

Discussion Papers

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Water and Sanitation: Achievement of Large Indian States

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Rimon Saha**

Abstract: Using data for the census year 2001 and 2011 the study make a comparative analysis of water and sanitation facilities across Indian states. It found that not only are the facilities alarmingly low in certain states but there are also disparities across the states. Along with the low facilities, state spending for the provision of such facilities is also limited. We found that the correlation between expenditure and the facilities are also not direct and strong. Moreover, the spending is also not done in accordance of the poverty rate of the states.

JEL codes: H50, H75, J10, O15.

Keywords: Water and Sanitation, Indian State, State finances.

Background

The SDGs targets that seek to achieve holistic development (Stiglitz *et al.*, 2017) are more extensive than the Millennium Development Goals and seek to fulfil the agenda ‘Leaving no one behind’. The 6th Sustainable Development Goal (SDG) is to “Ensure availability and sustainable management of water and sanitation for all”. This SDG has evoked considerable discussion in India (Kumar and Anand, 2019) as fulfilling this SDG is demanding because it has to reach the entire population across the country. The Indian Government has stressed sanitation since 2014 and this has now been extended to managing the quantity and quality of water.

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The issue is complex as implementation has to be at the state level, and states vary in their geographic characteristics, political history, culture, resource availabilities and much more. These differences make it very unlikely that the states will have uniform water and sanitation facilities; variation in state performance is quite obvious. The literature notes that social attainments and per capita income vary among Indian states. However, while several studies analyse economic disparities the research on social disparities across Indian states is limited. For example, Williamson (1965) reported increasing regional inequalities in India in the 1950s. Again Vennkataramiah (1969), Rao (1973) and Nair (1973) claimed that there was no evidence of narrowing of disparities; rather there is an increase in regional disparity.¹ So it is important to analyse the disparities in facilities, particularly as states starting from different levels of facilities in initial years will obviously progress differently over time. It is vital to measure the progress of the states over time. In this context it is important to see whether there is convergence in provision of facilities.

Access to clean water and adequate sanitation is vital for every citizen in the country; it has potential health benefits and positive health spill over (Günther and Fink, 2010). The inadequacy of such services in India has led to many water borne diseases, school drop outs and loss of productivity (Total Sanitation Campaign Report, 2012). The negligence of these facilities not only resulted in premature mortality, health care cost, health related productivity losses but also to GDP loss; furthermore the unavailability of these vital services has the greatest impact on the poor population through wage loss, high mortality rates and other water related diseases (World Bank Study, 2007). Thus, effective financing for water, sanitation and hygiene (WASH) is essential to accelerate and sustain services that could ultimately save two million lives a year (Trémolet and Rama, 2012). Government intervention through public spending has the potential to increase access to improved drinking water and sanitation to a large extent (Sbrana, 2009). So it is not only a SDG that needs to be accomplished by 2030 but it has immense potential to

improve country's growth rate and enhance people's well being. Since the government in developing countries play an important role in the provision of these services(Stiglitz, 1996), it is crucial to understand the trend and pattern of state financing in this regard and the contribution the expenditure could make to improve the states' facilities. It is also important to know whether the states have used their full potential in financing water and sanitation, i.e. whether the spending is in accordance with their gross domestic product since public expenditure is affected by state per capita income. Furthermore, an increase in the per capita income is supposed to be reflected in the growth of expenditure on social sectors (Singh and Sahni, 1984).

This paper examines state wise water and sanitation facilities, stressing the variation and convergence of the facilities across states between two time points. It also measures the relative progress of each state in terms of providing these facilities. In particular:

- We analyse the trend and pattern of state expenditure in this sector and relate the expenditure with the nature of the existing facilities.
- We assess whether state governments are adequately financing the sector in relation to its gross domestic product.
- We also attempt to find the determinants of water and sanitation expenditure of state

Data and Methodology

The first objective uses information regarding water and sanitation indicators for two time points, the indicators considered for this study are drainage facility, i.e. the percentage of population who do not have access to any kind of drainage system, toilet facility, i.e. the percentage of population who do not use any kind of toilet and lastly drinking water facility, i.e. the percentage of population having access to safe drinking water. This information is collected from State Statistical Reports that gives information regarding these indicators for the states over the years. For this study we used the information on drainage facility for the years 2002 and 2012, for toilet facilities the two time points are 1998 and 2012

and for drinking services they are 2001 and 2011. The two time points given the availability of information are chosen in such a way that there is a gap of at least 10 years since improvement of these kinds of facilities needs long periods. The initial year will be referred to as the base period and the latest year will be referred to as final year throughout the paper. To undertake a comparative analysis of the facilities across Indian states, we examine the variation of the states at these two time points and check whether there was decrease or increase in the variation overtime. We also study the relative progress in two time points by ranking the states according to the progress, and examine whether there was convergence.

Along with previous information we need the additional information on state finances and expenditure on the water sanitation sector needed for the second objective is collected from the Reserve Bank of India (RBI) handbook. Since expenditure doesn't translate into facilities immediately we considered previous 10 years' value of expenditure to observe the effect on facilities at later times.

For this we use the average of per capita expenditure and observe the distribution of states over the grand mean. We also examine the gap among the states in financing by studying the position of each state with respect to the highest spending states and variation of the expenditure over these 14 years, 2001 to 2014. For finding the relation between the facilities and expenditure incurred, the paper uses correlation coefficient, rank and position analysis. It also tries to relate the growth rate of expenditure with the progress of the facilities by rank analysis, since with high growth rate of expenditures the states are expected to progress better. To find trend of the expenditure we use trend growth rate of the per capita expenditure of each state over 14 years.

For the third objective we collect information on state finances and state gross domestic product (SGDP) from the RBI handbook. The analysis is based on only 15 major states in India, which together contain 90 per cent of the population, for the period 1998 to 2014.

We divided the states into three groups according to their income level such as high income, middle income and low income and observe their path of financing over the years. This exercise helps us understand whether states with similar income also spend similarly, to find whether the states are financing sanitation in accordance with the SGDP. We use rank analysis to check the relationship between the outcome, expenditure and SGDP ranks.

1) Water Sanitation in India and Other Countries

Providing necessary sanitation and hygiene facilities for the more than 1 billion living in India is very challenging. Especially when 21 percent of communicable diseases are directly or indirectly linked with unsafe water and unhygienic practices and more than 500 children under-5 age are dying due to diarrhoea (World Bank, 2007). When we compare India with other countries in defined groups, BRICS, G20 and South Asian countries for 2001 and 2011, we find India has the lowest performance (Table 1.1); the performance indicator is the percentage of people using at least basic sanitation services, that is, improved sanitation facilities that are not shared with other households. This indicator encompasses both people using basic sanitation services as well as those using safely managed sanitation services. Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs.

**Table 1.1: Water and Sanitation Performance for 2001 and 2011
(% of People with Access to the Facility)**

| BRICS | 2001 | 2011 | G20 Countries | 2001 | 2011 |
|--------------|-------------|-------------|----------------------|-------------|-------------|
| Brazil | 73.83 | 83.01 | Argentina | 87.54 | 93.18 |
| Russia | 83.79 | 87.97 | Australia | 99.99 | 99.99 |
| India | 18.78 | 44.03 | Brazil | 73.83 | 83.01 |
| China | 56.9 | 75.19 | Canada | 99.78 | 99.52 |
| South Africa | 59.83 | 70.06 | China | 56.9 | 75.19 |
| | | | France | 98.66 | 98.65 |

Table 1.1 continued...

