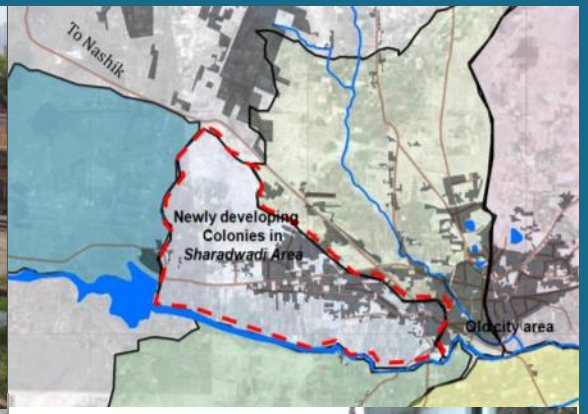
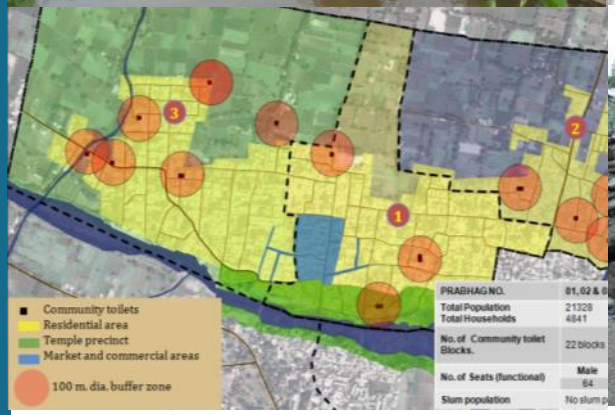
Urban Sanitation

Assessing priorities and options

IWA Development Congress
Nairobi
October 17, 2013





pas performance assessment system

Meera Mehta, Dinesh Mehta and the PAS Team
CEPT University, India

Global goals and targets beyond 2015

From July 2013 Report of the UN Secretary General

A life of dignity for all: accelerating progress towards the Millennium Development Goals and advancing the UN development agenda beyond 2015

> "*No person should go hungry, lack shelter or **clean water and sanitation**, face social and economic exclusion or .... These are **human rights, and form the foundations for a decent life**.*" (p.3)

From JMP's Post-2015 group for WASH

- ✓ Universal access to adequate sanitation at home (2040)
- ✓ Complete elimination of open defecation (2030)
- ✓ Sustainability and progressively eliminating inequities

From UN-Water SDG Group Aug 2013 working document

- ✓ Reduce the urban population with untreated wastewater by (x%) (2030)
- ✓ Increase urban and industrial wastewater reused safely by (y%) (2030)
- ✓ Improved governance and management systems in place to meet national targets

Assessing urban sanitation: A framework

Goals of improved sanitation	Functional groups in the value chain				
	User interface	Collection and /or storage	Conveyance	Treatment	Reuse / disposal
	Access		Waste Management		
Equity and access					
Public health					
Environment					
Sub-sectors					
Excreta					
Greywater					
Solid waste					

Source: Mehta, Meera and Mehta Dinesh (2013), "City sanitation ladder: Moving from household to citywide sanitation assessment", Journal for Water, Sanitation and Hygiene for Development, IWA Publishing, forthcoming.

Ladder of service performance and Policy Implications

Access	Waste Management			
	High service (>75)	Medium service (50- 75)	Basic service (25-50)	Low or no service (<25)
High access (>75)	High	Medium	Basic	Basic
Medium access (50-75)	Medium	Medium	Basic	Basic
Basic access (25-50)	Basic	Basic	Low	Low
Low or no access (<25)	Basic	Basic	Low	Low

Policy implications of sanitation ladder

Level of service		Description	Possible policy implications
4	High	Cities with high performance on both service components	Ensure sustainability of sanitation services
3	Medium	Cities with medium performance on both service components but still requiring improvements in some areas	Need to move towards universal access and use for all sanitation services and improve waste management
2	Basic	Cities with low scores on both or at least one service component and needing considerable improvements	Priority will need to be placed on the service component, where the city lags behind – either access or waste management
1	Low/No Service	Cities with no or very limited service on both service components and needing immediate remedial action	Immediate priority maybe placed on improving at least basic access and then gradually to waste management

Source: Mehta, Meera and Mehta Dinesh (2013), "City sanitation ladder: Moving from household to citywide sanitation assessment", Journal for Water, Sanitation and Hygiene for Development, IWA Publishing, forthcoming.

Two + 1 – Areas of focus in urban sanitation

- **Access and equity**
  - ✓ Eliminate open defecation
  - ✓ Ensure universal access to adequate sanitation

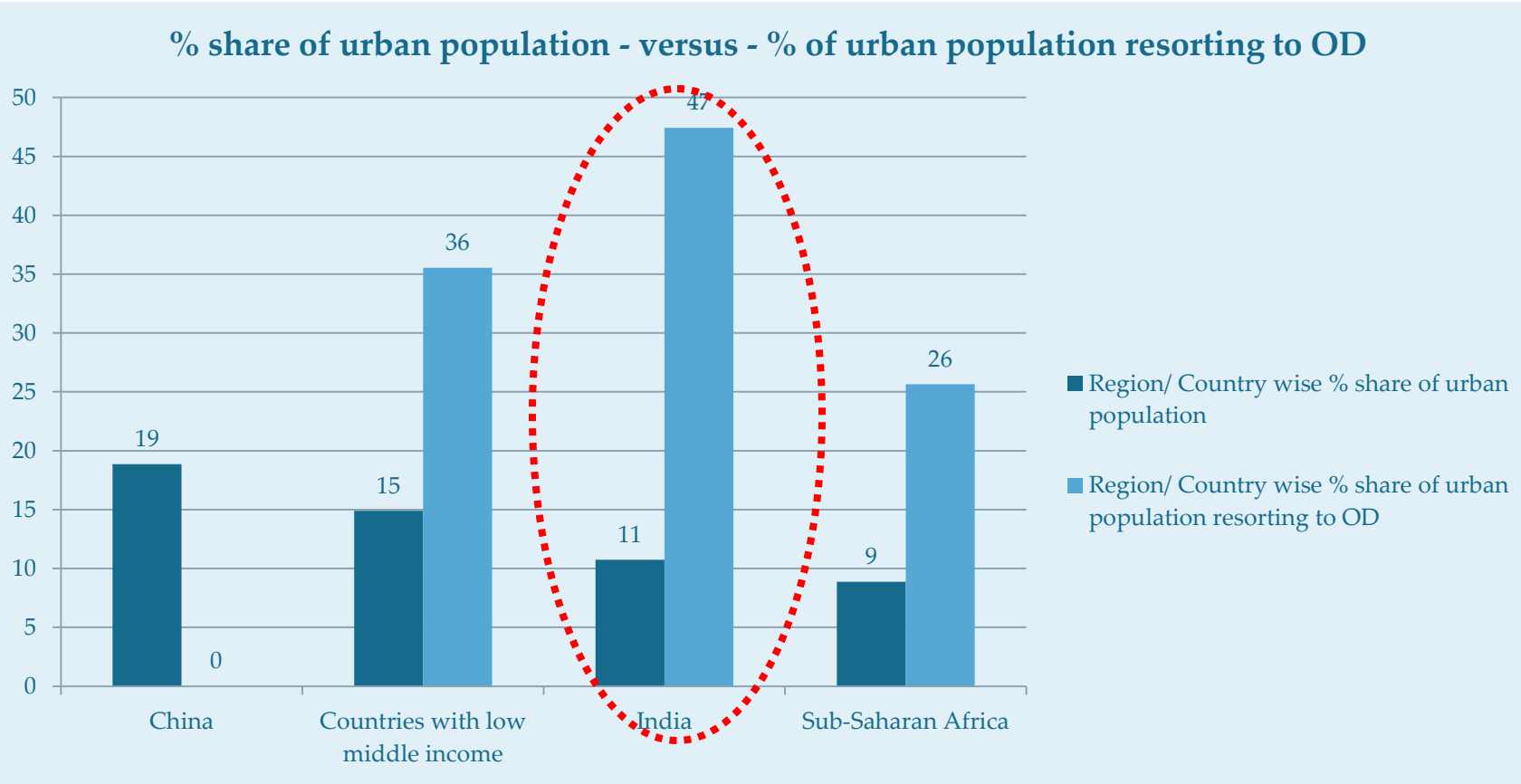
- **Waste water management**
  - ✓ Treatment of waste water – collection, conveyance and treatment
  - ✓ Reuse of treated waste water and sludge

- **Governance and financing**
  - ✓ Institutional capacity and financing
  - ✓ City level assessment of options

Eliminating open defecation

India story – faltering on sanitation!

