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ADB Working Paper Series

“SANITATION” IN THE TOP DEVELOPMENT JOURNALS: A REVIEW

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In 2011, the Government of India approved the name change of the State of Orissa to Odisha. This document reflects this change. However, when reference is made to policies that predate the name change, the formal name Orissa is retained.

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Abstract

The top 12 development journals published a total of 18,329 papers during the period 2000–2020. Out of these, just 51 focused on sanitation and related issues, which are the focus of this review. Results were mixed on the efficiency of sanitation delivery since political factors and administrative characteristics vary across locations. Accountability and leadership, especially at the local level, appear to be important driving forces. There is a need for more case studies that analyze what works, and what does not, in specific locations. Also, further studies will have to investigate how to influence the norms, traditions, and beliefs towards favorably supporting household sanitation decisions. Additionally, governments should enhance their social welfare programs to address socioeconomic inequalities (i.e., income, gender, and rural-urban disparities), which also critically affect individual and household sanitation investments. Efforts at national and international levels are needed to encourage research on the various dimensions of sanitation.

Keywords: sanitation, sustainable development goals, systematic review, empirical evidence, accountability, health, education, gender

JEL Classification: I0, I3, O1

Contents

1.	INTRODUCTION	1
2.	PUBLICATIONS IN THE TOP JOURNALS, 2000–2020.....	2
3.	PAPERS ON SANITATION: KEY FINDINGS	3
3.1	Sanitation Impacts	3
3.2	Sanitation Delivery.....	4
3.3	Structural Constraints	6
3.4	Other Research Findings	7
4.	SUMMARY AND DISCUSSION.....	8
5.	CONCLUDING OBSERVATIONS.....	8
	REFERENCES	9

1. INTRODUCTION

As pointed out by Araral, Yoshino, and Seetha Ram (2019, 3), “[t]he benefits of sanitation infrastructure... include reductions in diarrhea, cholera, typhoid, dysentery, and hepatitis, along with an increase in local economic development, a reduction in groundwater contamination, improvement in the recharge status of nearby aquifers, and economic benefits, such as the reuse of treated water for agriculture and/or industrial purposes and in terms of waste-to-energy benefits.”

Thus, it is no exaggeration to say that understanding the linkages between sanitation and development has been a growing topic that has captured the interest of researchers from various fields. The influx of both micro- and macro-level data on sanitation paved the way to carrying out high-quality empirical research. What does the latest research add up to? This is the question broadly addressed in this paper, which aims to review the relevant publications appearing in the top development journals, with a view to identifying the principal findings, policy implications, and research gaps.

Based on the year-wise impact factors¹ of development economics journals covering the period 2000–2019 obtained from the Scimago Journal Rank site,² the top 12 are identified as shown in Table 1.

Table 1: The Top 12 Development Economics Journals

Journal	Average Impact Factor
Journal of Economic Growth	5.0
Journal of Development Economics	2.8
World Bank Economic Review	1.9
World Development	1.7
Economic Development and Cultural Change	1.4
Development and Change	1.2
Journal of Development Studies	0.9
Studies in Comparative International Development	0.9
Development Policy Review	0.8
World Economy	0.7
Sustainable Development	0.7
Journal of International Development	0.5

The rest of this paper is organized as follows. In Section 2, we present a tally of the number of papers dealing with sanitation compared to the total number of papers published. An attempt is also made to subclassify the topics in the former category. Section 3 provides the key findings of the papers relating to sanitation. A brief discussion of the issues that remain to be addressed is the core of Section 4. The last section provides a few concluding observations.

¹ “Average number of weighted citations received in a year, by articles published in a journal in the previous three years” is the definition of the impact factor.

² <https://www.scimagojr.com>. Accessed 2 November 2020.

