

Misplaced Prioritisation in Sanitation Battle in India– Some Insights from the Global Experience

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ABSTRACT

While the role of safe water and sanitation facilities in ensuring better health and nutritional facilities are well-recognised in the literature and policy discourses, more often than not, they are approached in isolated manners in specific policies to address the issues. The present paper seeks to establish the need to address the issues of access to water and sanitation comprehensively, by analysing World Development Indicator data on a cross-section of 185 countries. With the help of principal component analysis for data reduction and multiple regression of principal components, the paper suggests that although access to improved sanitation facilities plays a critical role in addressing the issues of malnutrition and disease-mortality incidences, access to water cannot be undermined in policies that promote sanitation facilities. While in the case of disease-mortality control efforts, water plays a complementary role along with access to sanitation, in the case of policies to address malnutrition, access to water may play the role of a suppressor variable that enhances the impact of access to sanitation.

Keywords: Water and Sanitation, Sanitation campaign, Sanitation in India

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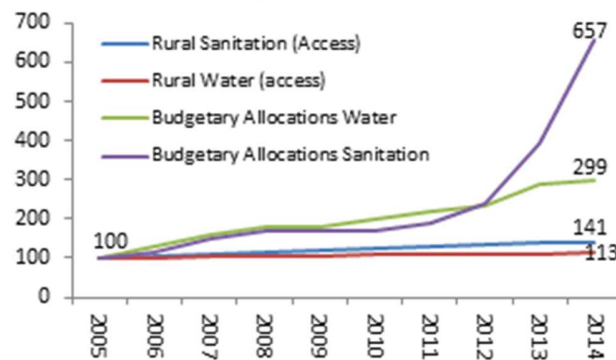
I. INTRODUCTION

The linkages between water, sanitation, health and nutrition have been critical in any policy discourse on poverty and human rights. A review of contemporary literature suggests that inappropriate and inadequate facilities related to water and sanitation have not only hindered the efforts towards poverty eradication, the non-availability of these facilities have also led to non-achievement in some critical developmental goals in education and health services, be it the progress towards the Millennium Development Goals, or the nationally defined developmental interventions (United Nations 2011; Mathekgana et.al 2001; Haines and Rogers 2000). Studies also suggest that even micro interventions such as school WASH programmes may have remarkable positive impact on the overall situations in a locality towards improving the health outcomes both within the institutions and localities (Freeman et.al. 2011; WHO 2002; Koopman 1978; Bowen et.al. 2007; Talaat et.al. 2011; Mwanri and Masika 2001; Ebong 1994; Midzi 2011). While the inter linkages have been well recognised, what really lacked in the context of policies is a holistic and systematic approach. Policies have more often than not been addressing specific issues such as access to water, access to sanitation and health related matters in isolated manners and probably this narrow approach to address issues is a cause of non-realisation of desired outcomes (Woodward et.al. 2001; Prüss-Üstün and Corvalán 2006; Moe and Rheingans 2006; Zhang et.al. 2010, Bartram and Cairncross 2010; Seppälä 2002). For example, in India, isolated efforts have been made for different aspects of this linkage and even after efforts over decades; the deficit in outcomes is still huge. The purpose of this paper is not to revisit the linkages but to generate some ideas on actionable intervention strategies that may potentially exploit these linkages for suitable development outcomes¹.

II THE INDIAN CONTEXT

The access to water and sanitation facilities has long been identified in India as critical preconditions for better health and nutritional outcomes. Recognising the extent of deficit in access to water and sanitation in rural areas, policies were made to intervene through specific programmes and missions for achieving universal access to water and sanitation. However, the policies not only treated

Figure-1: Progress in efforts towards Water, Sanitation and Budget Allocations in Rural India



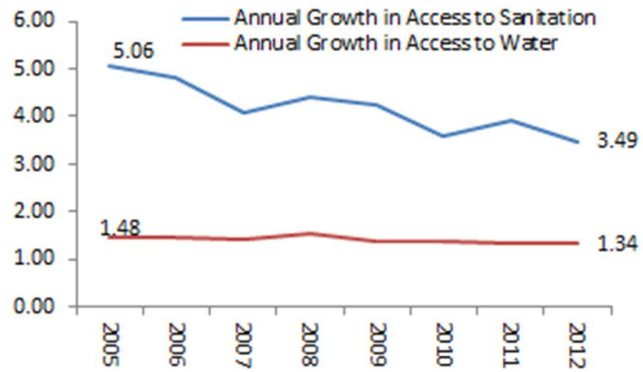
Source: Based on WDI and Union Budget (various years)