Percentage share of urban population compared to population resorting to OD



Source: WHO / UNICEF Joint Monitoring Programme (JMP – 2013) for Water Supply and Sanitation; Retrieved on 20th Sep 2013 from http://www.wssinfo.org/data-estimates/table/

Sanitation and stunting

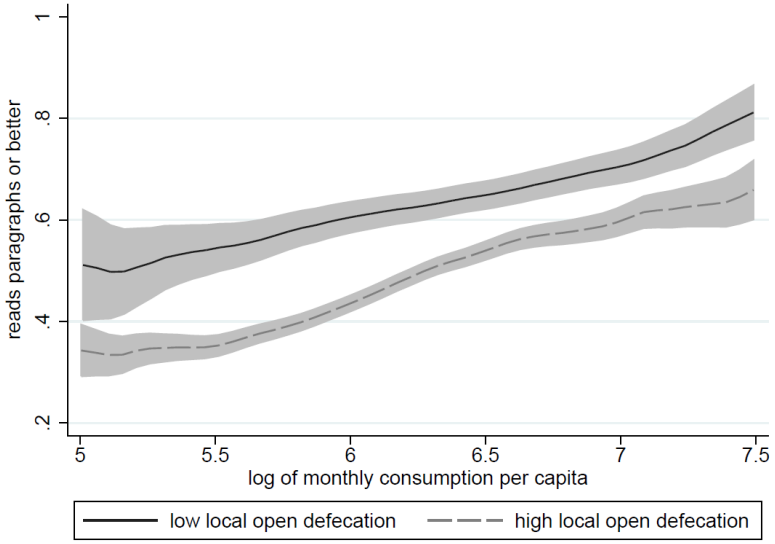
Sanitation and Stunting in India

Undernutrition's Blind Spot

ROBERT CHAMBERS, GREGOR VON MEDEAZZA

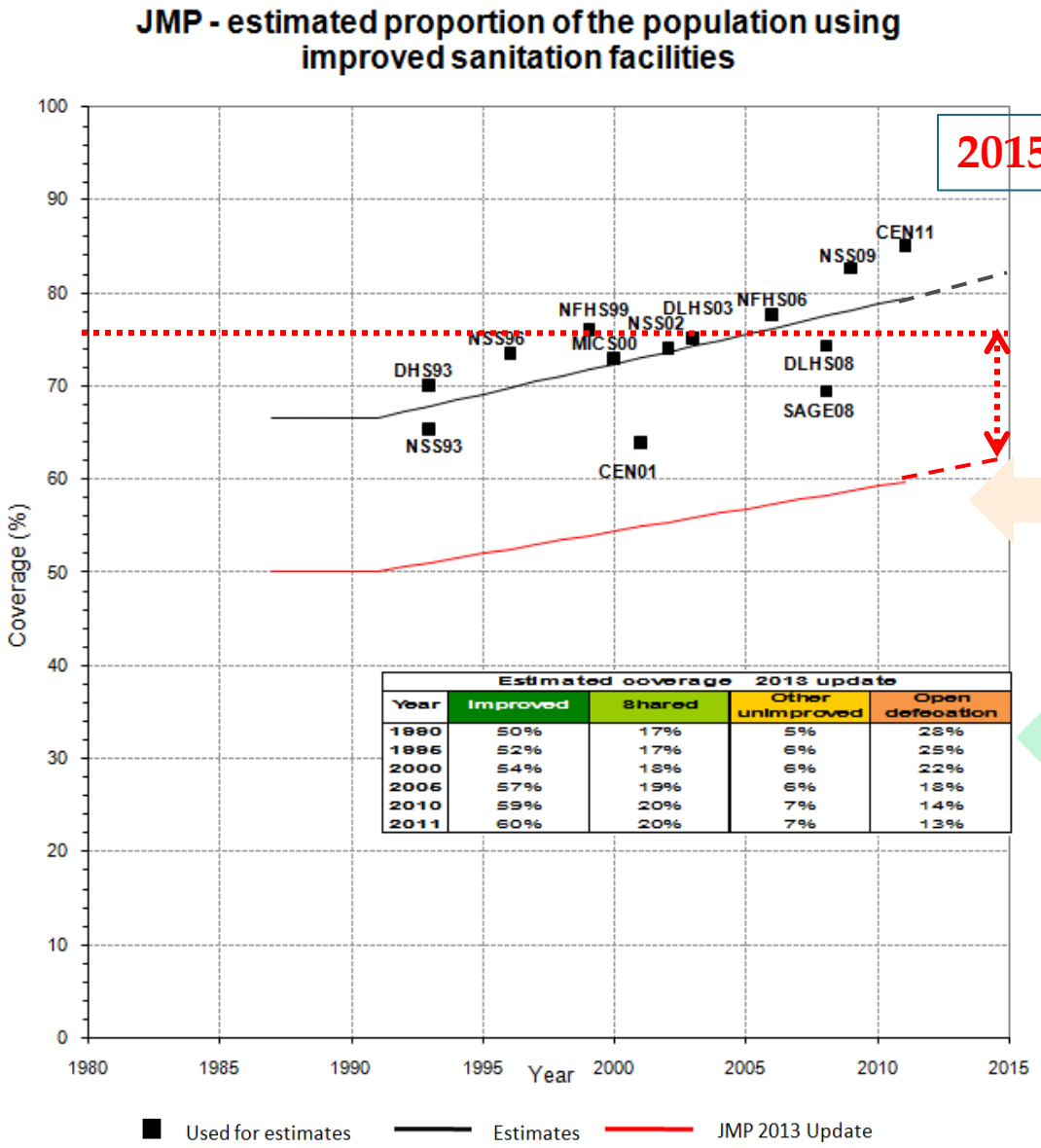
"The puzzle of persistent undernutrition in India is largely explained by open defecation, population density, and lack of sanitation and hygiene. The impact on nutrition of many feacally-transmitted infections, not just the diarrhoeas, has been a blind spot. **In hygienic conditions much of the undernutrition in India would disappear**."

Economic & Political WEEKLY EPW JUNE 22, 2013 VOL XLVIII NO 25



Dean Spears and Sneha Lamba, "Effects of Early-Life Exposure to Sanitation on Childhood Cognitive Skills: Evidence from India's Total Sanitation Campaign", working paper

Progress on MDG – missing the target?



Estimated coverage 2013 update

Year	Improved	Shared	Other unimproved	Open defecation
1990	50%	17%	5%	28%
1995	52%	17%	6%	25%
2000	54%	18%	6%	22%
2005	57%	19%	6%	18%
2010	59%	20%	7%	14%
2011	60%	20%	7%	13%

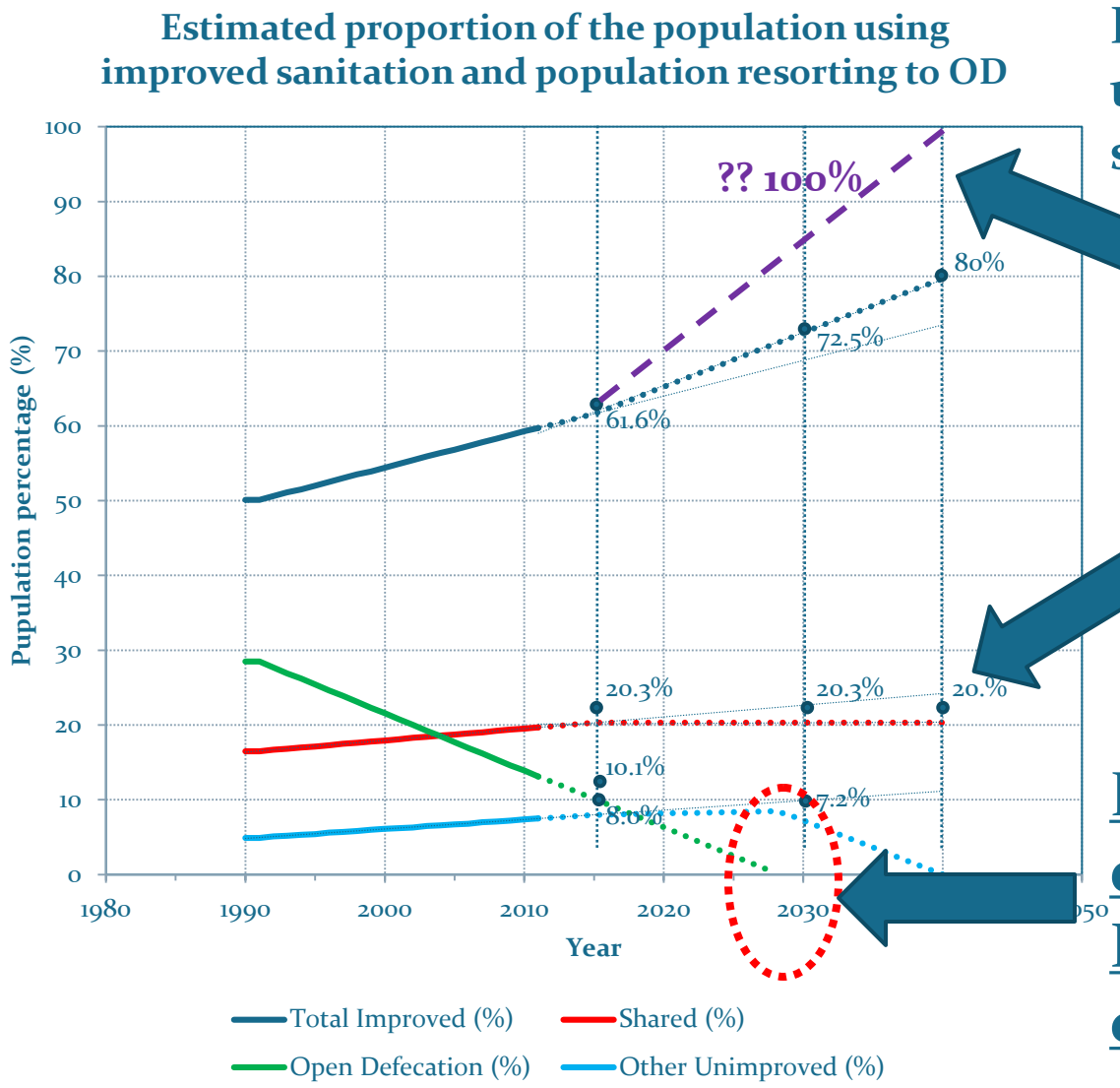
Gap in meeting the MDG target

Basic access increased from 50% to 60%

OD still high at 13%

Source: Projections by PAS Project based on data from WHO-UNICEF Joint Monitoring Program, 2013 Update

Progress on new 'SDG' –by 2030 / 2040?