Table 1.1 continued...

| South Asian Countries | 2001 | 2011 | | | |
|------------------------------|-------------|-------------|----------------|---------------|-------|
| | | | Germany | 99.22 | 99.22 |
| Afghanistan | 23.52 | 35.46 | India | 18.78 | 44.03 |
| Bangladesh | 26.97 | 40.54 | Indonesia | 42.96 | 61.87 |
| Bhutan | 50.11 | 63.03 | Italy | Not available | 98.77 |
| Nepal | 17.49 | 43.73 | Japan | 100 | 99.94 |
| Maldives | 75.7 | 92.76 | Mexico | 76.21 | 85.8 |
| India | 18.78 | 44.03 | Russia | 83.79 | 87.97 |
| Pakistan | 33.24 | 50.66 | Saudi Arabia | 98.41 | 99.37 |
| Sri Lanka | 85.26 | 91.71 | South Africa | 59.83 | 70.06 |
| | | | South Korea | 100 | 100 |
| | | | Turkey | 82.06 | 93.38 |
| | | | United Kingdom | 99.13 | 99.12 |
| | | | United States | 99.97 | 99.97 |

Source: World Bank Data

We observe that India has only 18 per cent improved sanitation facilities in 2001 and in 2011 it still couldn't provide improved facilities to more than half of its population (Table 1.1). It is the worst performer among BRICS countries in 2001 and remains to be the worst performer even after 10 years i.e. in 2011. The story is worse when we compare India with other G20 countries; India is the only country in this group which does not provide adequate sanitation to more than half of its population whereas most of the G20 countries provided by 2011 the improved sanitation facilities to 80 per cent of its population. Only in the Group of South Asian Countries India has shown better progress from 2001 to 2011 compared to Afghanistan and Bangladesh who had higher access to sanitation facilities in 2001 than India but couldn't keep up the status in 2011. But India in 2011 still had very low access of these vital facilities in comparison with Sri Lanka, Nepal, Maldives and Pakistan. India's remarkably low performance over the years is a matter of real concern and need to be addressed with utmost urgency.

The information on water and sanitation facilities for the period 2000 to 2017 for which the data is available is divided into two sections, one before the financial crisis, i.e. the period 2000 to 2008, and the period after financial crisis, i.e. 2009 to 2017. We calculated the trend growth rate for these two periods to identify any difference in growth rates because of the financial crisis. We can observe from Table 1.2 that the BRICS countries show a mixed result.

Table 1.2: Trend Growth Rate Before and after Financial Crisis

| BRICS | TGR_2008 | TGR_2017 | G20 Countries | TGR_2008 | TGR_2017 |
|------------------------------|-----------------|-----------------|----------------------|-----------------|-----------------|
| Brazil | 93% | 88% | Argentina | 56% | 32% |
| Russia | 42% | 42% | Australia | 0% | 0% |
| India | 250% | 258% | Brazil | 93% | 88% |
| China | 181% | 162% | Canada | -2% | -4% |
| South Africa | 104% | 96% | China | 181% | 162% |
| | | | France | 0% | 0% |
| South Asian Countries | TGR_2008 | TGR_2017 | Germany | 0% | 0% |
| Afghanistan | 108% | 131% | India | 250% | 258% |
| Bangladesh | 136% | 130% | Indonesia | 189% | 188% |
| Bhutan | 130% | 106% | Italy | 0% | 0% |
| Nepal | 252% | 300% | Japan | 0% | -1% |
| Maldives | 175% | 133% | Mexico | 98% | 90% |
| India | 250% | 258% | Russia | 42% | 42% |
| Pakistan | 181% | 154% | Saudi Arabia | 9% | 11% |
| Sri Lanka | 63% | 68% | South Africa | 104% | 96% |
| | | | South Korea | 0% | 0% |
| | | | Turkey | 107% | 96% |
| | | | United Kingdom | 0% | 0% |
| | | | United States | 0% | 0% |

Source: Author's calculation using World Bank Data.

The growth rate declined in countries with good facilities, e.g. Brazil, China and Russia but increased for India and South Africa, countries with poor facilities. In South Asian countries although there was some increase in the growth rate for Sri Lanka, there was remarkable increase for Nepal and Afghanistan. On the other hand, Bangladesh experienced a slight decrease in the growth rate but Maldives experiences a drastic fall followed by Pakistan and Bhutan. Interestingly among the G20 countries, except for India and Saudi Arabia, all the countries experience either decrease or stagnancy in the growth rates. The reason most of the countries are facing 0 per cent growth rate or negative growth rates is because these countries have already achieved almost full access to sanitation facilities and are left with very limited scope for improvement. Although we observe high growth rate of India over this period, i.e. around 250 per cent India still suffers from poor facilities and inadequate services compared to other countries. To address the problem of such low facilities it is very crucial to look at the achievements of the Indian states in that respect.

2) Do All the States Have Adequate Facilities?

The performance of all the states across all the indicators of this sector has improved over the years, though the extent of progress varied (Table 2.1). For the final year, i.e. 2011-12, it can be noted that Haryana has performed well in all the three indicators but Assam and Kerala are doing better for the toilet facility. All the states have drinking facility above 75 per cent, except Assam at about 70 per cent whereas Kerala has the lowest level at 33.5 per cent.² Orissa, Assam and West Bengal have an alarming drainage problem, as in Orissa almost 80 per cent of the population has no drainage facility while in Haryana only 2 per cent do not have the facility. Again, in Orissa around 50 per cent of the population has no toilet facilities followed by Bihar and Madhya Pradesh but in Kerala it is only 2 per cent. So there is large variation of the facilities across states, though there is less variability in the provision of drinking facility. So, it is important to study the variation of facilities.

Table 2.1: Water and Sanitation Across 15 Major Indian States

| States | No Drainage | | No latrine used | | Drinking Facility | |
|----------------|-------------|------|-----------------|-------|-------------------|------|
| | 2002 | 2012 | 1998 | 2012 | 2001 | 2011 |
| Andhra Pradesh | 52.5 | 34 | 59.65 | 31.2 | 80.1 | 90.5 |
| Assam | 68.9 | 60.9 | 13.35 | 6.865 | 58.8 | 69.9 |
| Bihar | 50.3 | 37.8 | 67.35 | 46.8 | 86.6 | 94 |
| Gujarat | 58.3 | 43.2 | 50.5 | 32.45 | 84.1 | 90.3 |
| Haryana | 22.3 | 1.6 | 58.7 | 13.4 | 86.1 | 93.8 |
| Karnataka | 38.3 | 28.7 | 59.45 | 39.9 | 84.6 | 87.5 |
| Kerala | 77.9 | 41.2 | 14.1 | 2 | 23.4 | 33.5 |
| Madhya Pradesh | 53.5 | 39.6 | 69.85 | 46.5 | 68.4 | 78 |
| Maharashtra | 42.2 | 31.5 | 50.8 | 30.45 | 79.8 | 83.4 |
| Odisha | 84.1 | 80.1 | 65.95 | 49.75 | 64.2 | 75.3 |
| Punjab | 19.5 | 10.8 | 41.35 | 14.2 | 97.6 | 97.6 |
| Rajasthan | 54.4 | 47.7 | 56.25 | 43.6 | 68.2 | 78.1 |
| Tamil Nadu | 52.3 | 40.8 | 60.5 | 39.3 | 85.6 | 92.5 |
| Uttar Pradesh | 28.1 | 18.1 | 59.4 | 43 | 87.8 | 95.1 |
| West Bengal | 71.5 | 64.5 | 45.65 | 22.55 | 88.5 | 92.2 |

Source: State Statistical Report.

To measure the disparities in facilities across states, we calculate the coefficient of variation for each indicator. We find that over time drainage facility and toilet facilities became more disperse across the states whereas the disparity in drinking facility fell (Table 2.2). The variation of the first two facilities, which was already high to begin with, increased drastically over the years to 50 per cent. Although the facilities of each state improved over the years and in the final year every state is better off compared to the base period, the rising coefficients of variation are alarming as they reflect increasing differences. Since improved facilities accompanied with less variation are more desirable outcomes, we examine whether states can converge in the near future.

Table 2.2: Disparities of Across States with Respect to Water Sanitation Indicators Over Time

| Water and Sanitation | CoV of Base Year | CoV of Final Year | |
|-------------------------------|-------------------------|--------------------------|------------|
| No Drainage_(2002-2012) | 37.38 | 52.32 | Increasing |
| No latrine used_(1998-2012) | 33.36 | 50.46 | Increasing |
| Drinking Facility_(2001-2011) | 23.66 | 19.29 | Decreasing |

Source: Authors' calculation using data from State Statistical Report.