both water and sanitation in isolated manner, they also kept changing their focus from time to time. The trend in progress made and priorities assigned to water and sanitation can be assessed from Fig-1 and Fig-2 below which shows an initial inclination towards making provisions for access to water without a corresponding improvement in the outcome and the focus in most recent years

shifting on sanitation and more so from infrastructure creation to awareness creation. Some recent studies have also highlighted that it is not the access but the use of the available infrastructure that holds the key to better health outcomes and thereby focus on creating awareness on the use (Clasen 2014).

Such studies may lead to some policy inference that instead of creating infrastructure, the policy makers should focus on effective use of this infrastructure and eventually pitting one goal against the other, especially when we are discussing the issue in the context of resource poor countries like India. While the concerns and initiatives need to be appreciated, it is also necessary that the policy makers avoid barking the wrong tree. On the basis of a simple statistical exercise, we seek to reemphasise the need for a comprehensive approach towards addressing the health-water-sanitation linkage.

Figure-2: Annual Growth in Access to Water and Sanitation



Source: Based on WDI 2013 for India

III THE FRAMEWORK, DATA AND METHODS

Unfortunately, the data available for a comprehensive study of these linkages is not only incomparable over the years, they also lack in scope and spread in the cross section. We have therefore resorted to different indicators compiled by World Development Indicators (WDI) as proxies for the present analysis. For those years for which specific data was unavailable, we have used the data available for the closest year or the average of the closest years. Indicator wise variables used in our analysis are presented in Table-2.

The broad tenets of the framework of our discussion are as below.

Table-1: Indicators for Assessment of the linkages

Indicators that assess the Level of Water and Sanitation Infrastructure	Indicators that assess the Use of the Infrastructure and Hygiene Behaviour	Indicators that assess the Health Situation (reported by households/clinics)
Access to safe Water	Use of water for domestic purposes	Infant mortality, Child mortality, prevalence of malnutrition
Access to Sanitation	Use of sanitation facilities	Prevalence of waterborne and other diseases related to sanitation facilities



Table-2: Indicator Wise List of Variables used for the Principal Component Analysis

Access to Water
Improved water source (% of population with access)
Improved water source, rural (% of rural population with access)
Improved water source, urban (% of urban population with access)
Access to Sanitation
Improved sanitation facilities (% of population with access)
Improved sanitation facilities, rural (% of rural population with access)
Improved sanitation facilities, urban (% of urban population with access)
Use of water for domestic purposes
Annual freshwater withdrawals, domestic (% of total freshwater withdrawal)
Annual freshwater withdrawals, total (billion cubic meters)
Use of Safe Drinking Water (% of population)
Use of Safe Drinking Water urban (% of urban population)
Use of Safe Drinking Water rural (% of rural population)
Use of Improved Sanitation (% of Population)
Use of Improved Sanitation rural (% of rural Population)
Use of Improved Sanitation (% of rural Population)
Infant mortality, Child mortality, prevalence of malnutrition
Mortality rate, infant (per 1,000 live births)
Mortality rate, infant, female (per 1,000 live births)
Mortality rate, infant, male (per 1,000 live births)
Mortality rate, neonatal (per 1,000 live births)
Mortality rate, under-5 (per 1,000 live births)
Mortality rate, under-5, female (per 1,000)
Mortality rate, under-5, male (per 1,000)
Malnutrition prevalence, height for age (% of children under 5)
Malnutrition prevalence, height for age, female (% of children under 5)
Malnutrition prevalence, height for age, male (% of children under 5)
Malnutrition prevalence, weight for age (% of children under 5)
Malnutrition prevalence, weight for age, female (% of children under 5)
Malnutrition prevalence, weight for age, male (% of children under 5)
Diarrhea treatment (% of children under 5 receiving oral rehydration and continued feeding)
Diarrhea treatment (% of children under 5 who received ORS packet)

Source: Data compiled from WDI, WHO and Unicef

At the global level, these variables are compiled for a specific year for each country. Then, the tool of Principal Component Analysis² was resorted to develop three specific components to represent all the three indicators namely, access, use and health related components. A multiple regression analysis was undertaken to study the relationship. On the basis of the PCA, we have taken the first principal component to be our variable for regression analysis (Table-3).