2. PUBLICATIONS IN THE TOP JOURNALS, 2000–2020

Between 2000 and 2020, the top 12 development journals published a total of 18,329 papers covering a wide range of subjects. Papers that focus on sanitation numbered just 51 (Table 2) or a miniscule 0.28% of the total. Out of the 51 papers linked to sanitation, the highest number of publications appeared in *World Development* (16 articles) and *Development Policy Review* (9 articles).

Table 2: Number of Papers on Sanitation, 2000–2020

Journal	Number of Papers ^a	
	Total	On Sanitation
Journal of Economic Growth	270	0
Journal of Development Economics	1,937	4
World Bank Economic Review	623	3
World Development	4,302	16
Economic Development and Cultural Change	670	3
Development and Change	1,672	5
Journal of Development Studies	2,102	6
Studies in Comparative International Development	443	0
Development Policy Review	1,109	9
World Economy	2,380	0
Sustainable Development	942	1
Journal of International Development	1,879	4
Total	18,329	51

^a Based on the number of articles listed on the journal websites. Keywords used for identifying sanitation articles included *sanitation*, *toilet*, *latrine*, and *open defecation*.

Not a single paper with a focus on sanitation appeared in the *Journal of Economic Growth*, *Studies in Comparative International Development*, or *World Economy*. This is not surprising, given the scope of each of these journals.³ As of now, one can see that there is still room to explore the linkages between sanitation and overall economic growth and other macro variables across countries and over time.

We classify the 51 papers on sanitation into four categories. The first category comprises seven articles. They are about the impact of sanitation on various developmental outcomes. These papers utilize rigorous evaluation techniques using quantitative information. The second category of papers (accounting for the largest number of 24 out of the 51) deals with the approaches and implementation strategies in sanitation delivery. It also pinpoints the challenges in expanding sanitation services. In the third category, there are 12 papers. They deal with the structural constraints that affect the use of sanitation infrastructure. Finally, the fourth category (four papers) comprises studies that are not classified under the first three categories. It is of note that two papers cover both category 1 and 3 topics while two cover topics in categories 2 and 3.

³ The scope of the *Journal of Economic Growth* includes dynamic macroeconomics, international trade, urban economics, and growth models. That of *Studies in Comparative International Development* includes political development, comparative politics, political-economic growth models, social structure, and culture. *World Economy* targets topics on international economics and international finance (i.e., open economy, trade, exchange rates, capital flows, and immigration).

3. PAPERS ON SANITATION: KEY FINDINGS

3.1 Sanitation Impacts

Most of the papers in this category are devoted to demonstrating the positive impact of improved sanitation on various indicators. The effect on human capital (i.e., health and education) is the aspect in which most significant changes have been observed.

Augsburg and Rodríguez-Lesmes (2018) find that a higher rate of latrine coverage resulted in an increase in child height in northern India. Most people know that one indicator of health status in children is the height and weight in sync with age. However, one does not normally expect open defecation to have anything to do with height. The Augsburg and Rodríguez-Lesmes finding is something of an eye-opener. Also, the study utilized construction material prices as an instrumental variable (IV) to address the endogeneity of sanitation.

The most recent article is by Spears (2020), titled “Exposure to Open Defecation can Account for the Indian Enigma of Child Height.” The following extract from the abstract of the paper provides a crisp summary: “Children in India are shorter than poorer children in Africa, a widely studied puzzle called ‘the Asian enigma.’ ... The paper’s main result computes a demographic projection of the increase in the average height of Indian children, if they were counterfactually exposed to sub-Saharan African sanitation, using a nonparametric reweighting method. India’s projected increase in mean height is at least as large as the gap.”

There are various dimensions for the positive impact of sanitation. The incidence of diarrhea in Ethiopian children and Indian adolescents was found to decline with better sanitation and correct behavior (Usman, Gerber, and von Braun 2019; Ramani, Frühauf, and Dutta 2017). The results were derived using different regression techniques, including an IV approach. Based on data from the Indonesian Family Life Survey, it was found that a mother’s water and sanitation conditions strongly influenced malnutrition among children (De Silva and Sumarto 2018). In Odisha, India, a randomized control trial study showed that children’s mid-upper-arm circumference and weight z-scores improved after a widespread sanitation campaign (Dickinson et al. 2015).