Policy changes needed for universal improved sanitation by 2040

The rate of growth for 'improved sanitation' at home will need to increase significantly – double/triple

Need to convert community toilets by promoting sharing by 5 households/ families

Based on past trends **open defecation from urban India is likely to be eradicated by 2030.**

Source: WHO-UNICEF Joint Monitoring Program, 2013 Update

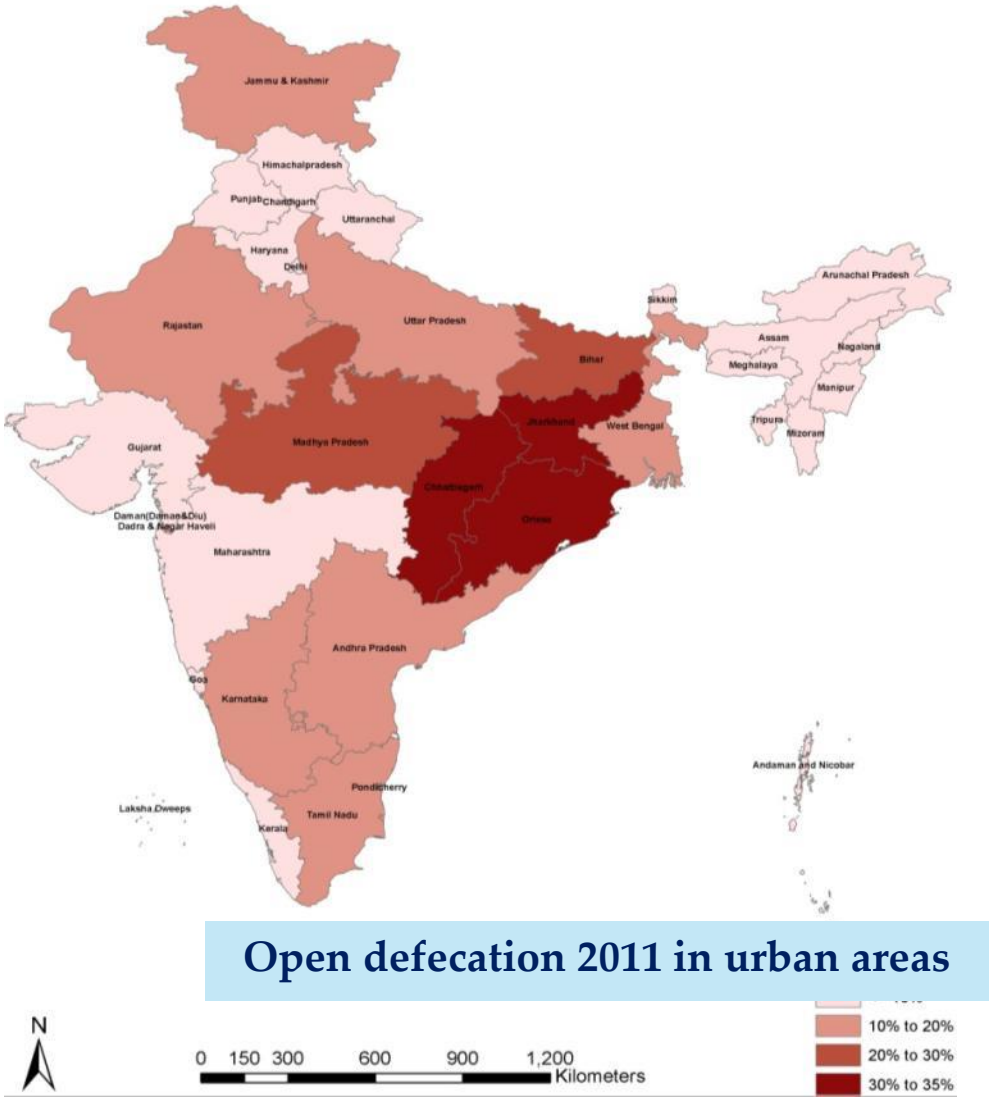
In urban India no state is open defecation free

No state in India is OD free

Chhattisgarh (39.8%), Orissa (35.2%) and Jharkhand (32.8%) top the OD list in 2011.

North-East, Kerala, Gujarat, Maharashtra, Himachal, Haryana, Punjab , Delhi and Uttaranchal do better.

But the last mile continues to allude all states



Open defecation 2011 in urban areas

Source: Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under House listing and Housing Census Data Highlights – 2011. R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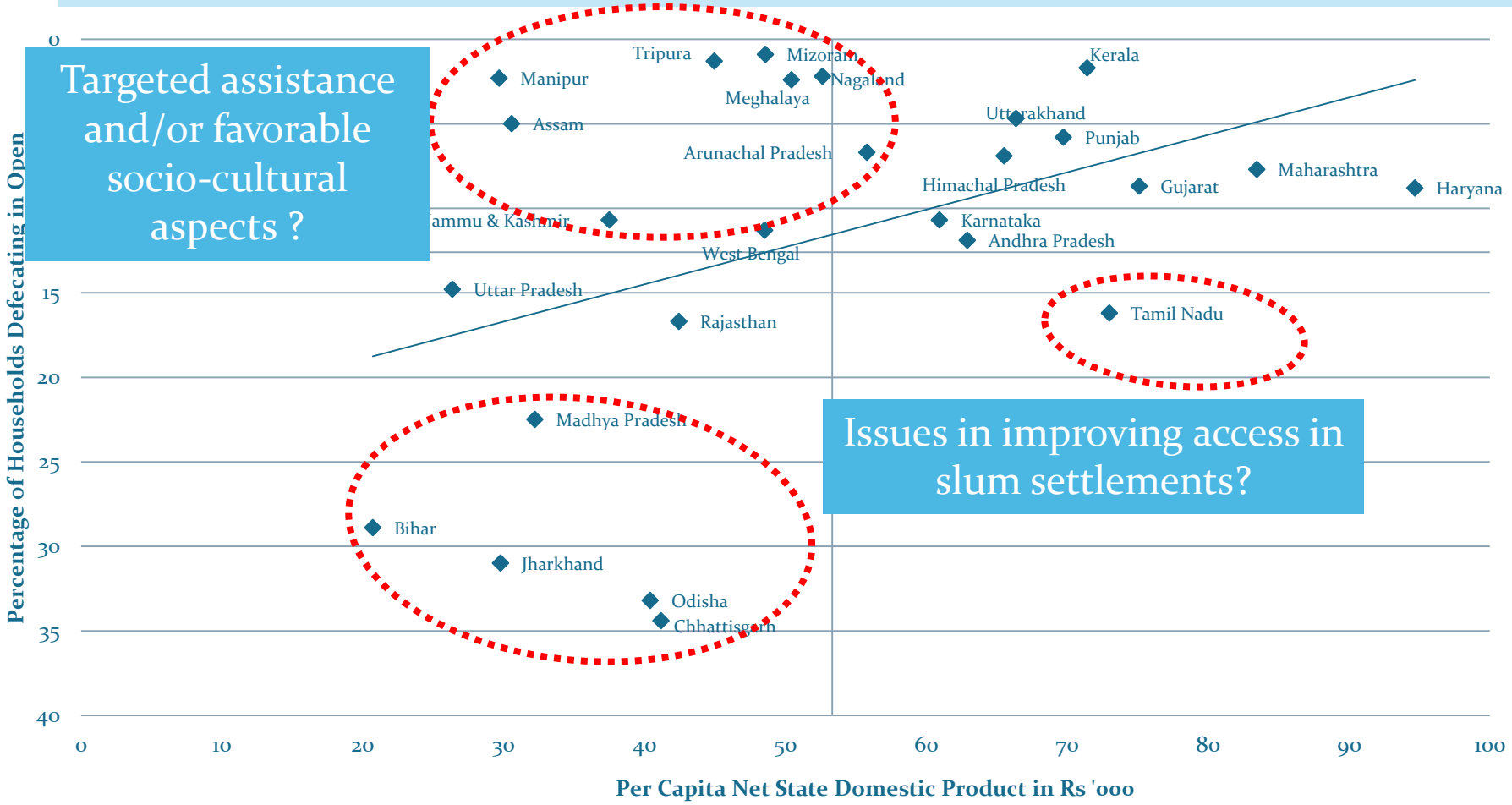
What explains OD rates across states?

Per capita net state domestic product (Rs '000) versus households defecating in open (%)

