

# IMPROVING SUSTAINABLE SANITATION SERVICES IN BIHAR: AN EVIDENCE FROM NATIONAL FAMILY HEALTH SURVEY (NFHS - 4)

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*Swachh Bharat Mission (SBM-G) programme is undergoing a revolutionary change the state of Bihar"s. The current government at the state has embarked upon an ambitious „Swachh Bharat Mission" as its new initiative to modernize Bihar. This paper highlights the inter-regional disparity in coverage of sanitation services in Bihar on sanitation. The current paper based on the National Family Health Survey-4 and SBM-G-Bihar.*

*The study attempts to explore the pattern of utilization of sanitation services viz. antenatal care, safe deliveries, child immunization and reproductive and child health status (complications during pregnancy, delivery and post-delivery etc.) in the districts of Bihar. The linkages of different socio-economic and sanitation indicators with utilization of services and snaitation status are also studied. The study elicits district wise reproductive health status indices. Further some indices namely; index of social development, health facilities, utilization of services, reproductive morbidities and index*

*of quality of care has been computed for all districts. As a final point, the correlation of these indices with indices of reproductive and child health has been illustrated. The study reveals that utilization of health services and social development depicts strong negative relation with reproductive morbidities.*

*The analysis of access to sanitation services shows that the provision of IHHL still remains an unachieved goal in Bihar. Moreover, it shows that a large part of the Bihar households depend on open defecation. Bihar has low coverage for both household sanitation and drainage service compared to all India level. As per the Census 2011, there are about 2.58 crores of households in the State and only 28 per cent households have individual household toilets. The study elicits district wise Household Infrastructure indices. Further some indices namely; index of improved sanitation, unimproved sanitation and index of quality of care has been computed for all districts. As a final point, the correlation of these indices with indices of IDI, ISI, UISI and QCI has been illustrated. The study reveals that utilization of sanitation services and improved sanitation services depicts strong negative relation with sustainable sanitation.*

**Keywords:** SBM-G, Regions of Bihar, Improved Toilet Facility, Unimproved Toilet, Districts, NFHS-4.

## INTRODUCTION

In the post-independence period, the Government of India has been concentrating on various development activities in the country. Particularly, rural development initiatives were prominent activities taken up and their implementation modalities saw a sea change in from and content. Initially, the thrust was welfare and later it turned into development oriented programmes. Today, there is a shift towards empowerment. In 1980s, rural sanitation was part of rural development activities steered by DRDA, Project Director. Thereafter, the government concentrated on initiating exclusive activities for rural sanitation. It can be recalled that post-independence era, rural sanitation was not a priority issue. However, it got real impetus with Mahatma Gandhi's thrust on rural sanitation as an important aspect for development.

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The Sustainable Development Goals (*SDGs-6, Clean water & Sanitation*) have to be fulfilled by 2030, where all the national governments across the globe have to fulfil the requirements of SDGs. Unfortunately, Toilets promote the safety and security of women and children; and convey dignity to women and girls. The challenge of sanitation in rural India is immense. Addressing the sanitation deficit requires government ministries to work together and align their flagship programmes to deliver access to sanitation for not just children, but for all families. It also requires public participation in the use of toilets and arrest of open defecation (UNICEF –April, 2013). Access to sustainable sanitation services is not only an important measure of the socio-economic status of the household but is also fundamental to the health of its member's. Safe and sustainable sanitation is essential for survival. Globally the world is on track to meet the SDGs on sanitation. India too is on track as a result of sustained efforts over the last three decades or so, sanitation coverage in India has increased from 1% during 1981 to around 47% in 2011 (urban 82% and rural 31%) (Census 2011). Consequently, albeit still at a low level, there is an increasing trend in usage of toilets among urban, peri-urban and rural communities. However, with increasing toilet usage, particularly in urban and peri-urban areas as well as emerging villages, the challenge of safe management of faecal sludge still remains. While numerous efforts have been going on to improve the sanitation coverage, providing solution to the faecal sludge is an area of neglect particularly in the rural areas.

