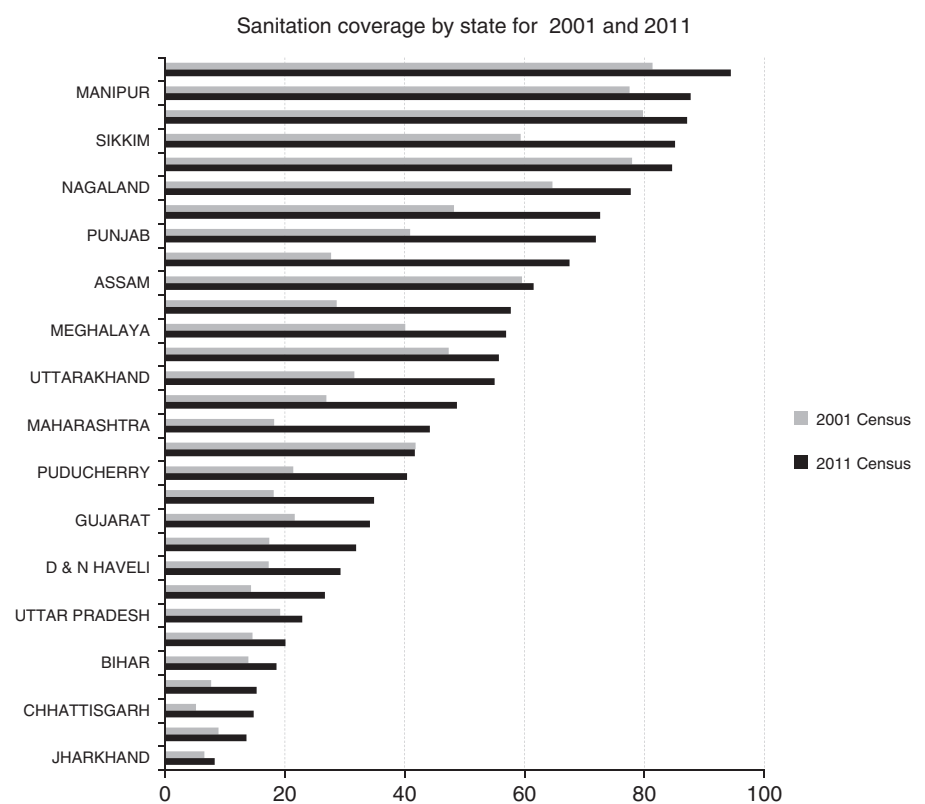
At the rural level, the difference has been phenomenal. For example, in Pakistan, 40 per cent of the rural population have access to an improved plus shared sanitation facility, which is significantly higher than the 27 per cent of rural people in India (UNICEF and WHO, 2012). In stark contrast to both India and Pakistan, in Bangladesh 80 per cent of rural people have access to sanitation (UNICEF and WHO, 2012).

This raises the question of why Bangladesh has been outperforming Pakistan and India? The main reason concerns Bangladesh's advantage with the availability of microfinance for the establishment of sanitation infrastructure in rural areas. Bangladesh is the home of large microfinance institutions of the world such as BRAC, Grameen Bank, ASA and so on. The BRAC, as the largest microfinance NGO, currently contributes significantly to building sanitation infrastructure among its clients in rural areas.

3.2 Comparative performance of Indian states

The Ministry of Drinking Water and Sanitation (MDWS) compiled an index ranking of 30 states based on the level of achievement of a number of target measures set as part of the Total Sanitation Campaign (TSC). The measures include the provision of sanitation facilities in households, schools and at community levels with weightings given to each of the included criteria[1]. As of the 2012 ranking (Ministry of Drinking Water and Sanitation (MDWS), 2012, p. 5), the five highest ranked states were Sikkim (top), Tripura, Haryana, Kerala and Uttar Pradesh. The lowest ranked states were Punjab, Bihar, Jharkhand, Pondicherry and Haveli (30th). It needs to be emphasised that the index and subsequent ranking in this instance is based on quantifying the implementation of the TSC, not on the raw levels of sanitation coverage. With that in mind, it is instructive to also consider the data on the percentage of the population with access to sanitation facilities.

As can be seen in Figure 4, in rural areas, there is a great variation in access to sanitation. For example, as of the 2011 census, the poorest performing state, Jharkhand, only had 8.3 per cent coverage, a modest increase from 2001 (6.57 per cent). In stark contrast to this was the best performing state, Kerala, which recorded 94.4 per cent coverage in 2011, a solid increase of 81.33 per cent coverage in 2001 (MDWS, 2012, p. 5). With such a huge variation in levels of sanitation infrastructure



**Figure 4.**  
Rural sanitation  
coverage by state  
for 2001 and 2011

Source: 2001 and 2011 census data cited in MDWS (2012)

between states, it is pertinent to briefly discuss the reasons for such marked variation taking a regression model into account below.