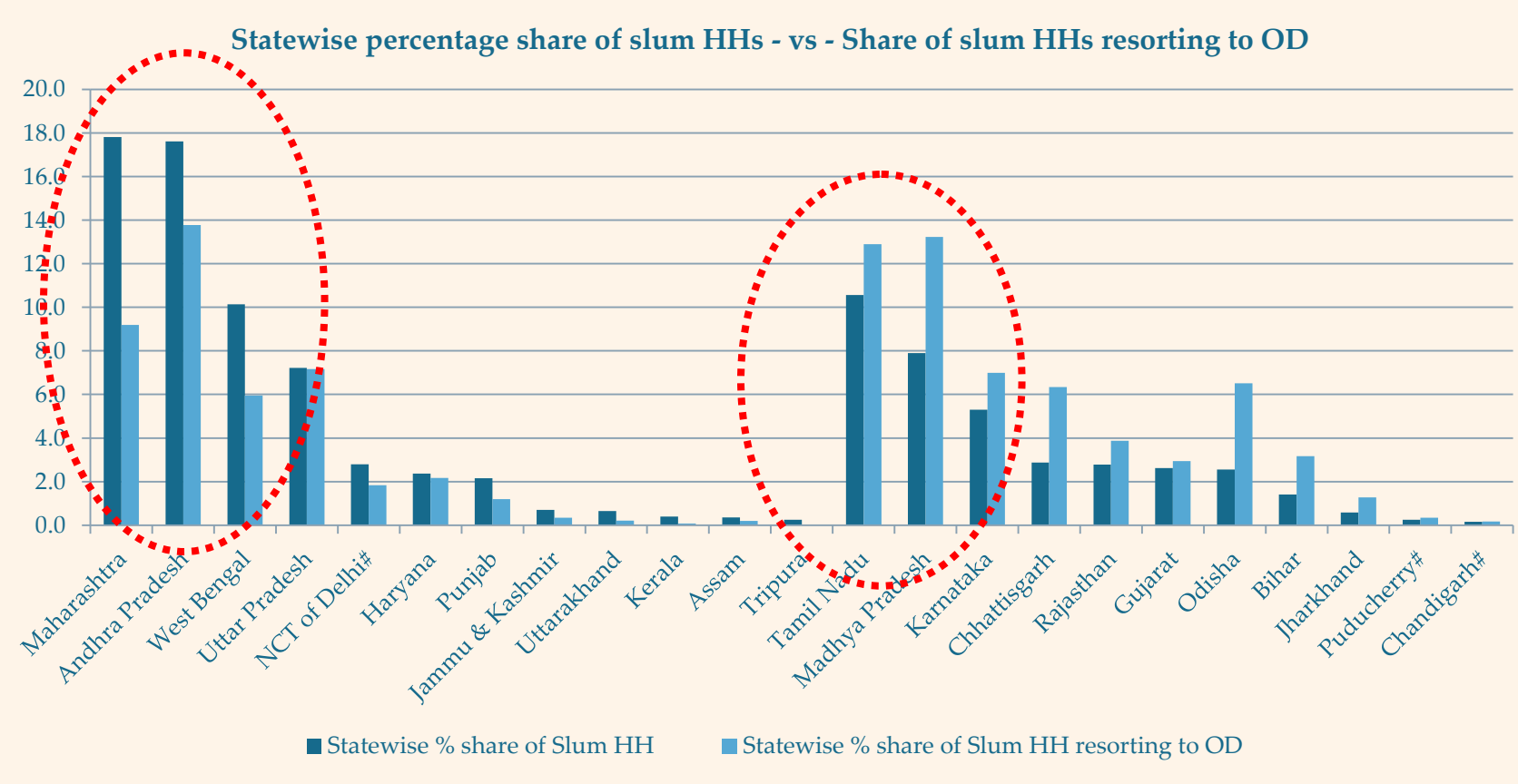


Source: Based on (i) Sl. No. 1-32 , Directorate of Economics & Statistics of respective State Governments and Central Statistics Office. Retrieved in July 2012 from http://mospi.nic.in/Mospi_New/upload/State_wise_SDP_2004-05_14mar12.pdf
(ii) Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf


MH-11 TC-62

Lessons from better performer states?

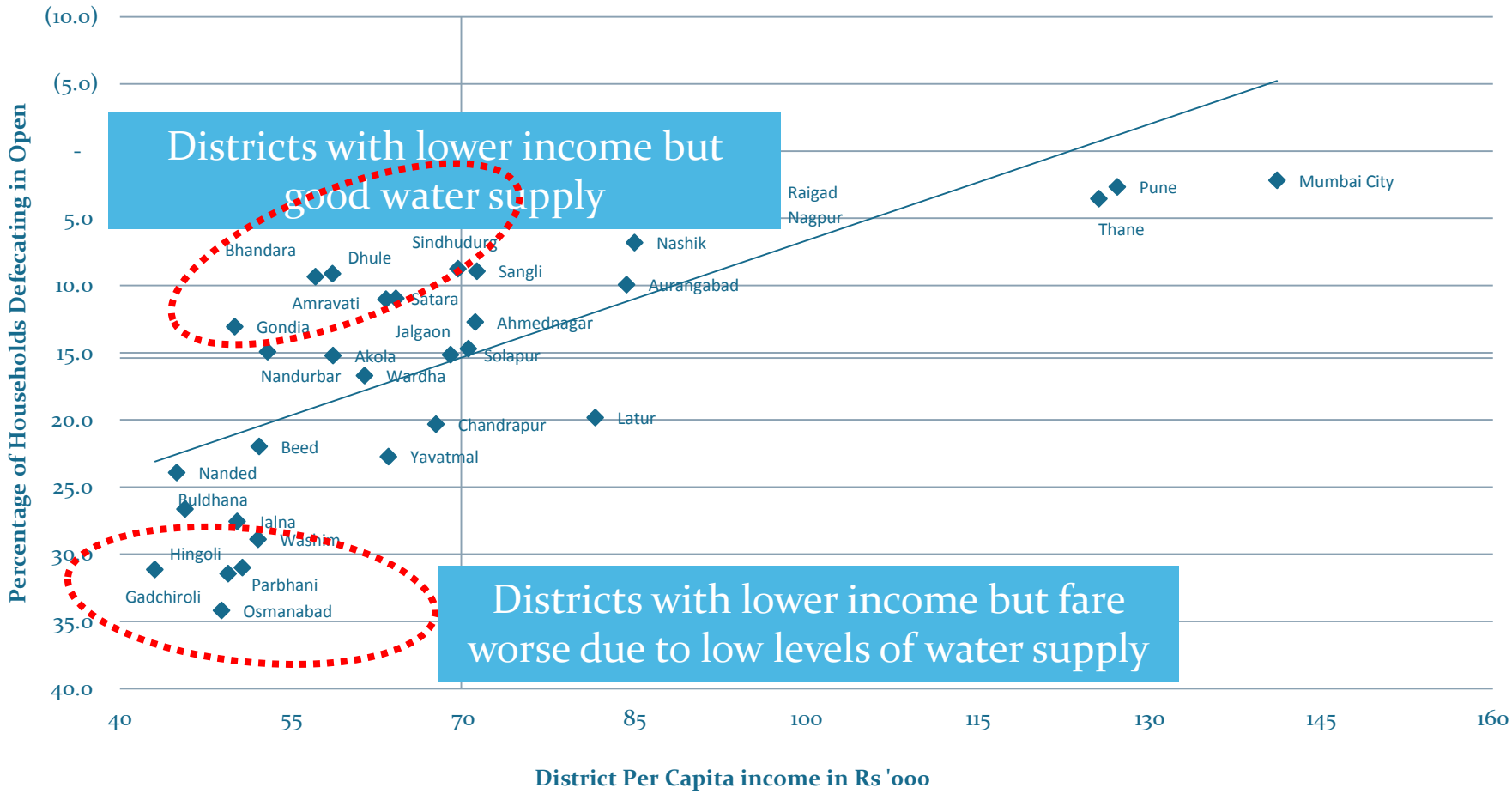
Comparison of state wise share of slum HHs with share of slum HHs resorting to OD



Source: Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

Does district income explain OD rates in urban Maharashtra?

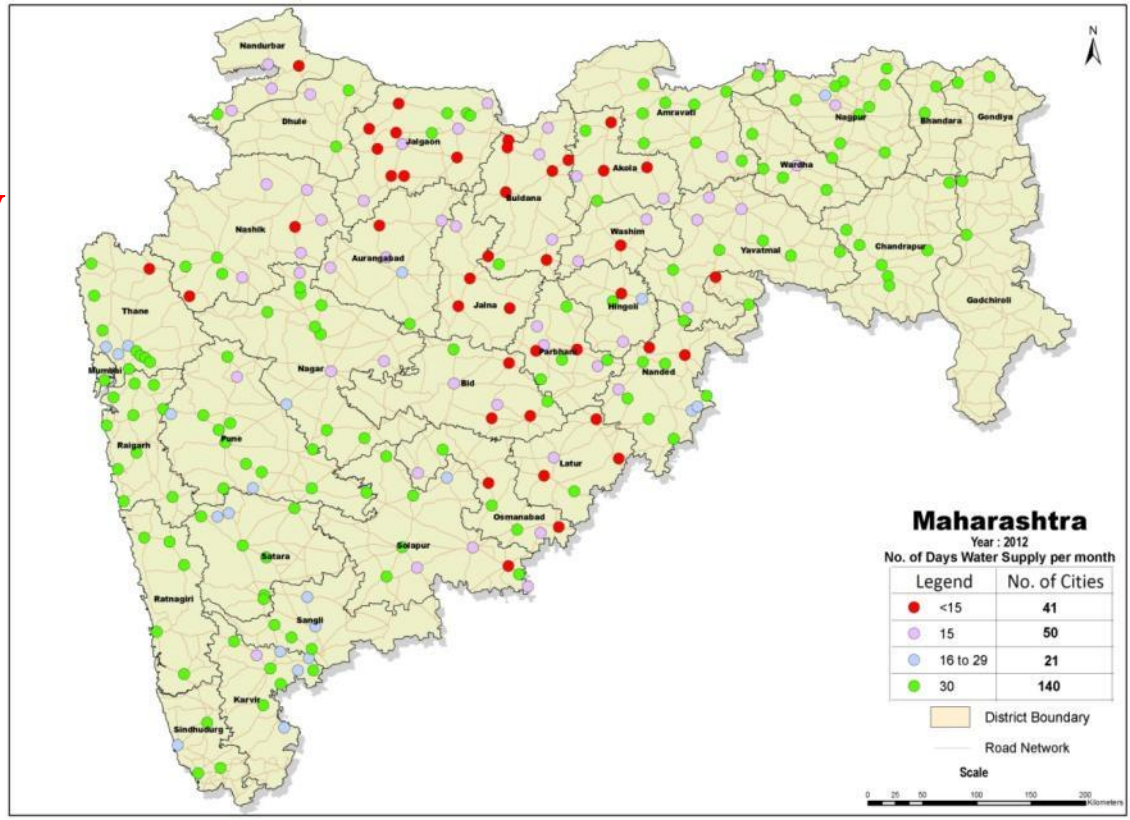
District per capita income (Rs '000) versus Share of households defecating in open (%)



Source: Based on (i) Annual Plan 2012-13 and Five year plan 2012-17, Planning Department, Government of Maharashtra, 29th May 2012. http://planningcommission.nic.in/plans/stateplan/Presentations12_13/maharashtra1213.pdf
(ii) Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

Importance of water for OD reduction

- More detailed intra state (multi-variate regression) analysis in Maharashtra suggests that **availability of water (lpcd) has significant impact on OD levels,** in addition to the more obvious factors of availability of on-premise toilets and higher district per capita income. City size is not important



To lower the high OD levels in water scarce regions of Maharashtra (Western Vidharbha and Marathwada), water supply will need to be ensured along with provision of toilets.