Bihar is 12<sup>th</sup> largest state of India in terms of geographical size (94,163 sq. km) and 3<sup>rd</sup> largest in terms of its population (10.38 crores as per Census 2011). The state is densely populated with 880 persons per square kilometres as against the national average of 324. Of 104 million, 92 million live in rural areas (88.7 percent census 2011). The state has about 15.7 percent of Scheduled Caste (SC) population and 0.9 percent Schedule Tribe (ST) population (as per 2001 census). The sex ratio of the state at 916 females per 1000 males is lower than the national average of 940 females per 1000 males (Census 2011). In the specific context of rural poverty indicators, the latest estimates of 1999-2000 indicate that Bihar has 44.3 percent as compared to national average of 27.1 percent. This level of rural poverty of Bihar is second highest in the country. In absolute terms, about 54.35 million people live below the poverty line in Bihar (Source: UNDP Economic and Human Development Indicators). The state has 38 districts, 534 blocks, 8382 Panchayats and 38803 Villages ( SBM.gov.in website). On Sanitation Bihar in India faces significant sanitation challenges with less than 30% toilet penetration (Census 2011). Moreover, in rural areas quality and affordable options for FSM (faecal sludge management) are non-existent. Sludge extraction in rural Bihar is performed by manual pit cleaners from marginalized communities in unhygienic conditions, though there is a legislation banning manual scavenging. Manual pit emptying in addition to being unsanitary is also a social issue tied to empowerment and livelihood of pit cleaners. Mechanical pit emptying, although preferred by consumers due to the lower cost and higher speed, is unavailable in rural areas, as few entrepreneurs who exist operate only in urban areas. The biggest challenge mechanized providers' face in rural pit emptying is the low density of existing toilets, type of toilets and the need to cover large geographic areas with poor road access to reach sufficient customer volume (Census 2011). Hence, in this paper the study is thus aimed to examine the variation in the utilization of sustainable Sanitation services among the districts of Bihar.

## Objectives of the Study

Based on the above background of sustainable sanitation, the paper objectives as following-

- To study the Sanitation facility in rural Bihar.
- To study the regional variation in the Access and Utilization of sanitation services among the districts of Bihar.

## MATERIAL AND METHODS

The present study is based on data from National Family Health Survey –IV (NFHS-IV) 2016-17. In Bihar NFHS-IV data have been collected from 36,772 households in 38 districts by interviewing 45,812 eligible women in the age group of 15-49 years and 5,872 Men in the age group of 15-54 . NFHS-IV measures the type of Sanitation facility and household amenities. In this paper district level analysis is done for all districts as curved out in 2011 Census. The state was divided in to 06 sub-regional districts grouped in two geographical regions, namely :

**Region I (North Bihar Plain): Subregion 1:** Saran, Siwan, Gopalganj, Pashchim Champaran, Purba Champaran **Subregion 2:** Sitamarhi, Sheohar, Vaishali, Darbhanga, Supaul, Madhubani, Samastipur, Muzaffarpur, Saharsa **Subregion 3:** Purnia, Araria, Madhubani, Kishanganj, Katihar, Madhepura

**Region II (South Bihar Plain): Subregion 4:** Patna, Lakhisarai, Bhojpur, Rohtas, Kaimur, Buxar **Subregion 5:** Munger, Jamui, Khagaria, Bhagalpur, Banka **Subregion 6:** Nalanda, Gaya, Arwal, Jehanabad, Aurangabad, Nawada, Begusarai

To study the inter-districts variation in the sustainable sanitation services and its outcomes in terms of **Improved**-not shared facility (Flush/pour flush to piped sewer system, septic tank, or pit latrine, Pit latrine with slab, Other-Includes ventilated improved pit (VIP)/biogas latrine and twin pit/composting toilet, **Unimproved**-Flush/pour flush not to piped sewer system, septic tank, or pit latrine, Pit latrine without slab/open pit, Other unimproved facility- Includes dry toilet, No facility/open space/field, Others the ), District Level National Family Health Survey 2016-17 (IIPS, 2017) data has been utilized to analyse the sanitation services in Bihar. Also SBM-G data of Bihar has been used to see the present scenario of Sanitation and incentive received.