To find whether the states are converging with respect to the water and sanitation indicators we regress $(x_t - x_{(t-1)})/x_{(t-1)}$ on $x_{(t-1)}$, where, x_t is the facility for the recent year and $x_{(t-1)}$ is the value of the past year and t in this expression denotes the final time point. To test beta convergence the basic equation that needs to be estimated is $(x_t - x_{(t-1)})/x_{(t-1)} = a + bx_{(t-1)}$. If 'b' is significantly negative it means that the states are converging but if we find 'b' value to be significantly positive then the states are diverging. Table 2.3 shows the coefficient of convergence for all the three indicators of water and sanitation. The drainage facility and the toilet use have no significant convergence coefficient whereas drinking facilities of the states will converge over time but the coefficient of convergence is very low. Since there is no strong sign of convergence, it is important to analyse the relative progress of the states in this time period.

Table 2.4 shows the relative progress of each state in water and sanitation indicators for a decade. For measuring progress we used the following formula:

$$\text{Progress value} = (\text{Value of final year} - \text{Value of base year}) / (100 - \text{Value of base year})$$

The numerator will give us the direction and the value of progress whereas denominator is introduced so that it can adjust the initial point of the states such that for similar amount of progress states that already has high facilities are being weighed more compared to the states having low facilities³. Overall the progress value gives us the extent of progress after regulating the differences in the starting points.

Then we rank the states according to the progress value, i.e. the state having the highest progress value is ranked 1 and so on. This exercise is being repeated for all the three indicators and then for the overall rank of water and sanitation facilities we average the ranks in all the three indicators and then rank the states according to that average value. Overall Haryana has the greatest progress and Punjab the lowest. This maybe because Punjab already was among the good performer in the initial stage and manages to remain among the high performer in the final period but over this two time points the progress was less compared to the other Indian states. Haryana being a mediocre performer in the base period progressed enough to become one of the high performer in the final year.

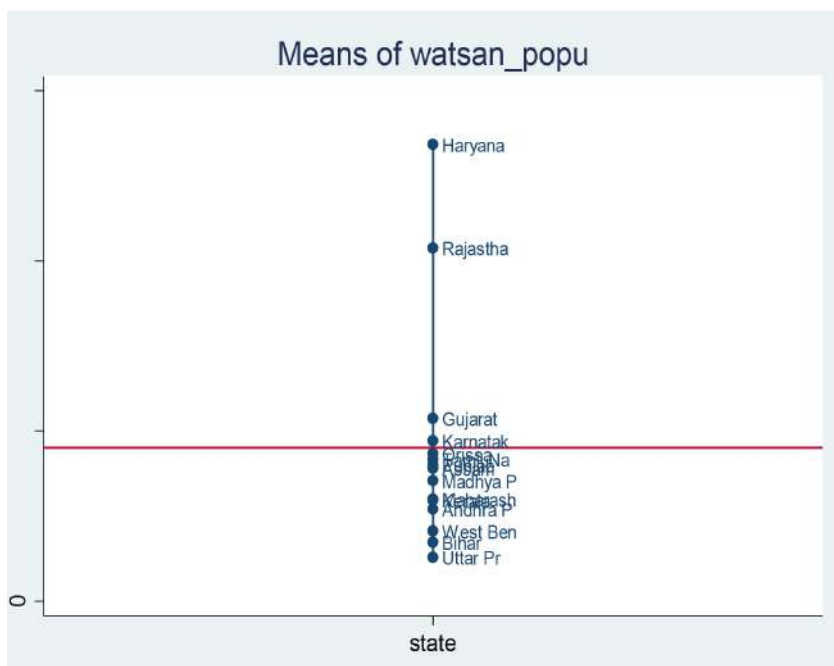
In drainage facility Kerala has progressed better than any other states whereas Punjab has least progress. But Kerala has less progress in the other two indicators compared to the other states; Haryana had progressed well in drinking and toilet facilities. Water and sanitation being a basic need and given the existing disparities in the facilities, state government intervention through expenditure is essential. Furthermore, public social spending has significant positive impact in providing the basic facilities and the development outcome (Hong and Ahmed, 2009; Jha, Biswal and Biswal, 2000; Fan, Hazell and Thorat, 2000). So in the next section, we investigate the water and sanitation expenditure pattern of the states over the years and how effective it was to improve the facilities across states.

3) Did States Finance Efficiently to Improve the Facilities?

To analyse the pattern of expenditure and differential in spending across states, we calculate the average per capita expenditure of each state over 14 years and then plot these values around the overall grand mean. The grand mean is the mean of the sanitation expenditures of all the states over the 14 years. Table 3.1 and Figure 3.1 show the average per capita state expenditure in water and sanitation over the 14 years. Figure 3.1 in addition shows the deviation of states' average per capita expenditure with respect to the grand average of the sector and this is denoted by the

red line. It can be observed that Haryana on an average spent the most whereas Uttar Pradesh, Bihar and West Bengal spent the least on this sector (figure 3.1). Most of the states are clustered below the grand mean; Gujarat and Karnataka are situated just above the mean and Rajasthan has second highest spending on water sanitation. Haryana spent on average as much as Rs. 536 per head while Uttar Pradesh spent less than 10 per cent of Haryana, i.e. only Rs. 51 (Table 3.1). Even the difference between two high spending states is remarkable as Gujarat is spending half of what Rajasthan is spending on this sector.

Figure 3.1: Distribution of Average Per Capita Expenditure of Indian States Over Grand Mean



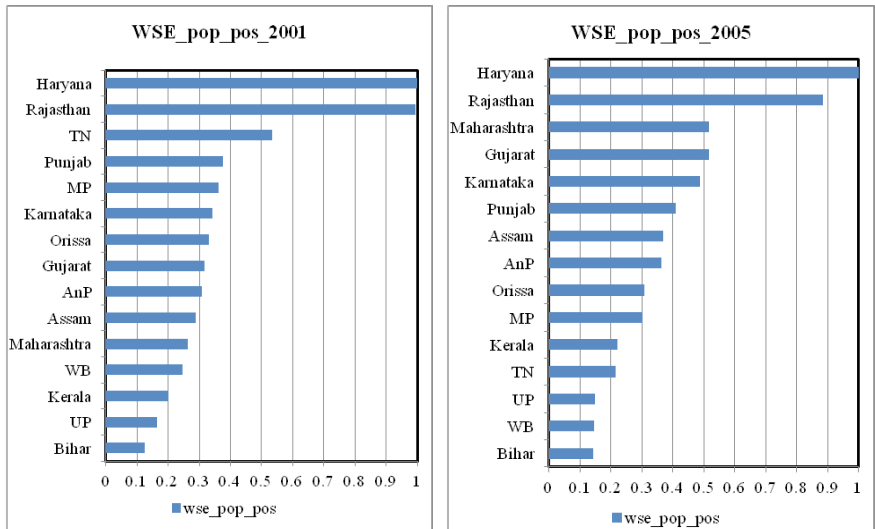
Source: Authors' calculation using data from RBI handbook.

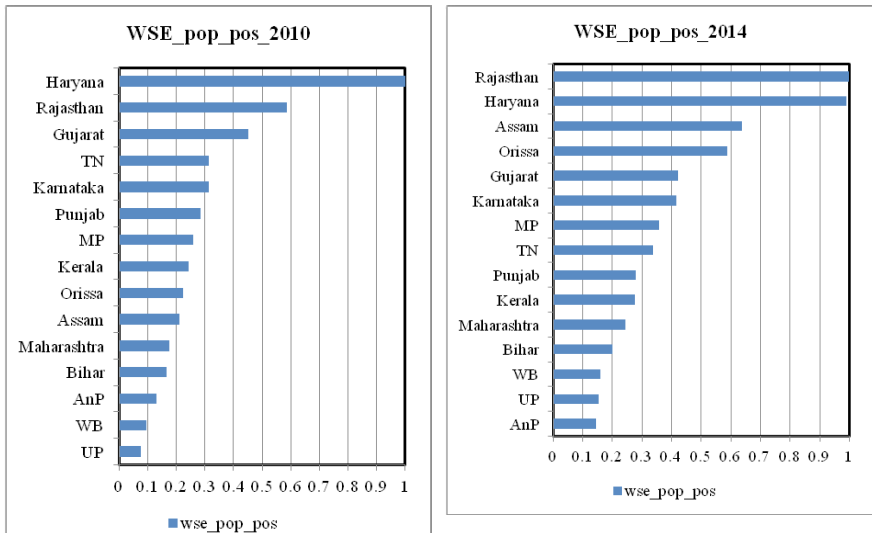
Table 3.1: Average Per capita Expenditure of Indian states for 2001-14 (in Current Rupees)

| | | | | | | | | |
|--------------------------|-------------------|------------------|---------|-------------------|----------------|---------------|------------------|--------|
| States | Haryana | Rajasthan | Gujarat | Karna- taka | Orissa | Tamil Nadu | Punjab | Assam |
| AVG (watsan_ popu) | 536.64 | 415.12 | 214.23 | 188.26 | 173.01 | 166.51 | 159.68 | 156.18 |
| States | Madhya Pradesh | Mahara- shtra | Kerala | Andhra Pradesh | West Bengal | Bihar | Uttar Pradesh | |
| AVG (watsan_ popu) | 141.48 | 119.75 | 118.47 | 107.47 | 81.83 | 69.06 | 51.21 | |

Source: Authors' calculation using data from RBI handbook.