Another IV paper shows that higher coverage of latrines resulted in higher cognitive scores among children in India (Orgill-Meyer and Pattanayak 2020). Hutton et al. (2020) evaluate the outcome of the Clean India Mission by monetizing the time and costs saved by households by using latrines instead of open defecation. Their cost-benefit model estimated a total annual benefit of US\$727 per household, which is higher than the costs of building and maintaining the toilets and latrines.

As a caveat to these positive claims, Whittington et al. (2012) argue that sanitation-related parameters on health (i.e., burden of a disease and case fatality rates) are generally difficult to estimate and may quickly change in a short period of time. Their cost-benefit analysis also shows that in some Monte Carlo simulations, the net benefits from sanitation turn negative. Hence, careful analysis of data and interpretation of findings remain crucial.

Overall, most empirical evidence supports the notion that sanitation interventions improve human capital at the individual level and yield monetary benefits at the household level. It is important to note that these results may vary across different contexts and that completeness and accuracy of data contribute to better impact evaluations.

3.2 Sanitation Delivery

As sanitation interventions are found to have positive influences on development, there have been numerous efforts to carry out sanitation campaigns around the world. Among several sanitation promotion approaches, the most widely adopted one is the community-led approach. Research efforts were thus focused on examining its pros and cons.

Community-led total sanitation (CLTS) is the most popular approach used to end open defecation. It involves social mobilization, self-enforcement, and behavioral change. Zuin et al. (2019) examine qualitatively the diffusion of this policy and the reasons for its popularity. They find that government officials, donors, and NGOs are all persuaded because CLTS is seen as a fast and effective solution.

Indeed, there are examples showing that the community-led approach yields positive outcomes. An assessment of a community-based sanitation campaign in rural Mali shows that open defecation was reduced by half as residents' awareness increased and as social norms shifted favorably towards the usage of sanitation facilities (Alzúa, Djebbari, and Pickering 2020). The community-driven approach also targets the four main challenges in urban sanitation, namely the challenges of collective action, coproduction, affordability, and housing tenure. Importantly, it yields improvements through social innovation and technological design as has happened in India (McGranahan 2015; McGranahan and Mitlin 2016). Ekane et al. (2020) also attribute the successful implementation of sanitation programs in Rwanda partially to its community-level intervention.

Some scholars challenge both the legitimacy and effectiveness of the community-led approach. As the CLTS approach relies on social mobilization to demand the usage of latrines, "shaming" of noncompliance is criticized by many scholars (Engel and Susilo 2014; Bateman and Engel 2018). Furthermore, Joshi, Kooy, and van den Ouden (2016) criticize the CLTS approach for its coercive nature and its disrespect of children's rights because children are often seen as the "triggering" element in this approach and their participation is required, if not forced. Furthermore, empirical findings from a randomized control trial in Indonesia reveal that CLTS only yielded modest improvement (Cameron, Olivia, and Shah 2019).

The key issue is how to improve the introduction of CLTS initiatives. Hueso, Boni, and Fernández-Baldor (2018) focus on the policy process in the introduction of CLTS in three regions in India. They offered an analytical framework, which comprises policy narratives, agents, and interests, to unpack the policy process. It is pointed out that a deeper understanding of how the policy process shapes the outcomes of sanitation interventions will enable better preparation of the strategies used to introduce CLTS.

Apart from the community-led approach, other approaches are also in focus in the research under review. For example, panel data show that foreign aid has contributed substantially to improving the water supply and sanitation among recipient countries (Gopalan and Rajan 2016; Ndikumana and Pickbourn 2017). The implementation of development engineering interventions to address health and environmental concerns has also generated positive impacts in advancing sanitation in South and southern Africa (Muller 2020). Decentralization of sanitation programs is also a popular approach used to improve sanitation delivery in urban areas. Three major challenges, however, are identified in implementing this approach in Kenya: competition for sector leadership, lack of incentives at local government level, and poor regulation. However, as demonstrated by experience elsewhere, these challenges can be overcome through correct policies (Mason, Oyaya, and Boulénouar 2020).