Different composite indices are computed to study the pattern of availability of household amenities and utilization of sanitation services in the districts of Bihar. All districts are ranked according to the absolute values of these indices. A composite index may encompass information for several indicators. The indicators may be grouped into positive and negative indicators. But before computing a composite index it needs to make them uniform, i.e. each indicator needs to be standardized. The positive and negative indicators are standardized as:

$$\text{For a positive indicator} \quad Xi = \frac{Vi - V_{\min}}{V_{\max} - V_{\min}} \times 100$$

Where as  $Vi$  is the value of a indicator for  $i^{\text{th}}$  district and  $V_{\max}$  and  $V_{\min}$  are the maximum and minimum value of that particular indicator.

$$\text{For a negative indicator} \quad Xi = \frac{V_{\max} - Vi}{V_{\max} - V_{\min}} \times 100$$

But before computing a composite index, each indicator is assigned a weight, the weight for each indicator is computed as

$$wi = \frac{1}{\sqrt{\text{Var}(Xi)}} \div \sum \frac{1}{\sqrt{\text{Var}(Xi)}}$$

Finally, using these weights a composite index is computed as

$$Ci = \sum_{i=1}^n Wi \times Xi$$

Where  $Xi$  is the standardized value of an indicator and  $Wi$  is the weight assigned to that particular indicator and  $n$  is the number of indicators included in the composite index.

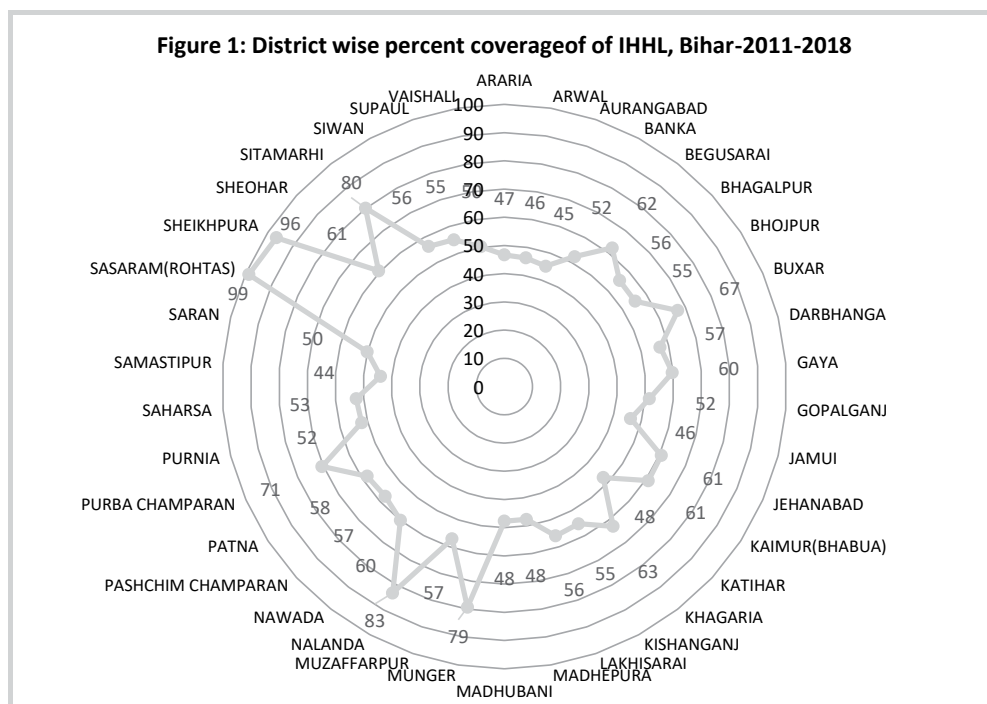
## Indicators Used in the Construction of Indexes

Index	Indicators used
Household Infrastructure Index (HII)	<i>i. Proportion of houses with electricity</i> <i>ii. Proportion of houses with drinking water facility</i> <i>iii. Proportion of houses using LPG</i> <i>iv. Proportion of households living in pucca house</i> <i>v. Proportion of households having BPL card</i> <i>vi. Proportion of households mobile telephone</i>
Improved Sanitation Index (ISI)	<i>vii. Proportion of flush/pour flush to piped sewer system</i> <i>viii. Proportion of septic tank, or pit latrine</i> <i>ix. Proportion of pit latrine with slab</i> <i>x. Proportion of other-Includes ventilated improved pit (VIP)/biogas latrine and twin pit/composting toilet</i>
Un-improved Sanitation Index (UI SI)	<i>xi. Proportion of flush/pour flush not to piped sewer system</i> <i>xii. Proportion of septic tank, or pit latrine</i> <i>xiii. Proportion of pit latrine without slab/open pit</i> <i>xiv. Proportion of other unimproved facility- Includes dry toilet</i> <i>xv. Proportion of no facility/open space/field, Others</i>
Quality of Care Index (QCI)	<i>xvi. Proportion of hand washing</i> <i>xvii. Proportion of water at hand washing place</i> <i>xviii. Proportion of use Toilet Facility</i> <i>xix. Proportion of share toilet with other households</i>