The two emerging strategies

1. Increase on-premise toilets: More than 90% on-premise toilets leads to lower OD levels.

2. Community toilets: Maharashtra and Delhi show the possible use of community toilets to lower OD levels

BUT the last mile is a continuing problem!

On premise toilets (%)	Shared/ Public facility (%)		
	< 3%	3-5%	> 5%
<70%	Odisha (33.2%)		Chhattisgarh (34.4%)
	Jharkhand (31%)		
	Bihar (28.9%)		
71-90%	Rajasthan (16.7%)	Madhya Pradesh (22.5%)	Tamil Nadu (16.2%)
	Uttar Pradesh (14.8%)	Karnataka (10.7%)	Maharashtra (7.7%)
	Andhra Pradesh (11.9%)	West Bengal (11.3%)	
	Jammu & Kashmir (10.7%)	Gujarat (8.7%)	
>90%	Haryana (8.8%)		NCT of Delhi# (3%)
	Punjab (5.8%)		
	Assam (5%)		
	Uttarakhand (4.7%)		
	Kerala (1.7%)		

Figures in parenthesis are % of households defecating in open.

OD levels	Colour
higher than 11%	
6-10%	
1-5%	

Source: Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

Strategies to improve access to on-premise toilets

GUJARAT

- Nirmal Urban (individual and pay and use toilet schemes) (2007–08)
- **Individual toilets: GoG subsidy (90%)** implemented through NGOs
- In last 7 years (between 2002-03 to 2010-11) total 4,23,818 individual toilets constructed

Individual Toilet beneficiary under NGP -Gujarat

MICRO-CREDIT

- Possibility to create awareness amongst HHs for small lending
- Various loan products available for SHG groups / self employed women for housing repairs, water / electricity connections and building toilets (SEWA)

E. Micro Finance and Infrastructure for the Poor

Economically weaker households are usually unable to access micro-finance services to access the housing and infrastructural services, like electricity, water and drainage connection. Even most of the nationalized or private financial institutions do not extend their services to them as they have a weak economic status and have irregular source of income. Additionally, housing finance is considered unproductive by the financial institutions. Thus, to facilitate these poor households to access housing and infrastructural services, MHT along with the SEWA Bank have designed various loan products to access infrastructure and set up systems in favour of them. Many poor households have taken the advantage of these products to access infrastructural services like water and gutter connection, construction of individual toilet, and also to access electricity. MHT has also facilitated formulation of new housing loan scheme for the poor by SEWA Bank. MHT has also developed a module for 'micro-finance institutions' to assist them in developing and designing their product as per the needs of the poor households.

In 2000, MHT and SEWA Bank have initiated a campaign on micro-finance for infrastructure at the national level. Also, the Bank and MHT are planning to launch SEWA Housing Finance Company (SHF) to provide customized but affordable housing loans to low-income households throughout India. The Mission of SHF "is to finance access to decent housing and sound living environments for, and with participation of, poor women and their families in the informal sector." SHF will deliver its products and services in a community based approach that will incorporate SEWAs' network organizations into its value chain. By doing so, it will have the personal customer information and interaction that has proven necessary for successful micro-lending. This will be combined with a highly professionalized core organization and systems, which are present in any typical formal mortgage finance systems. SHF plans to make over 37,000 loans in its first seven years, converting Rs. 1170 million of resources into 'bricks and mortar' for the benefit of nearly 0.15 million poor people.

SEWA-Microfinance & Infrastructure Initiatives for poor

More detailed assessments are needed to understand policies for on-premise toilets and innovative financing schemes

Shared facilities can be improved sanitation

Adequate sanitation at home: Adequate sanitation facilities at home are those that effectively separate excreta from human contact, and ensure that excreta do not re-enter the immediate environment. Each of the following sanitation facility types is considered as adequate sanitation for monitoring progress toward the household sanitation targets, if the facility is shared among no more than 5 families or 30 persons, whichever is fewer, and if the users know each other:

- A pit latrine with a superstructure, and a platform or squatting slab constructed of durable material. A variety of latrine types can fall under this category, including composting latrines, pour-flush latrines, and VIPs.
- A toilet connected to a septic tank.
- A toilet connected to a sewer (small bore or conventional).

Shared facilities are acceptable if:

1. Shared among less than 30 users or 5 families
2. Users know each other

Source: http://www.wssinfo.org/fileadmin/user_upload/resources/Fact_Sheets_4_eng.pdf,

Thrust on community toilets

MAHARASHTRA	▪ Nirmal MMR - Constructed about 24,000 seats at the estimated cost of approximately Rs. 250 crore for 5 MC and 13 councils ▪ MSNA provides for community toilet construction. ▪ Many ULBs use own funds , MLA funds to construct toilet complexes
DELHI	▪ 1,963 toilet complexes constructed by the MCD. Operation by NGOs, self-help groups, Sulabh International. User fees charged ▪ Private operators also operate some toilet blocks
CHATTISGARH	▪ Most cities have proposals for construction of 10-15 seater Sulabh complexes. ▪ Community toilets for urban poor. Guarantee Scheme for creation of community sanitation, O&M through user-fees

More detailed assessments are needed to understand policies for community toilets and appropriate management models for community toilets

Triggers for ODF Cities – Lessons from Good Practices

	SATARA (pop 1,20,079)	MAHAD (pop 27,531)
 **Local Leadership**	• Lead by Chief officer/ Vice President and Councilors	• Efforts by President lead to social awareness and pressure
 **Mobilization / Campaigns**	• with students and women groups	• private landowners contribute land for community toilets
 **Awards / Incentives**	• awards for consecutive 3 years provide incentives	
 **Continued Infrastructure Provision**	• Continuous provision of toilets to meet demand	• Individual toilets compulsory Community toilets across city
 **Funding Options**	• Grants from state/national government + own funds	• Use of own funds by local government
 **Better Management / Contracting**	• Sub contracting for toilets daily monitoring by ULB	• Rigorous supervision, private contracting planned

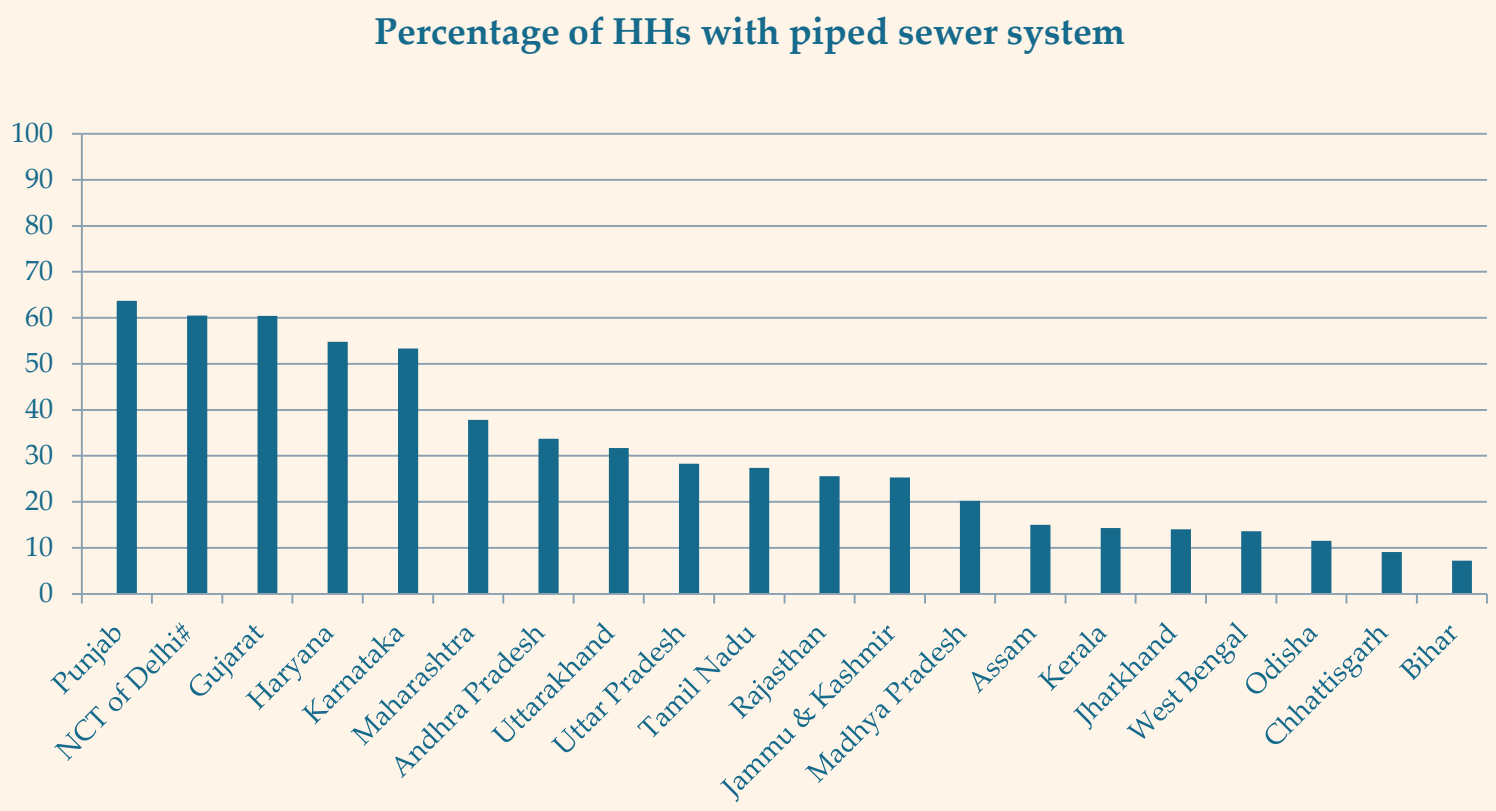
Strategies for the last mile ?