Carter and Danert (2003) emphasize the participation of the private sector in improving water and sanitation sectors. Danert et al. (2003) flag the importance of the private sector in delivering sanitation services in Uganda and how the government can further assist in the development of this sector. Lipscomb and Schechter (2018) find in their research in Senegal that subsidies are effective in encouraging households to purchase sanitation facilities. Acey et al. (2019) propose improving sanitation in poorer regions by using cross-subsidies, as their survey findings confirm the willingness of wealthier households to pay higher water bills in Kenya. Finally, surveys on social fund investments in Nicaragua show that these kinds of investments improve access to water and sanitation facilities, but the subsequent change in health outcomes from such strategies is not clear (Pradha and Rawlings 2002).

In addition to the discussion on different approaches to sanitation interventions, several papers focus on the implementation aspect of these policies. Most of these are from Development Policy Review and World Development. These articles identify several common difficulties in implementing policy. Ban, Das Gupta, and Rao (2010) find issues of accountability among local government officials in South India as they tend to monopolize these facilities for themselves, while keeping only the major villages well served and neglecting the surrounding villages. This likewise leads to poorer sanitation delivery in remote areas. Local bureaucrats in the urban areas in Ghana also fail to implement the policies: the politically protected privatization in sanitation services is an obstacle to enforcing standards for these bureaucrats (Crook and Ayee 2006). In Indonesia, where the national government allotted funds to local governments to prioritize sanitation infrastructure and provide it to citizens (Winters, Karim, and Martawardaya 2014), service provision was problematic due to factors concerning both the supply side (i.e., poor management) and demand side (i.e., lack of demand for safely managed sanitation from the residents).

Assessment of the implementation of sanitation projects has not been without inherent limitations. For instance, the Middle East and North Africa (MENA) made considerable progress to meet Target 10 of the Millennium Development Goals (MDGs). However, Zawahri, Sowers, and Weinthal (2011) find an obvious gap between the evidence from local reports and the assessment conducted by the Joint Monitoring Programme (JMP), run by UNICEF and the WHO. They observe that both political regimes and international organizations lack incentives to adopt a more accurate method of assessment. Herrera (2019) echoes these findings in her systematic review of previous case studies on water and sanitation management at the local level. She notes that, in developing countries, corruption and incompetence among local government officials are rampant. These are not accounted for or reflected in national-level data, which are usually presented in international reports. Kotsila and Saravanan (2017) also find a gap between the reality and the official assessment of water supply and sanitation (WSS) programs in Viet Nam. Even though access to WSS remains unequal, false narratives of successful implementation were created partly because the Vietnamese government wants to be seen as a “high modernity.”

As one would expect, there are also examples of successful implementations. Reis (2016) attributes the success of the water and sanitation supply in rural Viet Nam to its political culture that is in line with managerialism, which enables international donors' collaboration. Ekane et al. (2020) demonstrate in their case study that although Rwanda and Uganda share similar policy designs, the implementation in Rwanda is more successful for several reasons, including strong political leadership, which is crucial for the Rwanda government to overcome difficulties in implementation.

3.3 Structural Constraints

While listing the positive impacts of sanitation interventions, most papers also point out that the same sanitation approach generates heterogeneous outcomes within a community. Such heterogeneity is not caused by poor implementation, but by structural constraints within the community that limit the effectiveness of a policy. In respect of India, the first constraint is the caste system and the division it creates. Evidence shows that the practice of untouchability associated with the caste system is the most significant factor in the prevalence of open defecation (Vyas and Spears 2018; Spears and Thorat 2019). The case study by O'Reilly, Dhanju, and Louis (2017) shows that the caste system is robust and plays a crucial role in failed sanitation interventions in India. Lamba and Spears (2013) also analyze the probability of low-ranking caste village leaders winning the Clean Village Prize for eliminating open defecation in Rajasthan. They find that these village leaders from a lower caste are less likely to win the championship or deliver satisfactory results. These studies utilized various econometric methods to analyze community-level and national-level data.