Table-3: Composite variables developed

First Principal Components	KMO test for Sample Adequacy	% of variance captured in the first component
Independent variables		
Access to improved source of water	0.610	67
Water use	0.602	89
Access to improved sanitation facility	0.614	96
Dependent variables		
Prevalence of Diseases and mortality	0.749	71
Prevalence of Malnutrition	0.792	91
Overall Health Problems	0.814	57

Source: Computed by authors

IV RESULTS AND DISCUSSIONS

The results of the analysis are presented in Table-4 and summary of results are presented below.

Both access to improved sanitation and access to improved source of water play significant role in reducing the prevalence of disease and mortality. The negative sign of the coefficient for both the variables indicate an inverse relationship between access to water - sanitation and the prevalence of disease and mortality.

The role of improved sanitation facility has a greater impact on reducing the prevalence of diseases and mortality than the access to safe drinking water when assessed independently in isolated manners.

In a combined manner, both sanitation and water increase the value of R squared signifying the relevance of comprehensive efforts.

Both sanitation and water play significant role in reducing the incidences of malnutrition. Countries with better access imply lower incidences of malnutrition.

Sanitation facilities play a more significant role in influencing malnutrition than the access to water.

Role of access to water may be considered as that of a suppressor variable³ that plays a role in enhancing the impact of access to sanitation in addressing the



issue of malnutrition (Condition-1: $|\beta_1 \text{ Est}| > |ry_1|$, Condition-2: $R \text{ squared} \leq r^2y_1+r^2y_2$. For more details see (Mohanty, 2014)⁴.

Table-4: Results from Regression

Model No	Dependent Variable	Independent Variables	R Squared (Adjusted)	Standardized Coefficient (t value)
1	Prevalence of Disease/Mortality	Access to Improved Sanitation ***	0.59	-0.781 (-12.2)
2	Prevalence of Disease/Mortality	Access to Improved Source of Water***	0.45	-0.670 (-9.2)
3	Prevalence of Disease/Mortality	Access to Improved Sanitation***	0.664	-0.586 (-7.7)
		Access to Improved Source of Water***		-0.314 (-4.14)
4	Malnutrition	Access to Improved Sanitation***	0.513	-0.719 (-11.7)
5	Malnutrition	Access to Improved Source of Water***	0.388	-0.627 (-9.11)
6	Malnutrition	Access to Improved Sanitation***	0.549	-0.541 (-6.828)
		Access to Improved Source of Water***		-0.266 (-3.356)

Note: *** Significant at 95% confidence interval.

V CONCLUSION

The paper used tools of principal component analysis and multiple regression analysis to assess the efficacy of policy focus on access to water and sanitation facilities for addressing health related issues of prevalence of diseases and prevalence of malnutrition. The analysis shows that for addressing the issue of prevalence of diseases, both water and sanitation play significant roles and ignoring any of the variable in the policy focus may not be desirable. In case of addressing malnutrition, while sanitation plays an important role, access to water plays the role of a suppressor variable indicating a highly facilitating role in ensuring the effectiveness of the sanitation facilities. Given this understanding from the recent global data from around 200 countries, it may be concluded that the present policy shift with relative budgetary focus in favour of sanitation facilities in India may not be desirable in addressing the issues of malnutrition in the country. To deal with issues of malnutrition and prevalence of diseases, both water and sanitation facilities should be viewed in a comprehensive manner. In countries like India where major sanitation drives like “Swachhhata Abhiyan” are underway, diverting all energy towards sanitation at the cost of shifting the hitherto policy focus on both water and sanitation, may not yield desirable results.

Notes:

1. The authors are thankful to Binu Arickel, Regional Manager, WaterAid Madhya Pradesh for providing initial ideas for this commentary paper.

2. Principal component analysis (PCA) was used to reduce the number of variables for each indicator and to compute a resultant variable that may explain maximum variations in these variables.
3. Suppressor variable as explained by Horst (1941) and others may be defined as a variable that shows little relationship with the dependent variable but when added to a set of well-defined independent variables, does exhibit very high coefficient of determination.
4. $|\beta_1 \text{ Est}|$ is the standardised beta for the first variable (non-Suppressor), R^2 is the coefficient of determination, r_{y_1} is the correlation coefficient between dependent and the first independent variable and r_{y_2} is the correlation coefficient between dependent and second independent variables.

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