WASHCost

Working Paper 3

Assessing sanitation service levels

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WASHCost is a five year action research project investigating the costs of providing water, sanitation and hygiene services to rural and peri-urban communities in Ghana, Burkina-Faso, Mozambique and India (Andhra Pradesh). The objectives of collecting and disaggregating cost data over the full life-cycle of WASH services are to be able to analyse costs per infrastructure and by service level, and to better understand the cost drivers and through this understanding to enable more cost effective and equitable service delivery. WASHCost is focused on exploring and sharing an understanding of the true costs of sustainable services (see www.washcost.info).

Abbreviations and Acronyms used in this Working Paper

CBO	Community-based organisation
CWSA	Community Water & Sanitation Agency (Ghana)
DWST	District Water and Sanitation Team (Ghana)
HH	Household
IEC	Information, Education and Communication
IHHL	Individual household latrine
JMP	WHO/UNICEF Joint Monitoring Programme
KVIP	Kumasi Ventilated Improved Pit (latrine)
MDG	Millennium Development Goal
NGP	Nirmal Gram Puraskar (awards in India for achieving ODF status)
NGO	Non-governmental organisation
ODF	Open defecation-free
O&M	Operation and minor maintenance
ONEA	L'Office national de l'eau et de l'assainissement National water and sanitation agency in Burkina Faso
PHAST	Participatory Hygiene and Sanitation Transformation
PRI	Panchayati Raj Institutions (local level government in India)
RSM	Rural Sanitary Mart
RWST	Regional Water and Sanitation Team (Ghana)
SSHE	School Sanitation and Hygiene Education
SuSanA	Sustainable Sanitation Alliance
TSC	Total Sanitation Campaign
VIP	Ventilated Improved Pit (latrine)
WASH	Water, Sanitation and Hygiene
WSDB	Water and Sanitation Development Board (Ghana)

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1. Introduction

1.1 Purpose of this working paper

The purpose of this working paper is to set out sanitation service levels to be applied as an analytical tool for WASHCost research on the disaggregated unit costs of water, sanitation and hygiene services. It should be read together with Working Paper 2: "Ladders for assessing and costing water service delivery"[1] (Moriarty et al., 2010) which introduces the concept of service levels, service level indicators and the use of ladders as a metaphor and a means to differentiate between broad levels of service. Both are working documents of the WASHCost team, aimed at providing a framework for data analysis to be used and tested by WASHCost. To help in the evolution of the WASHCost thinking and approach, feedback and comments are sought from interested readers.

The purpose of the water and sanitation ladders is to provide a common framework to analyse and compare water and sanitation cost data being collected across different country contexts with different service delivery norms and standards. It is hoped that the water and sanitation service ladders developed for WASHCost research purposes can be used as part of the process of setting norms and targets with respect to ongoing service delivery and will also serve an advocacy function.

The emphasis in WASHCost is on collecting and understanding full life cycle service costs, including operational, capital maintenance and direct and indirect support costs. This represents a fundamental shift away from a focus on capital investment costs for water or sanitation facilities[2] or technologies, to the costs of sustainable water and sanitation *services*.

The contribution of this paper is therefore to propose a set of globally comparable sanitation service levels comprising service indicators, rather than sanitation technology options as set out in sanitation ladders most commonly used today. Sanitation services are defined as the (i) containment, (ii) collection, (iii) treatment, (iv) disposal and (v) re-use of excreta and solid and liquid waste. Conceptually, the management of excreta, urine, greywater[3] and solid waste are all part of sanitation services. However, in practice solid waste services are organised and delivered separately, and greywater disposal or management requires a different hardware system from urine and excreta disposal and management. It is proposed that these services be assessed against separate service ladders as described in Appendices A and B of this paper. The main part of this paper and the sanitation levels focus on the management of excreta and urine for the protection of human health and the environment.

The aim is to aggregate and benchmark sanitation based on service levels rather than technology or facility-related indicators. This represents a shift away from the focus of the Millennium Development Goal (MDG) on facilities for the containment of excreta to a service delivery approach that takes the entire delivery chain into account.