Relatedly, religion seems to influence sanitation practices. Vyas and Spears (2018) mention that in Bangladesh, India, and Nepal, regional open defecation rates are positively associated with the proportion of Hindus in the population. This relates to the discussion mentioned above that the observance of purity among Hindus discourages the use of toilets in the household. Meanwhile, Adukia et al. (2019) argue that in India, differences in sanitation practices between Hindus and Muslims greatly depend on their location in the country (i.e., rural or urban) rather than the disparity in religious beliefs.

Gender difference is another structural constraint that transcends various communities. Empirical evidence indicates that the improvements in health outcomes among girls (i.e., height and cognition) are greater than those among boys when the same sanitation intervention is applied (Augsburg and Rodríguez-Lesmes 2018; Orgill-Meyer and Pattanayak 2020). This implies that women rely more on toilets, use them more often, and thus potentially have a greater demand for them. This gender disparity in toilet usage preference is also reflected in the case study of a “No Toilet No Bride” campaign in India by Stopnitzky (2017), which made use of a difference-in-difference approach. He finds that women in a region with a disproportionate gender ratio use their scarcity in the marriage market to bargain for toilet ownership. It is worth noting that past sanitation interventions seem to fail in supporting women's need for safe and clean sanitation access. Dickin et al. (2021) measure the Empowerment in Water, Sanitation and Hygiene Index (EWI) in Burkina Faso using indicators such as decision-making in sanitation expenditure, work-life balance, and time spent on water-related chores. The EWI serves as an indicator of empowerment in terms of participation in the water, sanitation, and hygiene (WASH) sector and gender parity in sanitation-related outcomes. The results reveal that the empowerment ratio for women is merely 26%, compared to 62.7% for men.

Poverty is also a significant structural constraint. It limits households' capacity to incorporate sanitation facilities. Hence, the impact of sanitation interventions among households tends to be heterogeneous, with the poorest households exhibiting minimal improvements relative to the average outcome (Gopalan and Rajan 2016; Cameron, Olivia, and Shah 2019). To address such disparity, Seth and Yalonetzky (2020) introduce a new parameter with an ordinal variable to measure the depth of poverty and deprivation, ensuring that the poorest are not overlooked in the statistics. Azqueta and Montoya (2017) also propose the Water Poverty Index as a new way to assess and understand poverty in relation to water scarcity.

Finally, rural-urban differences may also be a structural constraint. The obstacles that sanitation interventions face in rural and urban areas are different in nature and should therefore be addressed differently. Here is a set of three variants on the theme. First, McFarlane (2019) argues that many cities in the Global South are in a sanitation crisis, and the “specifically urban nature” of the crisis needs to be understood. He provides a framework covering the dimensions of people, life, things, spaces, and distributions to analyze this urban nature. Second, Chidambaram (2020) focuses more specifically on the slums within cities and argues that the ecology of each slum and the bureaucratic-institutional complexity that it is embedded in account for the failure of mobilizing slum communities in Delhi to build toilets. Finally, O'Reilly, Dhanju, and Goel (2017) explore “remoteness” as a distinctive nature in the sanitation problems in rural areas. They identify the physical distance suffered by remote villages as a crucial factor leading to open defecation, and a fundamental obstacle to sanitation infrastructure building.

All of the five structural constraints, namely caste system, religion, gender, poverty, and rural-urban characteristics, contribute to the heterogeneity in sanitation intervention outcomes. No universal model or approach can solve them all at once and they need to be addressed specifically in policy designs.