Figure 3.2: Relative Position of States with Respect to Per Capita Water Sanitation Expenditure Over Years





Source: Authors' calculation using data from RBI handbook.

Apart from the overall view it is important to measure the spending pattern of states with respect to the highest spending states over the years. Here we consider four time points with a gap of five years, i.e. 2001, 2005, 2010 and 2014. To understand such pattern in a particular year, we divide the per capita expenditure of each of the states by the highest per capita expenditure, so the highest spending state will get value one and others lesser than one. Then we plot these values to find the position of each state with respect to the highest spending state. This exercise is repeated for all the four time points. This gives us the relative position of the states in terms of expenditure and shift in those positions over the years; the results are represented in Figure 3.2. The values are arranged in descending order, the 1st bar corresponding to the highest spending state.

Haryana and Rajasthan have persistently over the 14 years remained in the top five states in terms of spending whereas Uttar Pradesh, Bihar and West Bengal were consistently spending less in this sector. So we detect that the two high spending states and three low spending states were sticky to their position throughout the time span. Over the years,

Bihar has spent only 20 per cent of the highest spending state and Uttar Pradesh in 2010 spent only 10 per cent of the highest spending state. So we find considerable disparity in the spending pattern of the states

Table 3.2: Year-wise Coefficient of Variation in Water and Sanitation Expenditure Across Indian States

| | | | | | |
|----------|-------|-------|-------|-------|-------|
| Year | 2001 | 2002 | 2003 | 2004 | 2005 |
| wse_popu | 65.56 | 67.56 | 68.44 | 63.92 | 61.26 |
| Year | 2006 | 2007 | 2008 | 2009 | 2010 |
| wse_popu | 71.35 | 72.95 | 76.78 | 76.85 | 74.81 |
| Year | 2011 | 2012 | 2013 | 2014 | |
| wse_popu | 92.29 | 75.91 | 82.37 | 64.83 | |

Source: Authors' calculation using data from RBI handbook.

So, we next examine the variation of public spending by using coefficient of variation (CV) of per capita expenditure over time. CV after minor fluctuations from 2001 to 2003 and a slight decrease during 2004 and 2005, increased between 2006 to 2011 reaching its peak of 92.29 per cent in 2011 (Table 3.2). Interestingly, we observe a simultaneous rise in the disparity level of the outcome variable in 2012 compared to the base period, so one reason for such dispersion in facilities is likely to have been the dispersion in spending; since spending takes time to translate into facilities the disparities in financing over the years might have caused the disparity in the facilities in the latest period.

To identify the relation between financing and facilities, we measure the correlation coefficient between the two variables. The extent of availability of facilities indicators is weakly related with the spending variable as the correlation coefficient is small (Table 3.3). Although the increase in expenditure will improve the required facility, the intensity of translating expenditure into quality is very low, i.e. less than 30 per cent for drainage and toilet while for drinking facility it is less than 10 per cent to establish a strong correlation.

Table 3.3: Correlation Coefficient of Water and Sanitation Indicator with State Expenditure

| Components of Water and Sanitation | Correlation Coefficient |
|---|--------------------------------|
| No Drainage | -0.2848 |
| No latrine used | -0.1334 |
| Drinking Facility | 0.0653 |

Source: Authors' calculation using data from RBI handbook and State Statistical Report.

To further understand the relation of expenditure with the facilities for a particular state we use rank and position analysis. Rank analysis gives us the overall match or mismatch whereas Position analysis gives us the extent of the match and mismatch between the two variables under study. Position analysis considers one state as ideal state and compares other states with respect to that particular state. But in Rank analysis it is just the rank comparison of each state for the two variables.

We take the average of the state expenditures over the past 10 years, i.e. from 2001 to 2010 and rank the states from the highest average expenditure to lowest. Similarly, we rank the states according to the indicators of water and sanitation facilities for the latest year and find out the average rank of all the indicators. Then we rank the states for the sector as a whole according to the average rank. On the X-axis, we rank the states according to the average expenditure over the ten years. A state to the left spends more. So the left most state is the highest spender and the right most state the lowest spender. On the Y-axis we measure the rank of the states according to the extent of services in the recent year. The state with the best services is at the bottom. The higher on the axis a state is the worse the extent of services. On the same figure 3.3 we depict rank analysis and position analysis.

The states in the 2nd and 3rd quadrants, namely the right half of the figure, will ranks less than 8 in expenditure, namely would be low spending states. The higher spending eight states are on the left, namely the 1st and 4th quadrants. Similarly, the states in the bottom half, 1st and 2nd quadrants are the eight states with good facilities in the final year and states in the top half, the 3rd and 4th quadrants are the eight states with poor facilities.

Figure: 3.3: Pictorial Representation of the Rank and Position Analysis

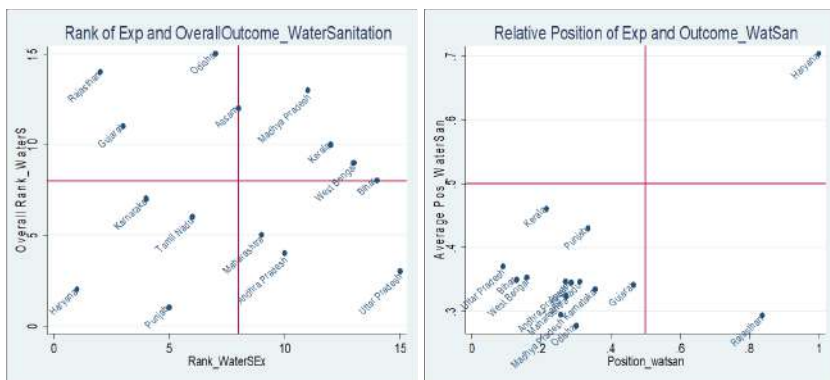
| | | |
|---|---|---|
| Mismatch.. Dissimilar status for both the variable IV | Match.. Similar status for both the variable III | Rank analysis X-axis = Rank of the states according to the average expenditure over ten years Y-axis = Rank of the states according to the outcome of the recent year |
| Match.. Similar status for both the variable I | Mismatch.. Dissimilar status for both the variable II | Position Analysis X-axis =Position of the states according to the average expenditure over ten years Y-axis = Position of the states according to the outcome of the recent year |

Source: Authors' representation.

Both rank and position analyses are comparative in nature. For states in odd quadrants there is a correspondence between the rank on expenditure and rank on outcome but for states in the even quadrant there is a negative link between expenditures and outcome. So States in the 1st quadrant spend more and had better facilities than others, and states in the 3rd quadrant spent less and had poorer facilities than others. But a state in the 4th quadrant spent more but couldn't translate the spending into facilities compared to other states. A state in the 2nd quadrant is spending less but provides better facilities. So for the 1st and the 3rd quadrant points states are achieving the outcome level in accordance with their expenditure but for the other quadrants some states are achieving more and some less given the expenditure. So we can divide the states into four categories: one, which spent and have the facilities; two, which didn't spend much but have the facilities; three, which didn't spend and do not have the facilities; and four, which spent but have lower facilities. So we can observe from the 1st diagram of Figure 3.4 which shows the comparison of states according to rank we observe that the points are evenly scattered over the graph. Haryana, Tamil Nadu, Karnataka and Punjab have performed in accordance with their spending, whereas Maharashtra, Andhra Pradesh and Uttar Pradesh are spending

less compared to the outcome. But from the second diagram in Figure 3.4 we observe that in comparison with Haryana which is spending the highest and also has the highest facilities all states gets clustered in the 1st quadrant. So from position analysis we examine that compared to Haryana who has acquired the 1st position among all states the other states are spending not only less but also has outcome largely low in comparison to ideal state. Rajasthan as an exception is in the 2nd quadrant spending higher than the others but have low facilities so thus spending might be done inefficiently.