National sanitation policies and strategies tend to focus on improvements in infrastructure that contribute towards the achievement of the MDG target for sanitation. However, service providers struggle to deliver sanitation services with respect to the needs of the population and settlement characteristics within national norms and criteria. In some countries there are no national norms against which to assess sanitation services, and even where national norms or criteria do exist there are contextual, technical, social and financial constraints to compliance.

1 Accessible at http://www.washcost.info/page/196

2 The terms "latrine", "toilet" and "facility" are used interchangeably in this paper.

3 Greywater is wastewater generated from domestic activities such as laundry, dishwashing, and bathing which can be recycled for uses such as irrigation. Liquid from toilets is designated 'sewage' or 'blackwater' to indicate it contains human waste. (Adapted from Wikipedia http://en.wikipedia.org/wiki/Greywater).

1.2 Structure of this working paper

This first section of this paper has outlined the scope and purpose of this Working Paper. **Section two** reviews sanitation levels in current use and proposes indicators of a sustainable sanitation service as a basis for the WASHCost sanitation levels. **Section three** presents sanitation service level norms and criteria in WASHCost countries. **Section four** sets out the proposed WASHCost sanitation service levels. **Section five** summarises the steps towards the general sanitation levels and outlines the next steps for testing and refining country based sanitation ladders. **Section six** discusses the importance of hygiene services and makes suggestions for the development of a hygiene service assessment ladder. **Appendices A & B** contain tentative outline ladders for solid waste and for greywater.

2. Sanitation ladders in current use

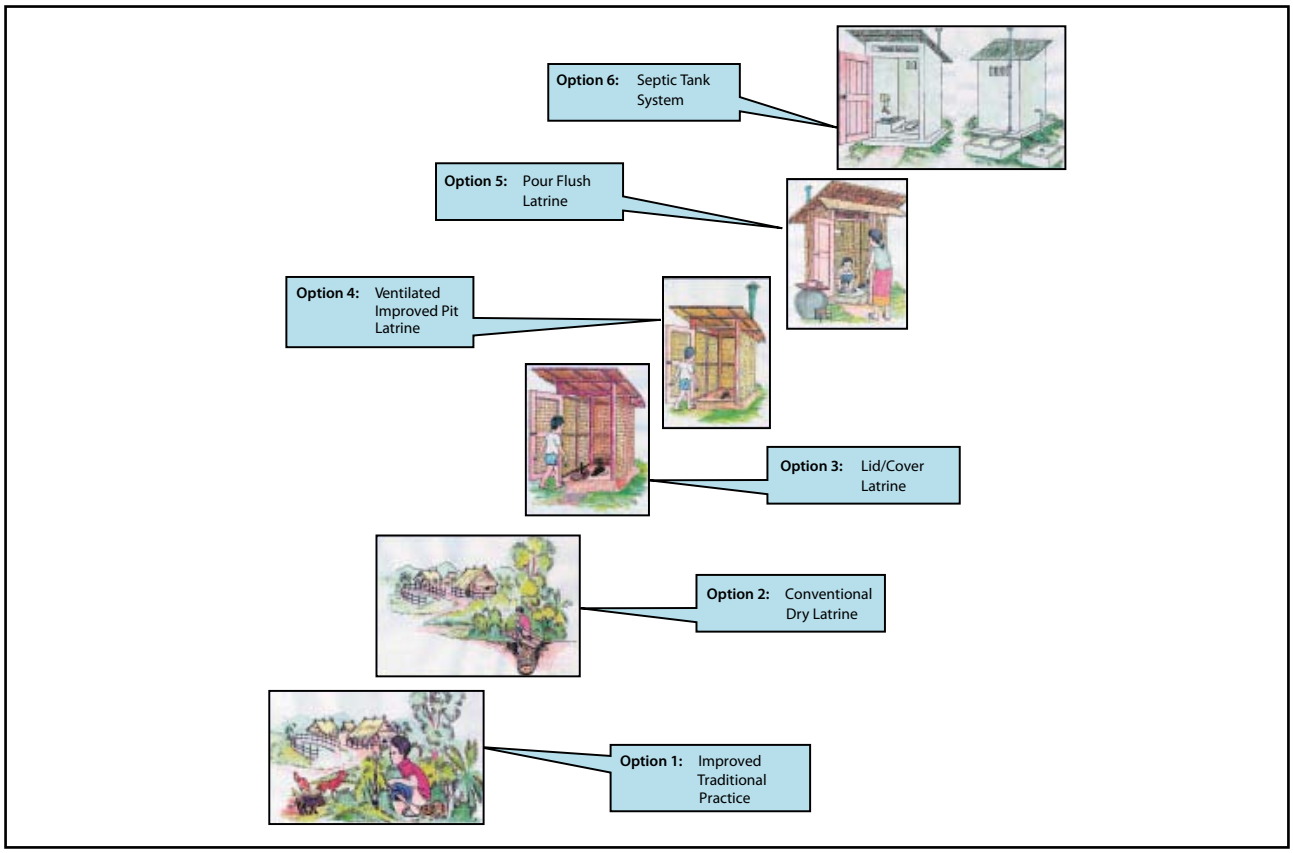
2.1 Tools for participatory decision making