- **Leadership of elected representatives – mayors**: example from small cities in Maharashtra
- **A strong media strategy**: lessons from hand-washing campaigns?
- **Policy changes** to enable provision in slums
- **Appropriate design and management models for community toilets**: lessons from Pune, Wai, …
- **Demand-led credit for household toilets**: example from Madurai, with community toilets
- **Outcome based financing** for ULBs: for a citywide strategy with subsidies for low income groups

Options for waste water management

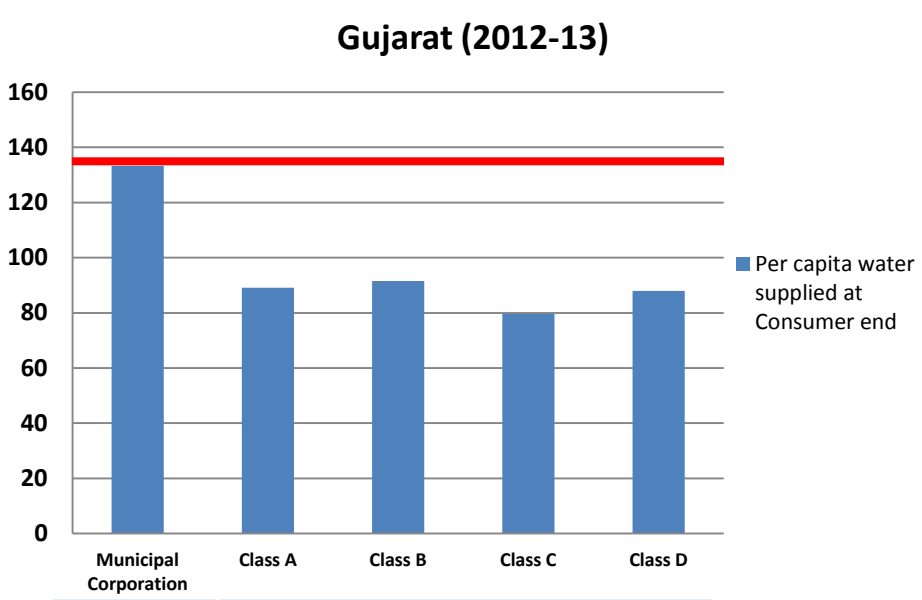
Sewerage systems are not common

Only 33% of urban households have access to piped sewerage system



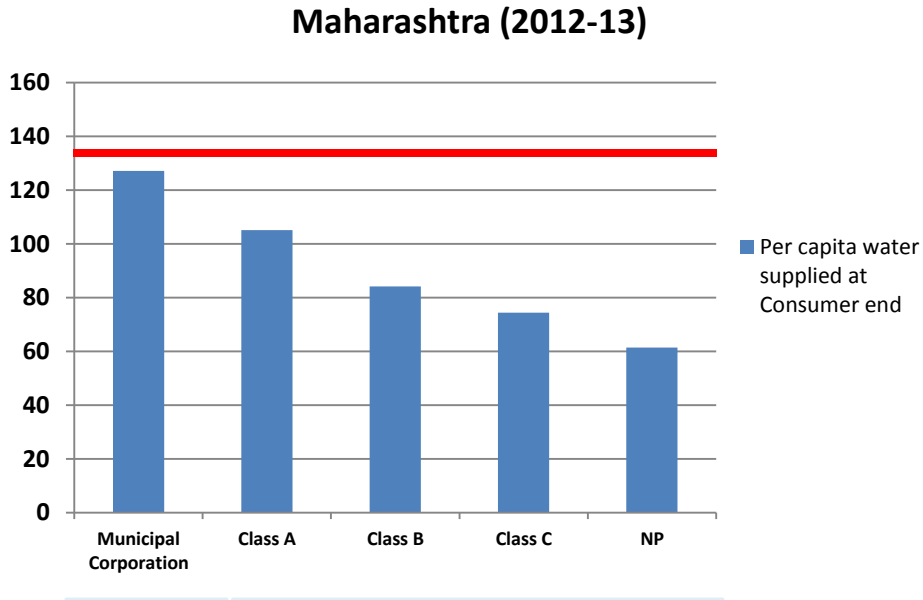
Source: Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

Insufficient water supply for sewerage projects



Population > 3,00,000	Municipality Population : 15,000 to 3,00,000			
38 %	6%	6%	4%	6%

% of cities with Water supply greater than 135 lpcd



Population > 3,00,000	Municipality Population < 3,00,000			
22 %	27%	12%	5%	0%

% of cities with Water supply greater than 135 lpcd

Per capita water supply at consumer end

Source: Information from PAS Project for local governments of Gujarat and Maharashtra, 2012-13, pas.org.in

WHERE DO PIPED DREAMS END ?

Central Pollution Control Board and Controller and Audit General point to inadequate treatment of collected sewage

This is also a lost opportunity for resource recovery for agriculture, energy and use for non-potable water uses

Importance of onsite sanitation in urban India

38.2% URBAN HHs HAVE SEPTIC TANKS

Are septic tanks linked to soak pits

Are they built as per Codes / Specifications ?

How often are they cleaned ?

Where does the effluent flow ?

What happens to the SLUDGE?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आरोग्य विभाग फोन नं.-२२००२२
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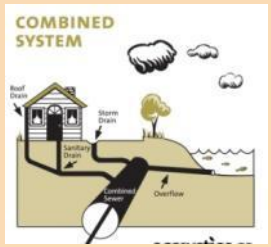
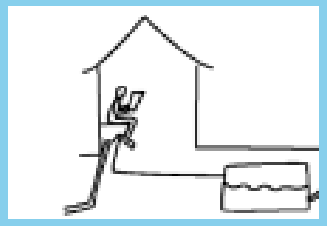
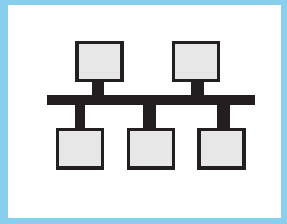
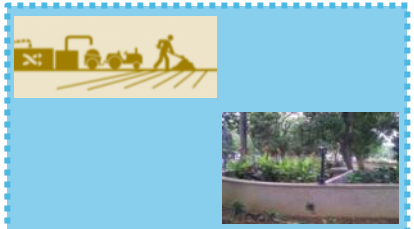
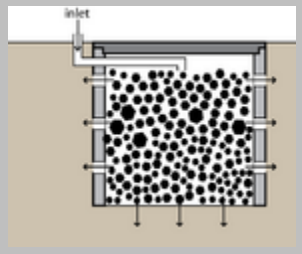
Sanitation system options across value chain

	Collection	Conveyance	Treatment / Reuse	
CONVENTIONAL SEWERAGE SYSTEM				
	Black/ grey water collected through sewerage network	*Combined system to carry storm water / sewerage*	*Decentralized Treatment Plants*	*Conventional Treatment Plants*
SETTLED SEWERAGE SYSTEM				
	Septic tanks for excreta	*Periodic cleaning / Sludge Conveyance*	*Settled Sewer for Grey Water Conveyance*	*Plant for Grey Water & Sludge treatment*
ON SITE SANITATION SYSTEM				
	Septic tanks for excreta	*Soak Pits for Grey Water*	*Periodic cleaning / Sludge Conveyance*	*Fecal Sludge Treatment Plant*

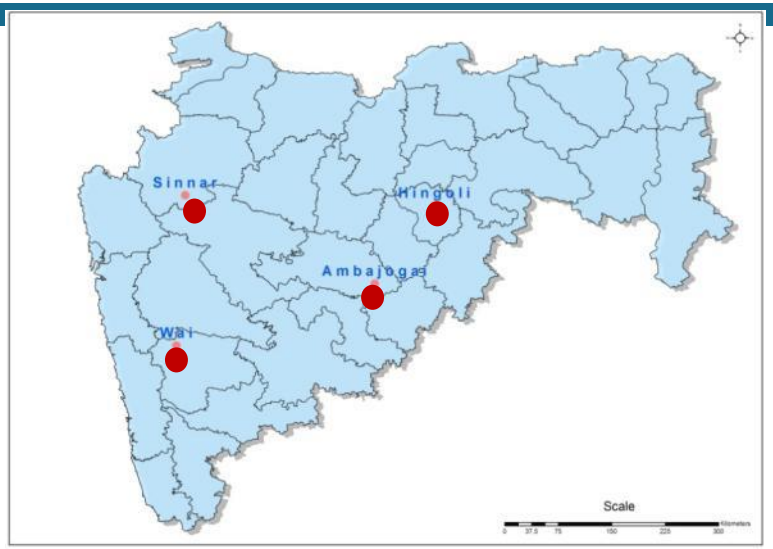
Options for waste water management systems