## RESULTS AND DISCUSSION

### Current Scenario of Sanitation in Bihar

To achieve the vision of 'Swachh Bihar', 'sanitation for all' has been the core agenda of Government of India and Govt. of Bihar (GoB). For holistic coverage, GoB complements Lohiya Swachh Bihar Abhiyab/Swachh Bharat Mission-Gramin (LSBA/SBM-G) Programme with the introduction of Lohiya Swachhata Yojna (LSY), a State scheme on rural sanitation, to incentivise all those families, who were not covered under National Sanitation Programmes. Bihar is the first State, where benefit of adopting sustainable sanitation practices is extended to all the rural families. But still the Progress is pathetic please see figure 1. The analysis depicts that 15 districts namely Sasaram(Rohtas-99%), Sheikhpura (96%), Nalanda (83%), Sitamarhi (80%), Munger (79%), Purba Champaran (71%), Buxar(67%), Khagaria (63%), Begusarai (62%), Kaimur(Bhabua-61%), Jehanabad (61%), Sheohar(61%), Nawada (60%), Gaya (60%) and Patna (58%) IHHL coverage having above the state average 58%. Rest of 23 districts are below the state average.



## Availability of Household Infrastructure

The 'basic human needs' approach to development emphasises on providing basic material needs to people (Hicks and Streeten, 1979; Goldstein, 1985; UNRISD, 1970). However, there is no unanimity among scholars as to the number and type of items to constitute the 'basic human needs'. The 'basic human needs' approach describes two distinct aspects of 'poverty', poverty line approach and multidimensional poverty approach. The poverty line is a monetary translation of required bundle of goods and services. The poverty line approach is the most widely used concept of the poverty to comprehend the proportion and number of people living below the poverty line. Like many other countries, this concept is adopted by Planning Commission of India to estimate the poverty and for policy formulation. On the other hand, 'multidimensional poverty (Alkire and Santos, 2010; Alkire and Foster, 2011; Alkire and Seth, 2013) is the 'weighted deprivation index of a list of 'basic human needs'. However, both these approaches deliver varying magnitudes of trends in poverty.

Though, it is universally agreed that poverty is a multifaceted phenomenon encompassing deprivations along multiple dimensions, their aggregation to offer a reasonable assessment is yet to attain consensus. It is also known that each dimension of 'basic human needs' has its own characteristics, thus, require different policy intervention. Therefore, it is much more rewarding to assess individual dimension of deprivation rather than being in the quest of an aggregate measure which will be at the cost of adequacy and simplicity. Hence, the table 1 makes an attempt to analyse the progress of Bihar in some important 'basic human needs' essential for a human life. Among districts of state, Patna, Bhojpur, Rohtas, Nalanda and Buxar districts have comparatively better health infrastructure. While availability of household facilities are worst in backward districts

like Munger, West Champaran, Banka and Jamui. It is also important to know that household infrastructure is by and large poor in eastern region of state.

**Table 1: Five best and worst performing districts according to household index of infrastructure (HII)**

Rank	Districts	Has electricity	Improved source of Water	Coocking with LPG	Has BPL card	Has mobile phone	Live in Pucca House	IDI
1	Patna	86.3	98.8	49.5	37.9	93.2	61.0	100.0
2	Bhojpur	63.6	99.7	20.3	50.4	95.8	33.6	88.5
3	Rohtas	81.5	99.3	18.9	46.1	92.5	39.3	87.6
4	Nalanda	70.2	97.6	22.6	50.0	92.1	46.7	87.6
5	Sheikhpura	79.2	94.3	15.6	51.5	92.8	39.6	81.3
34	Katihar	32.2	98.9	10.5	65.0	87.8	18.1	53.6
35	Purnia	49.7	99.8	7.6	61.8	85.9	14.0	52.5
36	W. Champaran	45.3	96.4	15.9	57.3	86.8	15.8	51.6
37	Samastipur	39.4	98.5	13.8	58.8	85.3	15.1	48.3
38	Jamui	62.1	80.1	10.0	62.0	91.0	23.8	46.6