The concept of a sanitation ladder originated through Participatory Rural Appraisal, Participatory Hygiene and Sanitation Transformation (PHAST) and other participatory methodologies that developed and used water and sanitation ladders in the 1980s as visual tools to facilitate community-based decision making on technology options. These tools provide visual reference points to enable community members to discuss and agree on appropriate technical options given a range of considerations including cost, convenience, privacy, their impact on health, availability of local materials and so on. These sanitation ladders, with technology options adapted to local circumstances, are still in widescale use. The use of a sanitation technology ladder as a participatory decision making and planning tool with reference to contextual realities is therefore well established.

For example, rural sanitation technology options were identified using a sanitation ladder in Lao PDR depicted in Figure 1, based on the following selection criteria:

- sustainability and lasting long-term benefits (impact)
- immediate benefits (quality, convenience, reliability)
- capacity requirement to provide supply-side support
- operation and maintenance
- upgradeability, working life, eventual replacement possibilities
- cost-effectiveness (capital and recurrent costs and type of materials required for construction)
- accessibility

Figure 1: The Lao Sanitation Ladder (Lahiri, S. & Chanthaphone, S., 2000)



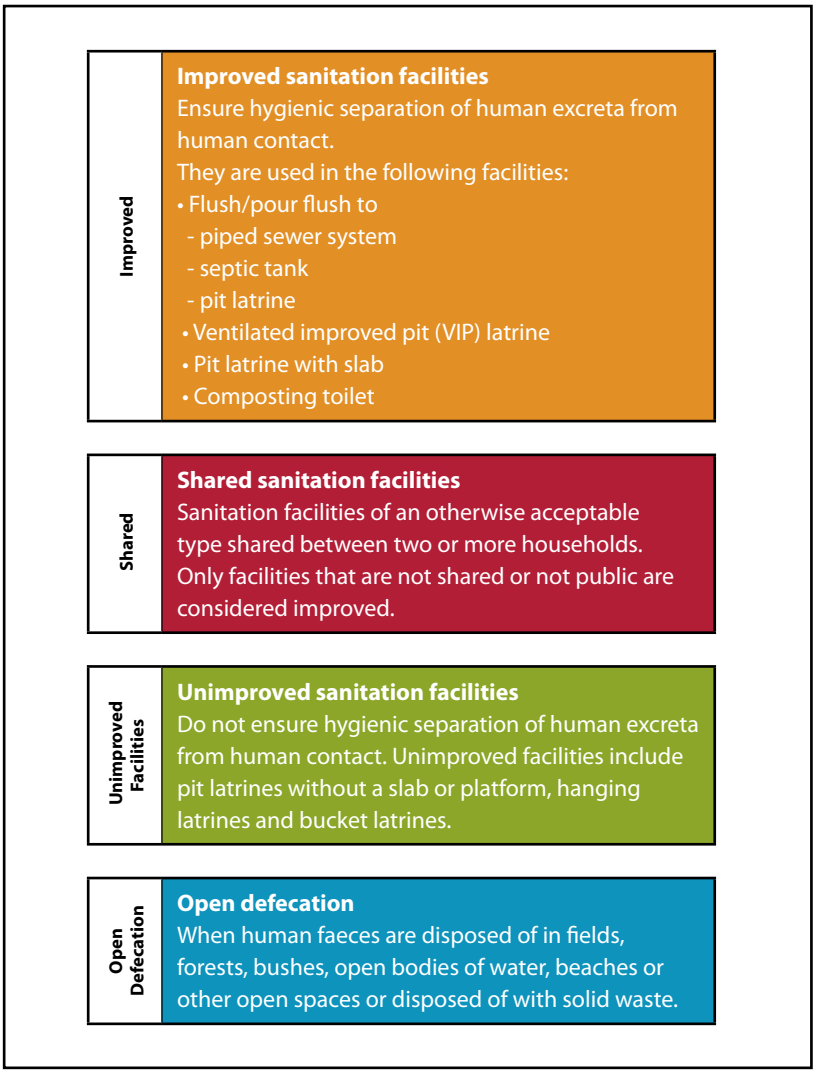
Sanitation improvement is not as straightforward as the concept of "a ladder" with incremental improvements from open defecation to full flush might suggest. In practice, from the users' perspective, a VIP toilet may be a better and more sustainable option than a septic tank system, given the potential shortfalls in operation and maintenance. With anything other than full flush sewerage, post implementation service and support is usually non-existent and left to households. There is, therefore, a wide gap between our understanding of technologies and of service provision; the implication being that the ordering of options on a ladder may look very different to the user than it does to a technical planning team.