3.4 Other Research Findings

The miscellaneous category has four papers. Their main findings are briefly noted here. First, the paper by Kooy, Wild, and Mason (2015) relates sanitation delivery to state- and peace- building in the Democratic Republic of Congo and Republic of South Sudan. They mention that the delivery of sanitation to citizens can be a means to assess the state's capability to take visible action, influence community cooperation, prioritize inclusion, be held accountable, and expand opportunities to assist people in need. Via these processes, delivering sanitation services can be a pathway towards peace building.

In the second paper referring to Brazil, Diep et al. (2020) attempt to connect Sustainable Development Goal (SDG) 6 on water and sanitation to the other SDGs, which similarly relate to equality, pollution control, waste management, and overall well-being. They recommend structuring and integrating policies in such a way that they deliver basic services to the least served population, advancing not only the sanitation goal but also other related SDG targets.

Setty et al. (2019) is the third paper in which the authors investigate how to expand learning, research, and networking opportunities in sanitation and how to disseminate data from this sector for broader use. Based on survey data collected from 36 countries, managing untreated wastewater and fecal sludge is the area that requires the most attention for knowledge and capacity building. The authors recommend, among other things, fostering communication and exchange of ideas among experts in the field, conducting seminars for research dissemination, and creating a portal for reference materials and data that can be accessed by researchers and policymakers.

The fourth paper is actually a review of a book by Kurian (2007). The book, *Governance of Water and Sanitation Services for the Peri-urban Poor: A Framework for Understanding and Action in Metropolitan Regions*, discusses the movement of people caused by globalization and the consequent pressure on water and sanitation services.

4. SUMMARY AND DISCUSSION

Data limitations are a major hindrance in conducting further experimental and quasi-experimental analysis on the impacts of sanitation. If more data were available in other areas, it would be possible to verify the external validity of current findings and compare results across different settings and contexts. Likewise, if more variables on sanitation were available, researchers would be able to expand their analysis and consider other unexplored factors that may affect sanitation. Further empirical research and evidence may help practitioners and policymakers in designing, modifying, and implementing concrete and effective programs on sanitation and most importantly in sustaining the quality of the services.

Results were mixed on the efficiency of sanitation delivery since political factors and administrative characteristics vary across areas. Accountability and leadership, especially at the local level, appear to be the most important driving forces. Other factors that may enhance sanitation provision at the national or community level include international support (through foreign aid), private sector development, and programs on subsidies and cross-subsidies. There is a need for more case studies that analyze what works and what does not in a specific location. In terms of assessing local government performance, there is a need for a clear action plan and framework for collecting and managing administrative data at the local level in a way that ensures that the information is reflected in national-level databases.

The caste system, religion, gender, poverty, and rural-urban characteristics tend to hinder the use of, and benefits from, sanitation facilities. Further studies will have to investigate how to influence the norms, traditions, and beliefs towards favorably supporting household sanitation decisions. From a policy standpoint, behavioral change campaigns remain crucial. They should be incorporated and prioritized in policy designs. Additionally, governments should enhance their social welfare programs to address socioeconomic inequalities (i.e., income, gender, and rural-urban disparities), which also critically affect individual and household sanitation investments.

Finally, there are several other facets of sanitation that remain largely unexplored. These include relating sanitation to peace-building processes and institutions, exploring the links between sanitation and other SDG targets, and formulating ways to enhance capacities in the sanitation sector through various learning and research initiatives.

5. CONCLUDING OBSERVATIONS

This short paper has had the limited objective of briefly reviewing the findings in the 51 articles (out of the total of 18,329) on sanitation appearing in the top 12 development journals during the period 2000–2020. Though meager in number, the identified articles explored a fair range of topics relating to the political and economic aspects of sanitation delivery and effectiveness using both quantitative and qualitative approaches.

The very small proportion of articles with a primary focus on sanitation calls for efforts to strengthen and expand research in the area. Governments, private institutions, and international development organizations could provide support through research scholarships/grants to young researchers. Also, they could help make sanitation data more accessible (for instance, via an integrated online database). In general, national and international initiatives should be in place to promote relevant research.

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