### Utilization of Sanitation Facility

The Government of Bihar has adopted SBM (G) with a vision of 'Lohiya Swachh Bihar Abhiyan' to make rural Bihar Open Defecation Free (ODF) and clean by 2019. The Rural Development Department (RDD) is responsible for SBM (G) implementation in the State through Jeevika. Although, the earlier approach of the PHED was supply driven and focussed on construction of toilets through Non-Governmental Organisations (NGOs), it had been increasingly realized that such an approach was not successful in achieving the collective behaviour change required to motivate usage of toilets and achieve ODF villages. Hence, a demand driven approach is proposed at the centre of rural sanitation programme implementation in the State. In the light of revised SBM (G) guidelines, additional emphasis is being given on awareness generation. Further, making communities ODF through collective behaviour change is being seen as far more important than just building toilets. Hence, to study the spatial variation in available sanitation facilities within the state, a composite index of sanitation facilities is computed. The index of improved and un-improved sanitation facilities are computed on basis of the *Proportion of flush/pour flush to piped sewer system, Proportion of septic tank, or pit latrine, Proportion of pit latrine with slab, Proportion of other- Includes ventilated improved pit (VIP)/biogas latrine and twin pit/composting toilet, Proportion of flush/pour flush not to piped sewer system, Proportion of septic tank, or pit latrine, Proportion of pit latrine without slab/open pit, Proportion of other unimproved facility- Includes dry toilet, Proportion of no facility/open space/field, Others*. Table 2a&2b shows that five-five districts with better sanitation facilities and five-five districts with poor sanitation facilities.

**Table 2a: Five Best and Worst Performing Districts according to Index of Improved Sanitation Index (ISI)**

Rank	Districts	Flush to piped sewer system	Flush to septic tank	Flush to pit latrine	Ventilated Improved Pit latrine (VIP)	Pit latrine with slab	Composting toilet	Composite Index
1	Darbhanga	1.2	16.1	8.9	1.3	7.5	0.3	85.6
2	Bhagalpur	1.5	31.1	5.0	0.4	5.3	0.3	76.3
3	Munger	0.5	34.2	6.4	3.2	3.7	0.0	75.4
4	Lakhisarai	0.2	32.7	8.9	2.9	2.6	0.2	72.8
5	Khagaria	0.7	24.3	10.4	0.1	5.5	0.1	68.0
34	Kaimur (Bhabua)	0.2	22.6	1.9	0.1	2.2	0.0	23.3
35	Jamui	0.0	14.3	1.8	0.1	3.4	0.0	18.7
36	Araria	0.1	11.6	2.7	0.6	1.8	0.0	18.3
37	Arwal	0.1	21.9	3.2	0.1	0.6	0.0	18.1
38	Madhepura	0.3	14.3	1.2	0.1	1.8	0.0	15.9

The ranking of districts according to index of utilization of improved sanitation services reveals that districts like (Table 2a) Darbhanga, Bhagalpur, Munger, Lakhisarai and Khagaria district access and utilization of toilet facility are more whereas poor access and use reported in districts like Kaimur, Jamui, Araria, Arwal and Madhepura districts from north Bihar.

**Table 2b: Five Best and Worst Performing Districts according to Index of Unimproved Sanitation Index (UISI)**

Rank	Districts Bihar	Flush to somewhere else	Flush, don't know where	Pit latrine without slab/open pit	No facility/ bush/field	Dry toilet	Composite Index
1	Patna	1.3	1.4	0.2	34.4	0.2	54.1
2	Sheohar	0.1	1.1	71.5	0.3	0.0	51.0
3	Samastipur	1.2	0.3	1.3	73.6	0.4	49.5
4	Vaishali	0.2	0.1	0.4	59.5	2.6	49.3
5	Darbhanga	1.0	0.0	1.8	60.5	1.5	47.0
34	Sheikhpura	0.2	0.1	0.6	59.2	0.0	24.7
35	Saran	0.0	0.0	0.7	69.0	0.1	24.5
36	Jehanabad	0.3	0.0	0.3	60.4	0.0	24.5
37	Bhojpur	0.0	0.0	0.1	65.8	0.2	24.1
38	Nawada	0.0	0.0	0.1	63.1	0.0	21.3

Poor access to sanitation and hygiene brings colossal human and monetary expenses and makes a few societal imbalances, most remarkably for women and girls. Sanitation and hygiene carry a robust direct and indirect relationship with vital health and socioeconomic aspects, considering its impact on the society.