The ranking of appropriate technical options is highly context and settlement specific and dependent on the availability of water, soil and groundwater conditions, supply chain realities, settlement densities, types of housing and/or size of plot, and so on. The Lao ladder example in Figure 1 clearly sets out user preferences against decision making and planning criteria for that particular context, but these may not apply in other contexts.

2.2 Global MDG monitoring

The WHO/UNICEF Joint Monitoring Programme (JMP, 2008) adopted the concept of a ladder in developing a global monitoring framework for the achievement of the water and sanitation MDGs by distinguishing between 'improved' and 'unimproved' sanitation facilities (Ibid p6). The focus has recently shifted from the facilities themselves to the 'use of facilities', but in the JMP 2010 report (JMP, 2010) the emphasis remains on types of latrines or technology options and therefore on the 'containment' part of the sanitation service delivery chain, rather than on disposal, treatment and reuse, or on solid and liquid waste management.

Figure 2: The JMP sanitation ladder criteria (2010)



2.3 The functional approach

As noted by Kvarnström et al. (2008), the JMP approach has been criticised within the sector because it does not deal with service indicators such as quality, reliability and sustainability of water and sanitation. Kvarnström also notes that by definition, a technology-based approach restricts options to the technologies listed and is not open to other options developed through sector innovation. So, although composting toilets were included within the ambit of 'improved sanitation' from 2006, the reality remains that those sanitation systems that are not on a pre-defined list of technologies do not count towards meeting the MDGs. In response to some of this criticism, the JMP refined the indicators in the 2008 MDG assessment report and used a variation of the sanitation ladder approach. The JMP has also indicated that the ladder may be refined after 2015 to enable progress in the sector to be monitored based on a set of indicator rungs.

Kvarnström and others suggest that the ladder could be further improved by expanding the use of a function approach rather than a technology approach, as depicted in Figure 3 below.