Figure 3.4: Rank and Position of the States for the Water and Sanitation Sector



Source: Authors' calculation using data from RBI handbook and State Statistical Report.

Table 3.4 shows these four categories of states on the basis of level of expenditure and facilities. Maharashtra Andhra Pradesh and Uttar Pradesh spent less than Rajasthan, Gujarat, Orissa and Assam but provided better facilities. We can thus say that Maharashtra, Andhra Pradesh and Uttar Pradesh are efficient states and Rajasthan, Gujarat, Orissa, and Assam are inefficient states.

Again, Haryana, Punjab, Tamil Nadu and Karnataka have better facilities than Madhya Pradesh, Kerala, West Bengal and Bihar but are also spending more.

Table 3.4: Level of Expenditure and Facilities of Indian States

| Level of expenditure and facility | High expenditure and High facilities | Low expenditure and moderate facilities | Low expenditure and low facilities | Moderate expenditure and low facilities |
|-----------------------------------|---|---|---|---|
| States | Haryana, Punjab, Tamil Nadu and Karnataka | Maharashtra, Andhra Pradesh and Uttar Pradesh | Madhya Pradesh, Kerala, West Bengal and Bihar | Rajasthan, Gujarat, Orissa and Assam |

Source: Authors' calculation using data from RBI handbook and State Statistical Report.

To find states that spent a lot but couldn't provide comparable facilities and vice versa, we measure the difference in the ranks of the two variables (Table 3.5). We find that the Pearson's rank correlation coefficient is almost zero, namely that there is no correlation between the rank according to expenditure and the rank according to provision of water and sanitation facilities.

Table 3.5: Rank of States According to Facilities and Outcome

| States | overall rank | rank_exp | Difference |
|----------------|--------------|----------|------------|
| Punjab | 1 | 5 | -4 |
| Haryana | 2 | 1 | 1 |
| Uttar Pradesh | 3 | 15 | -12 |
| Andhra Pradesh | 4 | 10 | -6 |
| Maharashtra | 5 | 9 | -4 |
| Tamil Nadu | 6 | 6 | 0 |
| Karnataka | 7 | 4 | 3 |
| Bihar | 8 | 14 | -6 |
| West Bengal | 9 | 13 | -4 |
| Kerala | 10 | 12 | -2 |
| Gujarat | 11 | 3 | 8 |
| Assam | 12 | 8 | 4 |
| Madhya Pradesh | 13 | 11 | 2 |
| Rajasthan | 14 | 2 | 12 |
| Odisha | 15 | 7 | 8 |
| | Rank Cor | -0.0179 | |
| | Prob | 0.9496 | |

Source: Authors' calculation using data from RBI handbook and State Statistical Report.

Table 3.6: Trend Growth Rate and Rank of the States According to TGR and Progress

| States | TGR (watsan_popu) | Rank according to TGR | Rank according to progress | Difference in the Ranks |
|----------------|-------------------|-----------------------|----------------------------|-------------------------|
| Orissa | 13.54 | 1 | 7 | -6 |
| Karnataka | 12.79 | 2 | 11 | -9 |
| Bihar | 12.77 | 3 | 3 | 0 |
| Haryana | 12.51 | 4 | 1 | 3 |
| Kerala | 12.26 | 5 | 10 | -5 |
| Madhya Pradesh | 11.23 | 6 | 4 | 2 |
| Uttar Pradesh | 10.97 | 7 | 9 | 2 |
| Assam | 10.8 | 8 | 12 | -4 |
| West Bengal | 10.23 | 9 | 8 | 1 |
| Gujarat | 9.72 | 10 | 6 | 4 |
| Rajasthan | 9.25 | 11 | 13 | -2 |
| Tamil Nadu | 8.45 | 12 | 5 | 7 |
| Punjab | 8.25 | 13 | 15 | -2 |
| Maharashtra | 4.5 | 14 | 14 | 0 |
| Andhra Pradesh | 1.9 | 15 | 2 | 13 |

Source: Authors' calculation using data from RBI handbook and State Statistical Report.

Since position analysis is based on the level of the variables and not on pathways over time, we now analyse the pathways of the expenditure by using trend growth rate to see whether higher growth rate of expenditure was accompanied by better progress as expected from an efficient state. Table 3.6 shows the trend growth rate and the rank of the state according to growth rate of expenditure and also progress in providing facilities. It can be seen that although expenditure grew rapidly in Karnataka and Orissa they couldn't progress much compared to the other states in providing facilities, whereas Andhra Pradesh with lowest expenditure growth rate could do better than most of the states in providing facilities. Tamil Nadu and Gujarat also used their finances efficiently over time.

In this section we detected four categories of states and the two categories which need special attention are the states those are spending moderately but have low facilities and other is the state those who despite high spending have low facilities. For the 2nd category of states the finances may have been spent in an inefficient way or maybe at a disaggregated level the diversion of the finances is such that it doesn't serve the real purpose. The other category of states requires further study to identify the reason for their low spending. So, in the next section we examine whether the states are spending low because of their low capability or they have capability but still choose not to spend in this sector, i.e. we study whether the spending required are in accordance with their PSGSDP.

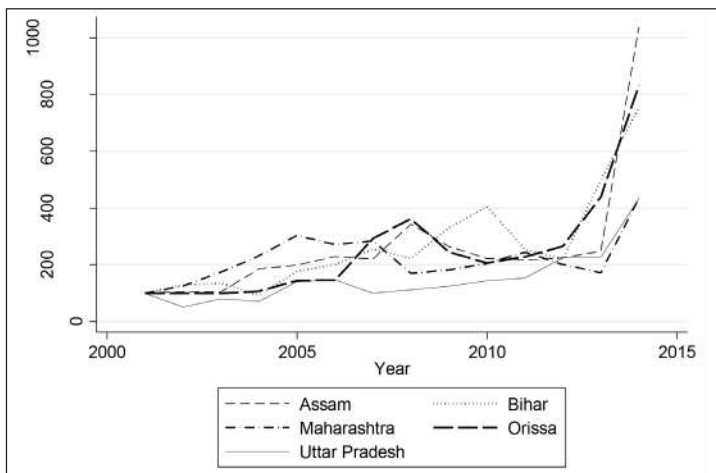
4): Is the Required Financing Done by the State According to their Capability?

The previous exercises show that a large number of states are spending little on the water sanitation sectors, so in this section we try to examine whether the states are constrained by their GDP. First we observe the pattern of the states' spending given their income level. For that, we divide the states into three groups, i.e. high income states, middle income states and low income states, each group having five members. We measure the trend growth of per capita water and sanitation expenditure for each group and display the results in Figures 4.1, 4.2 and 4.3, respectively. For finding the trend, 2001 is being considered as the base year and base year PCEXP is taken as 100 and the values of subsequent years are calculated using the formula, Value for year t is calculated as = (value for tthyear/value for base year (2001))*100.