	CONVENTIONAL SEWERAGE	SETTLED SEWERAGE	ONSITE SANITATION
Water Requirement	High (>135lpcd) ↑	Low ↓	Low ↓
Capital Costs	High ↑	Medium ↓	Low ↓
O & M Costs	High ↑	Medium-Low ↓	Low ↓
Technical Expertise	High- *Conveyance* ↑ / High - *Treatment* ↑	Medium- *Conveyance* ↓ / Medium- *Treatment* ↓	Low - *Conveyance* ↓ / Low – *Treatment* ↓
Maintenance requirement	High – on *Service Provider* ↑ / Low – on *House Holds* ↓	Medium – on *Service Provider* ↓ / Medium – on *House Holds* ↓	Low – on *Service Provider* ↓ / High – on *House Holds* ↑
Required capacity to operate	High ↑	Medium ↓	Low ↓
	Works well for high density areas with good slopes to minimize pumping. High cost and capacity required	Cost effective option to conventional system, requires less water but regular periodic maintenance of septic tanks	Suitable intermediate low cost choice for cities with low density and deep ground water table

Addressing governance and financing issues: City Sanitation Plans

City Sanitation Plans in Small Towns

	Wai	Sinnar	Hingoli	Ambajogai
Population	36,053	65,251	85,401	80,000
Area (sqkm)	3.6	51.4	16.7	10.2
No. of prabhags / zones	5	6	7	7
No. of electoral wards	19	-	28	28
Households	7,580	13,112	15,573	14,517
Slum Population	2,140	5,445	30,974	20,258
% of slum population	5.9%	8.3%	36.3%	25.3%
No. of slum settlements	2	8	9	12

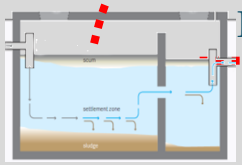


- In partnership with State Government of Maharashtra (Water Supply and Sanitation Department, State utility (MJP) and local Municipalities
- Plans cover elimination of open defecation, safe excreta disposal, black and grey management and solid waste management

Diagnostics of wastewater system – Sinnar

BLACK WATER

428 ML/Yr



Need to be designed as per prescribed standards

Periodic cleaning needs to be monitored

426 ML/Yr

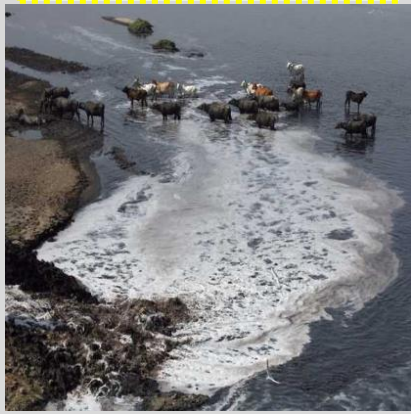
1228 ML/Yr

1.3 ML/Yr

Avoid indiscriminate dumping

Provide treatment sites

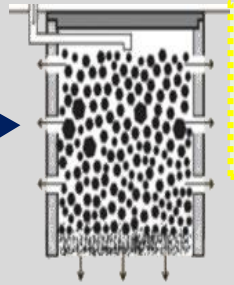
Avoid choking of drains through regular cleaning



Avoid pollution of land and water bodies

GREY WATER

803 ML/Yr



Avoid soak pits where ground water tables are high

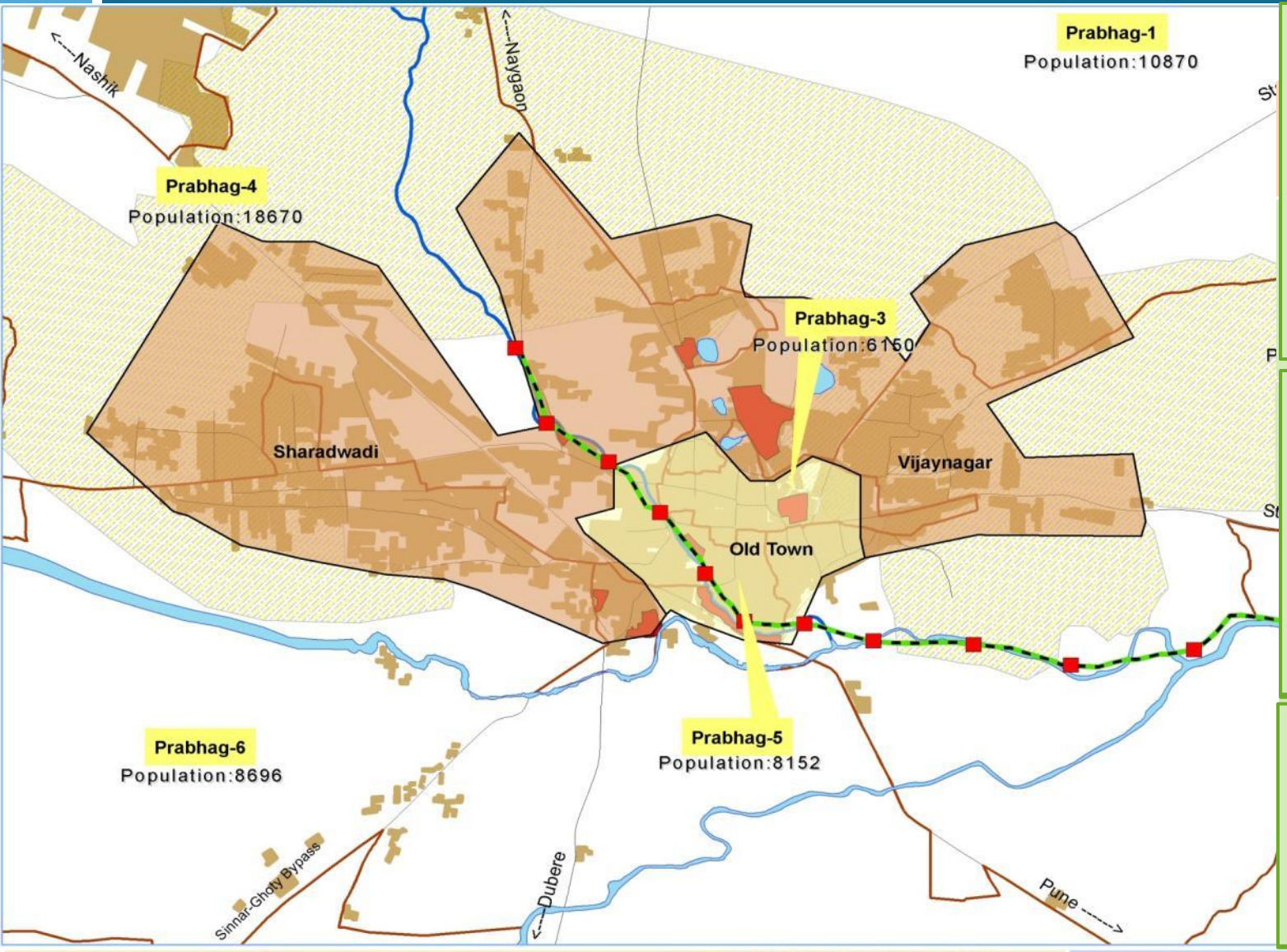
User interface | **Collection/Storage** | **Conveyance** | **Treatment** | **Reuse/disposal**

Existing Links In the value chain

Missing Links In the value chain

Areas for Intervention in the value chain

Wastewater Management- *Mixed option*



Soak pits for **New developing**

Settled sewer in **Old town area** *(78 km)*

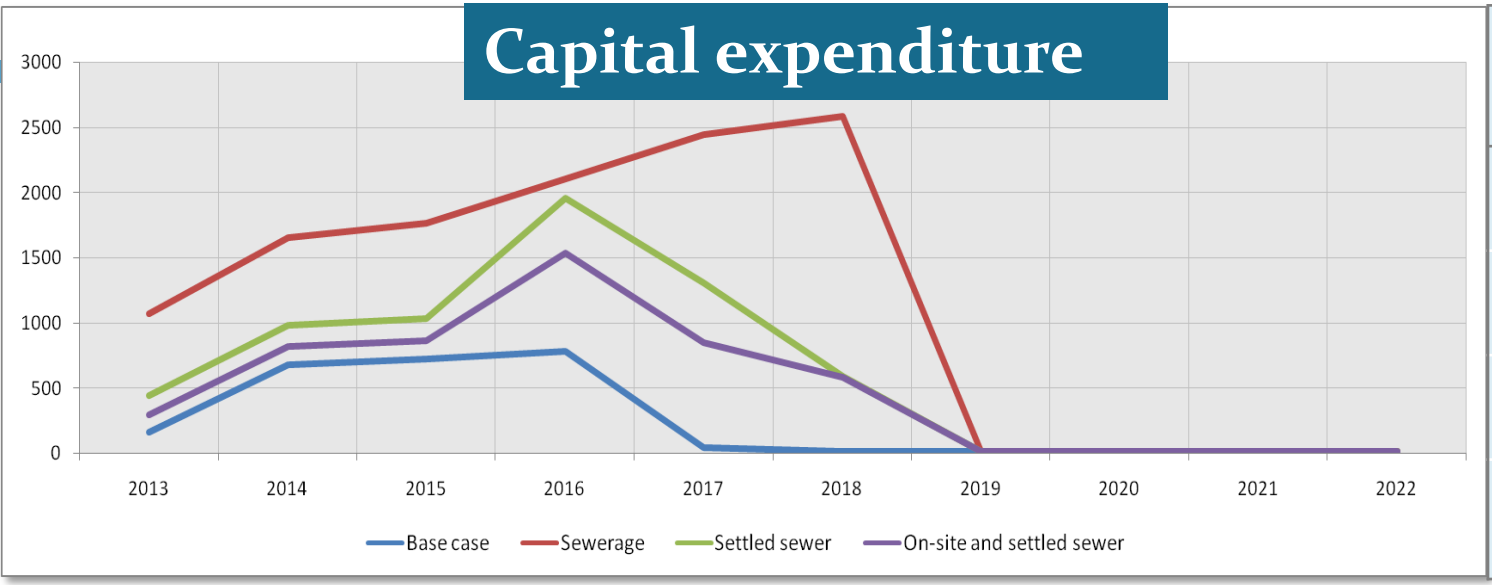
Settled **sewer connected** to **Interceptor sewer** *(8km)* *Waste water* **Treatment Plant** (15 MLD)

Suction emptier truck

Septage treatment facility

Costs of sanitation options differ greatly!