Figure 3: Suggested function-based sanitation ladder*

	Function		Description of rung	
Environmental Functions	7	Integrated Resource Management	The sanitation system is connected to and works productively with the related systems for water, nutrients, and energy provision, through integrated management of storm water, wastewater, faecal sludge, greywater and solid waste collection.	< ---------- Management Needs < ------
	6	Nutrient Containment	Protection of the environment by controlling releases of nutrients to water bodies and the environment; requires some treatment and/or storage methods; includes nutrients from both greywater and excreta flows.	
	5	Nutrient Reuse	Closing the loop on nutrients through reuse of treated human waste, e.g. in agricultural production or soil rehabilitation.	
	4	Pathogen Elimination	Secondary treatment that will destroy pathogens in the excreta and greywater.	
User Functions	3	Greywater Management	Means no stagnant water in the user environment, also eliminating exposure to pathogens, insects, and filth.	
	2	Access	The users have safe, reliable access to the sanitation facilities 24-hours a day, including privacy, personal safety, and shelter.	
	1	Excreta Containment	Contains the human excreta and sets barriers to pathogen transport; therefore includes no flies; no faecal matter lingering; hand-washing facilities are present. The facility should be clean and odour-free to preserve a clean/pleasant experience for the user and encourage use.	

* Note that moving up the ladder means that the functions below have also been fulfilled.
Source: Kvarnström et al., 2008

2.4 Towards a sustainable sanitation services ladder

Von Münch (2008) argues that sanitation should be regarded as a system from collection to treatment and re-use. She points out that sanitation includes excreta management or containment, greywater management, solid waste management and drainage, but that the MDG target focuses solely on facilities for excreta containment. The assessment of basic sanitation should not be based on the type of facility, but on sustainability, health and environmental criteria. Von Münch suggests criteria for the measurement of sustainable sanitation as noted in Figure 4.

Figure 4: Criteria for the measurement of sustainable sanitation

	Improved sustainable access to sanitation
Sustainability	Robust construction Easy to use Maintenance
Health	No contact with excreta Easy to clean Controlled downstream effect
Environment	Controlled sludge disposal Provision against flooding Low risk of groundwater pollution

In a similar vein, the Sustainable Sanitation Alliance has developed sustainability criteria related to the following aspects to be considered when improving an existing and/or designing a new sanitation system (SuSanA, 2007, P2):

Health and hygiene: includes the risk of exposure to pathogens and hazardous substances that could affect public health at all points of the sanitation system from the toilet via the collection and treatment system to the point of reuse or disposal.

Environment and natural resources: involves energy, water and other natural resources for construction, operation and maintenance of the system, as well as emissions. It includes the impact of recycling and reuse of the products. Technology and operation: incorporates the functionality and the ease with which the system can be constructed, operated and monitored using available human resources.

Financial and economic issues: relate to the capacity of households and communities to pay for sanitation, including the construction, maintenance and depreciation costs of the system. It takes into account the economic benefits from 'productive' sanitation systems, including the recyclables (soil conditioner, fertiliser, energy sources and reclaimed water), employment creation, increased productivity through improved health and the reduction of environmental and public health costs.

Socio-cultural and institutional aspects: criteria in this category evaluate the socio-cultural acceptance and appropriateness of the system, convenience, system perceptions, gender issues and impact on human dignity, the contribution to subsistence economies and food security, and legal and institutional aspects.

Arno Rosemarin of the Stockholm Environment Institute's EcoSanRes Programme agrees (Rosemarin, 2009) that sustainable sanitation needs to be more than simply"improved" and be based on systems that:

- protect and promote human health by providing a clean environment and breaking the cycle of disease
- are economically viable, socially acceptable, and technically and institutionally appropriate
- protect the environment and natural resources
- can involve a wide selection of technologies

Because the WASHCost sanitation ladder is designed as an analytical tool to allow for cross country comparison, it is suggested that the indicators of service delivery not only take into account the international sustainable sanitation service criteria set out above, but that they should also relate specifically to various country contexts (an aggregation of national norms and standards), effectively constructing country specific ladders.