We notice from Figure 4.1 the low income group has low spending growth until 2010, but then picked up substantially during 2011-14. Also the states in this group have minor fluctuations, namely expenditures do not always increase. The middle income states exhibited high growth after 2005 though growth of expenditure dropped after 2007 in Karnataka, Rajasthan and West Bengal and started growing only after 2012 (Figure 4.2). The high income group show consistent growth in expenditure over

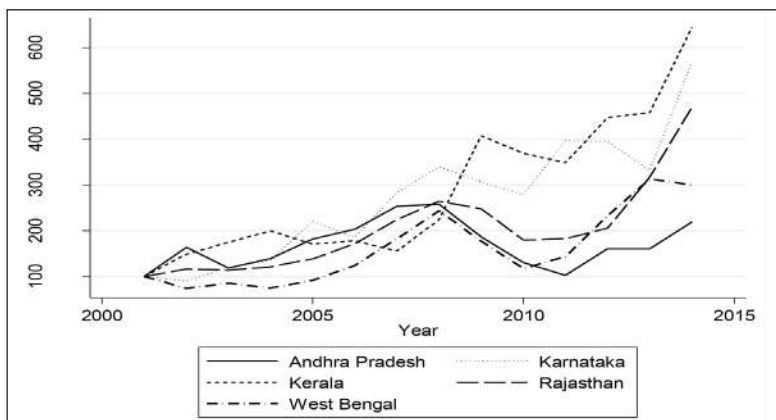
the years with slight fluctuations(Figure 4.3). Thus each group has a specific pattern of expenditure so we can say income of a state influences its spending pattern, as noted in the literature (Singh and Sahni, 1984).

Figure 4.1: Trend growth Rate of Per capita Expenditure of Low Income States



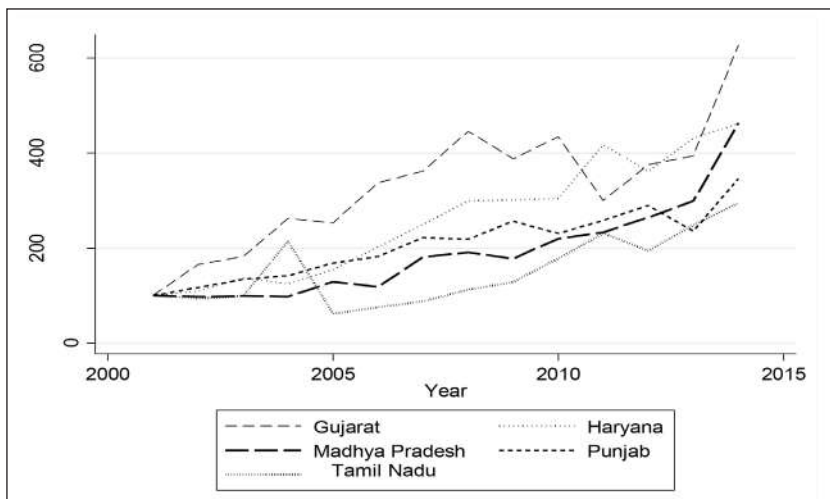
Source: Authors' calculation using data from RBI handbook.

Figure 4.2: Trend Growth Rate of Per capita Expenditure of Middle Income States



Source: Authors' calculation using data from RBI handbook.

Figure 4.3: Trend Growth Rate of Per capita Expenditure of High Income States



Source: Authors' calculation using data from RBI handbook.

We use position analysis for more detailed analysis of the spending of each state and their corresponding PCGSDP over three years. As in previous exercises we find the relative position of each state relative to the highest spending states and also for PCGSDP. We then display the combination of the two positions in a scatter plot. X-axis plots the position of PCGSDP of each state and Y-axis plots the PCEXP of each state. As previously, a state located in 1st and 3rd quadrant are spending in accordance with its income but if located in 2nd quadrant then it is spending less than its income and if it is located in the 4th quadrant then it is spending more than its income. This exercise is done for four time points with a gap of five years, i.e. 2001, 2005, 2010 and 2014 to get the pattern over the years and identify any shift in the location of the states across quadrants over the time span of 14 years. Figure 4.4 is a pictorial representation of the position analysis and Figure 4.5 represents the scatter plot of PCGSDP and PCEXP over the years. Each of the scatter plots for the mentioned figure has a table mentioning the states in each quadrant.

Figure 4.4: Diagrammatic Representation of the Tools Used in this Section.

| | |
|---|---|
| States spending more compared to their GSDP | States spending at par their GSDP |
| States spending at par their GSDP | States spending less compared to their GSDP |

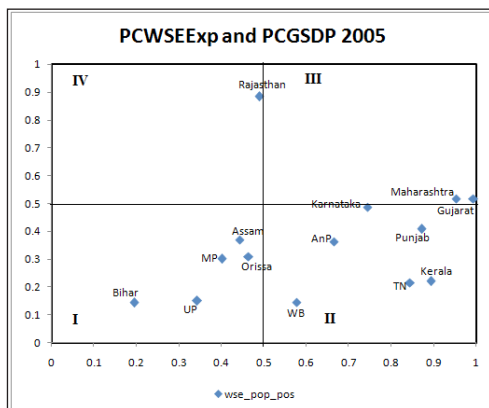
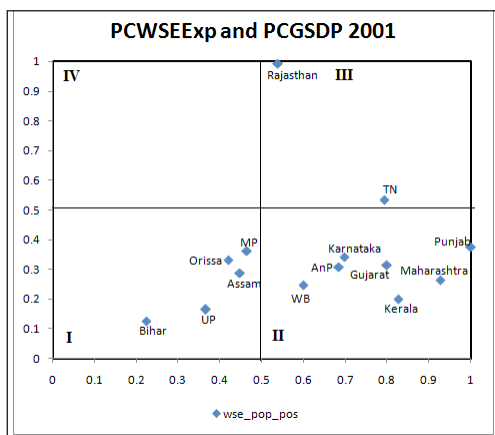
| Quadrant | The status of the state in that Quadrant |
|----------|---|
| I | The position of the state is Low in PCEXP Low in PCGSDP |
| II | The position of the state is Low in PCEXP High in PCGSDP |
| III | The position of the state is High in PCEXP High in PCGSDP |
| IV | The position of the state is High in PCEXP Low in PCGSDP |

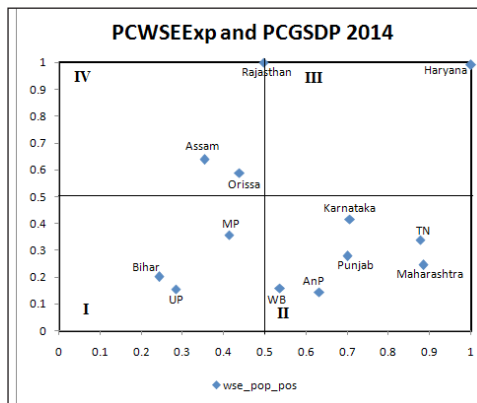
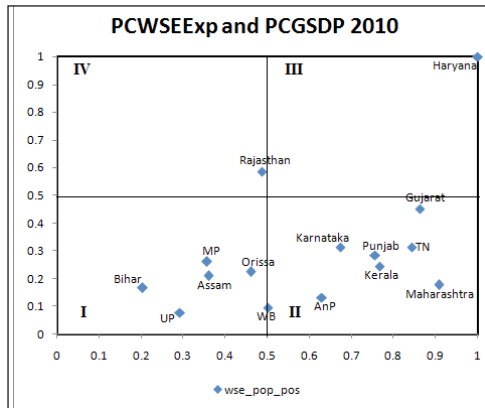
Source: Authors' representation.

The states are mostly scattered in the lower part of graph over the entire time span (Figure 4.5), so in general we can say that irrespective of their income states' spending in this sector are low compared to Haryana which is spending at par with its income and is situated in the corner of the 3rd quadrant in 2011 and 2014.⁴ Only in 2014, Assam and Orissa can be spotted in the 4th quadrant, i.e. these states even with low income are spending more on water and sanitation compared to other states. So the states in general are not spending according to their capability as

compared to the ideal state. One of the reasons for such low spending could be non-requirement for such expenditure. For example, even if a state has high PCGSDP it can very well spend less in this sector if it already has all the water and sanitation facilities and needs finances only to maintain the existing facilities. But special attention is required for the category of states that despite having poor facilities are spending little though having high incomes.

Figure 4.5: Relative Quadratic Positions of the States in Water and Sanitation Expenditure and PCGSDP





Source: Authors' calculation using data from RBI handbook.

To identify such states we find the ranks of the states according to their outcome level of the latest year i.e. 2011-12 to recognise its requirement for financing then we find the ranks according to PCGSDP of 2010 to understand the capability of the states and lastly find the rank of the states according to the expenditure in 2014 to detect whether the states with capability and need to finance did the spending accordingly. Since this whole process is stepwise so the time points are chosen with lags as firstly the state needs to identify its requirement then decide to spend on that sector so the outcome variable is considered in 2011-12 and the expenditure is being considered for the year 2014 again PCGSDP takes time to translate to PCEXP so for PCGSDP we considered the year 2010.