#### 4. A sanitation model

##### 4.1 Specification of the model

The model specified for estimating the rural sanitation coverage is based on cross-sectional data from 30 states of India for 2011. Rural coverage is estimated since only one-third of the rural areas have access to sanitation. Indeed, it is important to find out the sanitation services and their relations with other socio-economic variables at state level. We employed a regression model with rural sanitation coverage as the dependent variable and lag sanitation coverage, population growth, state growth and state rural Gini coefficient (distribution of income) as independent variables. A cross-sectional data set consisting of 30 states at two time periods (2001-2011) was used for estimation. Most of the data are from secondary sources, from government publications:

$$Sn_{i,2011} = a_0 + a_1 Sn_{i,2001} + a_2 Pp_i + a_3 Gr_i + a_4 GI_i + E_i$$

where  $Sn_{i,2011}$  is the rural sanitation coverage of states  $i$  in year 2011,  $Sn_{i,2001}$  is rural sanitation coverage of states  $i$  in year 2001,  $Pp_i$  is population growth of states  $i$  between 2001 and 2011,  $Gr_i$  is state growth rate between 2001 and 2011,  $GI_i$  is rural Gini ratio of states  $i$  in 2011, and  $a_1, a_2, a_3$  and  $a_4$  are parameters.

##### 4.2 Results

The econometric model has been estimated from cross-sectional data from 2011 census. 2001 census data are considered as  $Sn_{t-1}$ .

The key results of this regression model estimation are presented in Table I.

The key results are:

- The coefficient on 2001 coverage is both positive and significant at the 5 per cent level of significance. The result suggests that, the growth in sanitation coverage remains constant.
- The negative and significant population growth suggest that a 1 per cent increase in population will contribute to a decline in the sanitation coverage by 2.5 per cent. It is expected since the earlier estimate suggests that the growth in sanitation coverage remain constant over the period.

Cross-section observation Variable	30 states under study Coefficient	<i>t</i> -value
Intercept	-2.574605035	-0.175741274
2001 coverage	1.001358616	12.40775892
Population growth	-2.542314834	-1.654338746
State economy growth	1.867328677	1.6865692
Gini ratio rural	14.14552382	0.400980846
$R^2$ : 0.8882		
Adjusted $R^2$ : 0.8703		

**Source:** Present study

**Table I.**  
Results of the  
sanitation model

- The coefficient in state income growth (GDP equivalent) is both positive and significant and its value is 1.87. This implies that with a 1 per cent increase in income the sanitation coverage will almost double, and finally.
- The estimate of the rural Gini ratio suggests a positive but insignificant impact. The results show, with a 1 per cent improvement in the Gini ratio the sanitation coverage will increase by more than 14 per cent.

In summary, the econometric analysis with cross-sectional data confirm that population growth has a strong negative impact on sanitation coverage, which is consistent with the generic view. The impact of state growth (income) on sanitation was found to be positive and high and it is consistent with the generic view. Finally, the improved Gini ratio of rural areas suggest a strong impact on sanitation with cross-sectional data.

## 5. Conclusions

India still faces major challenges to implementing comprehensive sanitation coverage throughout the country. On a broader basis, India performs poorly against its neighbours and within the global context. On a national basis, that complexity incorporates great disparities in sanitation access both at the urban-rural level and between provinces and regions. As is illustrated by both the qualitative and quantitative analyses presented in this paper, the Indian sanitation picture is complex. The regression analysis suggests the following outcome:

The estimate confirms that population growth has a strong negative impact on sanitation coverage, which is consistent with the generic view. The impact of the economic growth (income) on sanitation was found to be positive and high and it is consistent with the generic view, as well. Finally, the improved Gini ratio (income distribution) of rural areas suggests a strong impact on sanitation.

Thus, India faces substantial challenges in addressing national sanitation development. Despite such challenges, the meeting of realistic sanitation access targets can be achieved both at national, state and local level. To achieve this will require a solid on going commitment from the various levels of government to create good policy coupled with an integrated approach to the spatial development of both sanitation infrastructure and implementation programmes. In India and its global partners in development, there must be one ultimate goal, universal sanitation access for all Indians, regardless of socio-economic status or geographic location.

## Note

1. Detail on the method and compilation of data can be found on pp. 4-5 of MDWS (2012).

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