The ranking of districts according to index of unimproved toilet services reveals that districts like Patna, Sheohar, Samastipur, Vaishali and Darbhanga are performing better (Table 2b). While Sheahpura, Saran, Jehanabad, Bhojpur and Nawada are some poorly performing districts. Most of districts adjoining to South Bihar region of Bihar state have poor utilization of sanitation services.

## Quality of Care

The provision of quality sanitation service, sanitation infrastructure, access and use of IHHL are considered to be essential elements for improving quality of sanitation services (Gulati & Sharma, 2004). Though, Government have establish huge sanitation infrastructure but these are not optimally utilized by people. Instead, people prefer to go to Open Defecation.

To evaluate the quality of sanitation services at district level, a composite index is computed with using information on indicators like Proportion of hand washing, Proportion of water at hand washing place, Proportion of use Toilet Facility, Proportion of share toilet with other households.

**Table 3 : Five Best and Worst Performing Districts according to Index of Quality of Care (QCI)**

Rank	Districts Bihar	Use of Toilet Facility	Share toilet with other households	Members wash their hands	Water at hand washing place	Composite Index
1	Patna	65.0	13.8	97.2	91.2	87.8
2	Munger	49.6	14.9	95.7	84.0	72.2
3	Bhojpur	33.9	8.0	99.7	97.5	68.3
4	Rohtas	35.6	8.2	99.4	92.9	64.9
5	Buxar	35.5	7.7	99.4	91.9	62.8
34	Madhubani	23.4	4.6	92.1	78.5	24.9
35	E. Champaran	26.9	6.3	87.1	78.3	22.0
36	W. Champaran	25.4	4.6	89.3	79.2	21.9
37	Jamui	20.3	4.8	90.0	73.2	15.1
38	Gopalganj	29.7	4.1	84.0	77.2	12.7

Table 3 shows that the index the quality of care (QCI), the quality of sanitation services are best in Patna and district followed by districts Munger, Bhojpur, Rohatas and Buxar. On the other hand, it is worse in Madhubani, East Champaran, West Champaran, Jamui and Gopalganj districts. It is also important to notice that most of districts from northern region not only have poor utilization of sanitation services but the quality of services is also worse in most of these districts.

## Association of Sustainable Sanitation with Other Indices

Above analysis reveals that most of the districts from north region and poor population dominated districts like Gaya, Madhubani, Nalanda, Nawada and E.&W. Champaran of states not only have lower infrastructure development, improved sanitation services, but quality of available sanitation services is also poor in these districts. Zero order correlations are also carried out to test



these relationships. Table 4 shows that districts those have better infrastructure development also have better access and utilization of sanitation facilities. Both infrastructure and sanitation indexes show high positive and significant association with the utilization of sustainable sanitation services, and quality of care services.

**Table 4 : Zero-order Correlation Matrix**

Indicators	IDI	ISI	UISI	QCI
IDI	1			
ISI	0.295*	1		
UISI	0.021	0.974**	1	
QCI	0.987**	0.993**	0.983**	1

*\*\* Correlation is significant at the 0.01 level (2-tailed).*

*\* Correlation is significant at the 0.05 level (2-tailed)*

## CONCLUSION

Worldwide efforts are being made to provide complete sanitation care, especially to women and Girls for social security and addressing other factors contributing to poor health. Both union and state governments in India have taken enormous necessary measures to curb down the higher violence among women and adolescent Girls. In addition to national programmes, Government of Bihar also implemented LSBA. But the coverage and utilization of sanitation services in the state is far below than the national average. There are also gigantic differences among the districts of Bihar in respect to Infrastructure development, Improved and unimproved Sanitation Services, and quality of services. Different indices show different results but by and large districts like Patna, Munger, Bhojpur, Rohats and Buxar are better off, while districts Madhubanu, East & West Champaran, Jamui, and Gopalganj are comparatively worst off. Scheduled Caste dominated districts not only have poor Infrastructure development but also have poor access and use infrastructure. Some social and economically developed districts like Muzaffarpur, Patna, Gaya, Vaishali and Purnea also have worse sanitation utilization coverage.

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