Table 4.1: State Ranking with Respect to Facility, Income and Expenditure

| States | Outcome Rank_2011-12 | PCGDP Rank_2010 | PCEXP Rank_2014 |
|----------------|----------------------|-----------------|-----------------|
| Odisha | 15 | 11 | 4 |
| Rajasthan | 14 | 10 | 1 |
| Madhya Pradesh | 13 | 2 | 11 |
| Assam | 12 | 12 | 3 |
| Gujarat | 11 | 3 | 5 |
| Kerala | 10 | 5 | 10 |
| West Bengal | 9 | 9 | 13 |
| Bihar | 8 | 15 | 12 |
| Karnataka | 7 | 7 | 6 |
| Tamil Nadu | 6 | 4 | 8 |
| Maharashtra | 5 | 13 | 7 |
| Andhra Pradesh | 4 | 8 | 15 |
| Uttar Pradesh | 3 | 14 | 14 |
| Haryana | 2 | 1 | 2 |
| Punjab | 1 | 6 | 9 |

Source: Authors' calculation using data from RBI handbook and State Statistical Report.

All the set of ranks are displayed in Table 4.1. As mentioned earlier, the states that have low spending and low facilities are Madhya Pradesh, Kerala, West Bengal and Bihar. Madhya Pradesh and Kerala are the two states which have low facility and have the capability to spend but are spending less compared to all the other states. On the other hand, West Bengal and Bihar given their PCGSDP rank have low capability to spend compared to other states. If we analyse the states having rank higher than 10 we observe that Orissa, Assam and Rajasthan are spending more despite having low capability but couldn't provide more facilities whereas Gujarat spending is at par with its PCGSDP but again has poor facilities.

5) Determinants of Expenditure in Human Priority Sectors

We now seek to identify the factors influencing the water and sanitation expenditure by using data over the time period 1991-2015 for 15 major

states which comprise 90 per cent of the population. During this time period some states were bifurcated, but⁵ we consider them as undivided to maintain uniformity of the analysis for the years before the division and after the division. Again to adjust for inflation, we took all the monetary variables in 2004-05 constant prices.

The dependent variable is per capita water and sanitation expenditure and the independent variables can be classified into four broad categories, economic, demographic, political and policy variables. The explanatory variables are explained as follows:

Economic Variables: Fiscal Deficit and Per Capita Income

A states' fiscal space is important as fiscal space allows maintenance of the size of the public spending without making the economy unstable, Heller (2005). We represent fiscal space by the fiscal deficit normalised as per cent of GDP. The fiscal deficit is expected to affect expenditure negatively as a smaller fiscal deficit allows more spending. The data on the fiscal deficit is collected from RBI handbook. We specify per capita income as an independent variable as a state with higher per capita income can spend more. Per capita income is expected to positively influence expenditure.

Demographic Variables: Dependent Population, Population Size, Rural Population, Poor Population

Demographic variables may have mixed effects on expenditure. For example, a state with more dependent population may need to spend more for public facilities but may face difficulty in generating resources because of a large dependent population. Again, populous state must spend more to provide for its people but as expenditure is normalised by population the impact of population size will depend on scale economies. Similarly, states having higher rural and poor population are supposed to spend more on water and sanitation to support the large vulnerable section but this will also limit the states in generating revenue for its expenditure. So, demographic variables may have a positive or negative effect.

Political Variables: Political Ideology, Election Year

Traditionally, left wing political parties believe more in government intervention than reliance on the market mechanism, so it can be expected that a particular state ruled by left wing parties will have more government spending compared to right wing parties. Political ideology is coded by following Dash and Raja (2013) paper and the coding is mentioned in Appendix Table A1. Again, election year is included to capture any effect of elections on spending; it is assumed that more spending occurs in the year before an election compared to other years to attract vote banks. So the year before the election year is expected to positively influence spending of priority sectors.

Policy Variables: MDG Announcement

Lastly under policy variables we include the MDG announcement year to capture any significant change of the expenditure due to the introduction of the targets in 2000. In addition we also include time trend as an explanatory variables to identify the spending pattern over time. We also include state dummies to control for state effects.

The variables for which information is only available for some particular years such as poverty rates population are extrapolated and interpolated according to the need of the exercise following the standard practice in literature. The specific data sources for the variables are mentioned in the Appendix Table A2.

Model Specification

To find the determinants of the expenditure we specify the model as follows:

Per capita water and sanitation expenditure=f (Fiscal deficit, Per Capita Income, Dependent population, Population Size, Rural Population, Political Ideology, Election Year, Poverty Rate, MDG announcement, Time dummy, state dummy)

The variables are constructed accordingly to fit the specified model and the variable construction is mentioned in Table 5.1.

Table 5.1: Independent Variable Construction

| Variables | Description |
|----------------------|---|
| Fiscal deficit | Fiscal deficit/SGDP |
| Per Capita Income | Log per capita income |
| Dependent population | Non-working age pop/Working age population |
| Population Size | State population/Country population |
| Rural Population | Rural population/Whole population |
| Political Ideology | Ideology codes by following Das and Raja (2012) |
| Election Year | The year before the election is coded 1 and others as 0 |
| Poverty Rate | Percentage of people below poverty level |
| MDG announcement | Year after 2000 coded 1 and before 2001 as 0 |
| Time trend | from 1991 to 2015 |

Source: Based on existing literature.

The variables such as fiscal deficit, dependent population, population size, rural population and poverty rate are taken as one year lagged variables as any decision of the future expenditure will depend on the existing condition of the state finances and population structure so these variables are lagged by previous year. All the variables are taken in their level form except per capita expenditure and per capita income which are taken in log version to avoid empirical problems such as heteroskedasticity and outliers arising from large differences in values of the variables across Indian states.

The basic statistics of the explanatory variables are mentioned in Table 5.2 and we can see that fiscal deficit of Indian states in those 25 years averaged 3.40 per cent of GDP whereas the dependency ratio is more than 60 per cent. The average population in each state was 6.10 per cent of the population in India. In India the rural population is around 70 per cent and the poverty rates as high as 32.30 per cent and inflation adjusted per capita income is below 29 thousand a year.

Table 5.2: Description of Explanatory Variables

| Explanatory Variables | Mean | Standard Deviation |
|------------------------------|-------------|---------------------------|
| Fiscal deficit | 3.40% | 0.0218 |
| Per Capita Income | 28859.03 | 16046.86 |
| Dependency Ratio | 64.50% | 0.125 |
| Population Size | 6.10% | 3.566 |
| Rural Population | 71.20% | 10.508 |
| Poverty Rate | 32.30% | 14.922 |

Source: Author's own calculation using several data set.

Our data set has certain cross-sectional and time-series characteristics which may result in biased coefficient parameters estimates if we use standard OLS estimation process. Moreover, in the presence of auto correlation and heteroskedasticity it is very unlikely that the assumption of independent and identically distributed error terms will be satisfied. So, we use panel corrected standard error model where the estimated results and the standard errors are corrected for heteroskedasticity and first order auto correlation. The model fits well with large number of years and less number of cross sectional units similar to our data set which has data of 25 years and 15 cross sectional units.

Regression Results

Table 5.3 portrays the regression result; the model reported is overall significant at 1 per cent level. From the table we observe that states spending on water and sanitation are significantly restrained by the available fiscal space, though state real per capita income has no significance in enhancing sanitation expenditure. Additionally, populous states and states with high dependency rate are spending more on this particular sector to support the vulnerable section, namely there seems to be no economies of scale. But states' large base of rural population and poor population has no significant impact on spending pattern. This may be because these vulnerable populations do not influence the spending decision. Among political variables although there is no influence of political ideology on the expenditures pattern the election year has a

positive impact on spending. This means that expenditure on water and sanitation increases significantly in the year before the election. The states have also increased spending on this sector in the years after the millennium development goals were introduced.