Capital expenditure

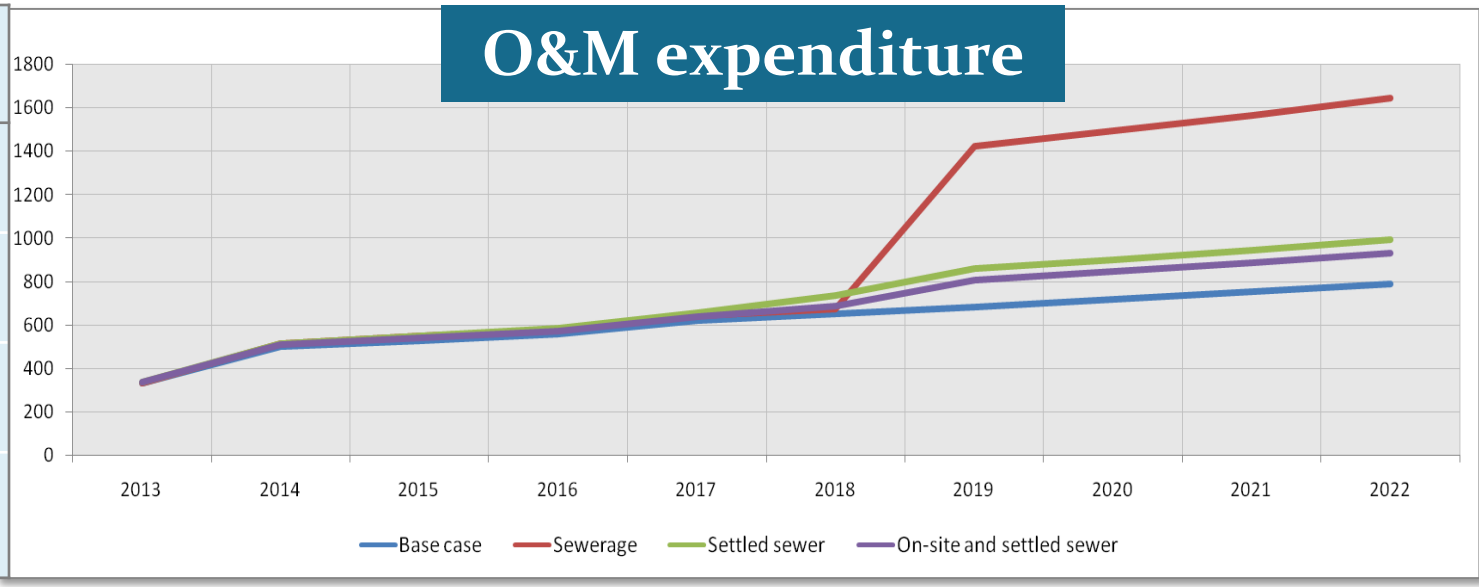


Sanitation option	Total CapEx (Rs. mn)
Base case	230
Sewerage	1150
Settled sewer	620
On-site and settled sewer	480

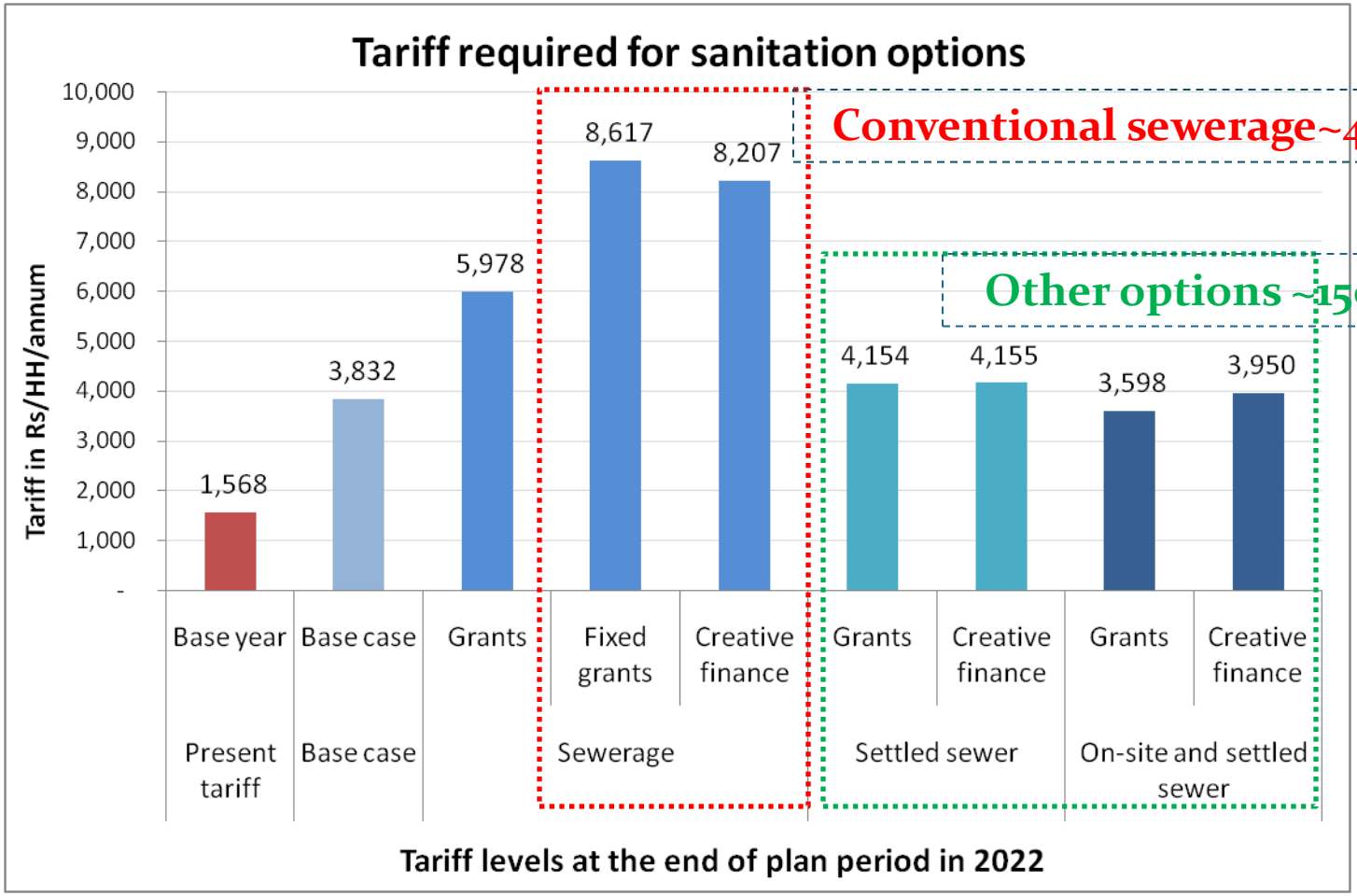
Capital expenditure on regular sewerage network is almost double the other options!

Sanitation option	Total OpEx (Rs. mn/ annum)
Base case	80
Sewerage	150
Settled sewer	100
On-site and settled sewer	90

O&M expenditure



Financial implications – tariff increase required!



Business models for desludging services

Urban Local Body (ULB)

Monitoring

Tax payment

Household/ Non residential properties

Monitoring

Rent payment for truck

Management fee

Rs. 12.3 lakhs/annum

Collection of septage

Private Sector

Business Model

Management Contract

- Capital investment done by ULB
- O & M services provided by Private
- ULB pays a management Fee to Private sector
- Monitoring of activities is done by ULB

Urban Local Body (ULB)

Monitoring

Tax payment

Household/ Non residential properties

Monitoring

Contract Amount

Rs. 15.2 lakhs/annum

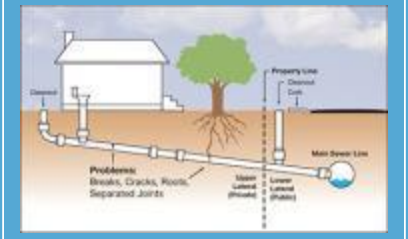
Collection of septage

Private Sector

PPP - Scenarios

50% Equity	100 % Equity
Pay back – 2.2 Years ROE – 109%	Pay back – 1.9 Years ROE – 73%

Governance and Finance



- **Institutional and Regulatory framework**
  - ✓ Review existing policy, institutional and regulatory framework that governs the domestic liquid waste disposal (black and grey water) in non-networked cities
  - ✓ Regulatory framework related to design, construction, approval and the institutions responsible for monitoring
- **Innovative Financing for Sanitation**
  - ✓ Use public funds to leverage new sources – community, household and social investors
  - ✓ Design of finance schemes – outcome based models, demand based schemes
  - ✓ Public subsidies should focus on outcomes and not technology linked (e.g. sewerage)

Summary recap

- Addressing sanitation issues needs **focus on the full value chain** – two key areas of:
  - ✓ Eliminating open defecation through 'improved /adequate sanitation'
  - ✓ Waste water /sludge management to reduce pollution and improve resource recovery
- **Evidence based policies** are essential as is **learning from good practices** and tackling **local political economy** to ensure last mile coverage
- Appropriate technology choices depend on properly addressing **local governance and finance issues**, capacity to properly engage communities and private entrepreneurs

Thank You

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