Table 5.3: PCSE Regression Results

| | Log water sanitation per capita expenditure | | | |
|-----------------------|---|----------------|------|-------------------|
| Explanatory variables | Coefficient | Standard Error | P>z | Significance |
| Fiscal deficit | -0.01** | 0.01 | 0.04 | Significant at 5% |
| Per Capita Income | -0.14 | 0.20 | 0.49 | Insignificant |
| Dependent population | 0.24*** | 0.07 | 0.00 | Significant at 1% |
| Population Size | 0.22*** | 0.09 | 0.01 | Significant at 1% |
| Rural Population | 0.04 | 0.08 | 0.67 | Insignificant |
| Political Ideology | -0.01 | 0.02 | 0.67 | Insignificant |
| Election Year | 0.05** | 0.02 | 0.03 | Significant at 5% |
| Poverty Rate | 0.001 | 0.001 | 0.14 | Insignificant |
| MDG announcement | 0.82*** | 0.08 | 0.00 | Significant at 1% |
| _cons | 2.41 *** | .68 | 0.00 | Significant at 1% |
| State effect | Yes | | | |
| Time effect | Yes | | | |

Source: Author’s own calculation using several data set.

Note significant variables at 1% level have three stars and variables significant at 5% level have two stars.

Conclusions

Water and sanitation are crucial component for a citizen’s well being that must be provided by the government. The provision of facilities according to the three indicators considered in our study, drinking and drainage facilities are entirely dependent on the provision by the government. Although use of toilet can be affected by the socio-economic characteristics of the citizen, building awareness for toilet use is again the government’s responsibility. Moreover, the sixth goal of the SDGs also focuses on the adequate provision of clean water and sanitation facility and India being a member country of United Nations is supposed

to achieve the goal by 2030. Given the present situation of the facilities in Indian states it seems difficult to complete the goal in time, For example in Orissa 80 per cent of the population do not have drainage facility and nearly half of them do not use a toilet,. The situation is aggravated by the increasing variation in the provision of these facilities across states so that facilities are not increasing faster in states with poorer facilities. The coefficient of variation has increased by about 50 per cent over the last decade and there is no sign of convergence.

Again, among the 15 major states only Haryana progressed significantly over the years; progress in Assam, Rajasthan and Maharashtra does not seem promising. Punjab has the lowest progress over the years may be because it already had better facilities compared to the others in the initial period. Even with the SDG time line and the dire situation of the facilities the states do not seem to spend enough in this sector. Haryana and Rajasthan are high spending states while others are spending comparatively less and this pattern has persisted over the years. The problem becomes more complex when we find low correlation between expenditure and availability of facilities; that means the finances ultimately couldn't be translated into facilities. For example Rajasthan, Orissa, Assam and Gujarat despite spending high amounts have poor facilities compared to others and such failure is most prominent in Rajasthan; Uttar Pradesh also suffers significantly from this problem. So it is important to follow a model where the state could successfully provide the facility with its finances;The quality of services Haryana provides is in accordance with its expenditures; it spends the most and has the best facilities. But unfortunately all the states are distinctly lagging behind. Again, while studying the pathways of the spending we find certain states like Karnataka and Orissa despite increasing expenditure over the years couldn't progress like Andhra Pradesh and Tamil Nadu. The reason for such failures could be diversion of finances.

The other category of states which is a matter of concern is those having poor facilities and also low spending. For them it is important to understand whether the state income is enough to finance the facilities. We find that for most of the states the pattern of spending over the years is same for states having similar income level and dissimilar for different

income level. But in comparison with Haryana other states spend a smaller share of their income . Although lower spending in relation to income is acceptable for states with already adequate facilities it is not for states such as Madhya Pradesh and Kerala who seem reluctant to spend on these sectors despite higher income and poorer facilities.. West Bengal and Bihar require external financing as they are struggling to finance the facilities from their own income. The states having insufficient facilities seem to have unique problems and need unique policies to address their issues, so it is hard to frame a general policy which will be appropriate for all the states. We have also found that expenditure can be restricted by the fiscal space of the state as it is very important to maintain fiscal stability. Moreover, we also observe that the most vulnerable sections and sections which are most dependent on government services do not seem to have significant influence on state expenditure decisions. It is vital for the state to take care of the vulnerable section of the people. However, given the time limit of SDG and the necessity of clean water and the government needs to urgently frame the required policies for each state so that all the states can timely achieve the goals and converge to a level of better facilities.

Endnotes

- ¹ Ray, Agarwal and Paramesaran (2019) examined the performance of Indian states using a holistic notion of development as enunciated by Stiglitz, Sen and Fitoussi (2017).
- ² Kerala depends more on local groundwater facilities so lower level of piped water may overstate the lack of facilities.
- ³ For example say there is state A has 60% access to facilities and state B has 90% access to facilities and over time both has 5% increase in the facilities but since State A already had low facilities compared to State B it will be easier for A to increase that 5% compared to B. So, denominator in the formula actually bring the states to similar initial points
- ⁴ In some sense a state spending in accordance with its GDP can be considered the optimal spending state.
- ⁵ In 2000, Chhattisgarh was separated from Madhya Pradesh, Jharkhand was separated from Bihar, Uttarakhand was separated from Uttar Pradesh and in 2014 Telangana was separated from Andhra Pradesh.

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Appendix:

Table A1: Coding of Political Ideology

| Serial No. | Party Name | Political Ideology | Ideological Stand | Ideology Scale |
|------------|--|--|-------------------|----------------|
| 1 | AIDAMK: All India Anna Dravida Munnetra Kazhagam | Social Democratic, Populist | Centre | 3 |
| 2 | BJD:Biju Janata Dal | Populist, Economic liberalism | Right-Centre | 2 |
| 3 | BJP:Bharatiya Janata Party | Economic liberalism | Right | 1 |
| 4 | BSP:Bahujan Samaj Party Dalit | Socialism, Socialism | Left-Centre | 4 |
| 5 | CPI:Communist Party of India | Communism | Left | 5 |
| 6 | CPI(M):Communist Party of India (Marxist) | Communism | Left | 5 |
| 7 | DMK:Dravida Munnetra Kazhagam | Social Democratic, Populist | Centre | 3 |
| 8 | HVP: Haryana Vikas Party | Social Democratic, Populist | Centre | 3 |
| 9 | INC: Indian National Congress | Populist, Democratic Socialism, Social Democracy | Centre | 3 |
| 10 | INLD: Indian National Lok Dal | Populist, Economic liberalism | Right-Centre | 2 |
| 11 | JD: Janata Dal | Populist, Economic liberalism | Right-Centre | 2 |
| 12 | JD(S): Janata Dal (Secular) | Populism, Social Democracy | Centre | 3 |
| 13 | JD(U): Janata Dal (United) | Integral Humanism, Conservatism | Right-Centre | 2 |
| 14 | JP :Janata Party Populist, | Economic liberalism | Right-Centre | 2 |
| 15 | LDF : Left Democratic Front | Communism | Left | 5 |
| 16 | LF: Left Front | Communism | Left | 5 |

| | | | | |
|----|---|--|--------------|---|
| 17 | NCP: Nationalist Congress Party | Populist, Democratic Socialism, Social Democracy | Centre | 3 |
| 18 | RJD: Rashtriya Janata Dal | Populism | Centre | 3 |
| 19 | SAD: Shiromani Akali dal Religious (Sikh) | Populist, Economic liberalism | Right-Centre | 2 |
| 20 | SHS: Shiv Sena | Economic liberalism | Right | 1 |
| 21 | SP: Samajwadi Party | Populist, Democratic Socialism | Centre | 3 |
| 22 | TDP: Telugu Desam Party | Regionalist, Fiscally Conservative | Right | 1 |
| 23 | UDF: United Democratic Front | Populism, Democratic Socialism, Social Democracy | Centre | 3 |

Table A2: Data Sources of the Variables

| Variable Name | Data Sources |
|----------------------|----------------------------------|
| Population | Census data 1991, 2001, 2011 |
| Dependency Rate | Census data 1991, 2001, 2011 |
| Rural Population | Census data 1991, 2001, 2011 |
| State Expenditure | Reserve bank of India Bulletin |
| Fiscal deficit | Reserve bank of India Bulletin |
| Election Year | Election Reports on State |
| Political Ideology | Election Reports on State |
| Population Size | Central Statistical Organization |
| Poverty Rate | Planning Commission Estimates |

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