For example, the definitions set out in the South African Strategic Framework for Water Services (RSA, 2003) are potentially useful in the identification of indicators for the quality of sanitation service provision because they separate the 'facility' from the 'service' as follows:

> **Sanitation facility:** "The infrastructure necessary to provide a sanitation service which is safe, reliable, private, protected from the weather, ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, and enables safe and appropriate treatment and/or removal of human waste and wastewater in an environmentally sound manner."
>
> **Sanitation service:** "The provision of a basic sanitation facility which is easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices."

It is important to note that the concept of a sanitation service does not imply an external provider. In fact, in most cases, households are responsible for ensuring the operation and maintenance of latrines with minimal or no external support. While some technologies require more external support than others, the effort required to access this support is a key indicator of service level. The sanitation facility definition includes ventilation in keeping with the South African national norm for a basic sanitation facility, which is a VIP latrine. As the review of latrine standards in WASHCost countries in the next section will show, this is not the case in many other countries, and so not all of these indicators are relevant.

3. National norms and standards in WASHCost focus countries

3.1 Burkina Faso

In Burkina Faso, sanitation norms centre on the number of people per type of latrine. For on-site sanitation in private dwellings, schools and public places, the following norms have been set.

Figure 5: Criteria for latrine provision in households and at public places

	Private	School institutions	Public places
Latrines	10 persons/ latrine	Sets of latrines at the rate of one seat per classroom	6 to 8 seats per set of latrines

Responsibility for evaluating who has access to sanitation is broadly shared and can be done at village, commune, region or national level. Figure 6a shows that for monitoring domestic individual sanitation, it is "standard compliant latrines" that are important and that there should be no more than ten people to each latrine. However, the definition of what constitutes a standard compliant latrine is not given, beyond saying that they should comply with "minimal hygiene, security and privacy conditions". The same is true for standard compliant septic tanks which should comply with "minimum hygiene and security conditions". Access to satisfactory sanitation is dependent on having access to a standard compliant individual latrine and a standard compliant septic tank.

Figure 6a: Standards for latrines and septic tanks in Burkina Faso

Item	Concept
Number of latrines	Number of existing latrines in a given geographical area
Number of standard compliant latrines	Number of latrines complying with minimum hygiene, security and privacy conditions
Theoretical rate of access to latrines	Percentage of population having access to a standard compliant latrine
Calculation (%)	*Total = 10 X number of standard compliant latrines/total population*
Rate of standard compliant latrines	Ratio of standard-compliant latrines to total number of latrines
Number of septic tanks	Number of existing septic tanks
Number of standard compliant septic tanks	Number of septic tank complying with minimum hygiene and security conditions
Theoretical rate of access to septic tanks	Percentage of population having access to standard-compliant septic tanks
Calculation (%)	*Total = 10 X number of standard-compliant septic tanks/total population*
Rate of standard-compliant septic tanks	Ratio of number of standard-compliant septic tanks to total number of septic tanks.
Theoretical rate of access to individual sanitation	Total rate of access to latrine and rate of access to sceptic tanks

Source: Adapted from *Normes, Critères et indicateurs d'accès à l'eau potable et à l'assainissement*, Direction Générale des Ressources en Eau, Ministère de l'Agriculture, de l'Hydraulique et des Ressources Halieutiques du Burkina Faso, July 2006

For collective and semi-collective sanitation (connected to a sewerage system) monitoring and follow up should take place at commune, regional or national level according to the standards set out in Figure 6b. Monitoring focuses on the percentage of dwellings and commercial premises that are actually connected amongst those that could be connected to a system. The question being posed here is how far does the waste water treatment plant function to its capacity.

Figure 6b: Standards for network sewerage systems in Burkina Faso

Item	Concept
Number of domestic connections	Number of dwellings connected
Number of industrial and commercial connections	Number of industrial and commercial premises connected
Total number of connections	Total of domestic, industrial and commercial connections
Theoretical rate of domestic connections	Percentage of population connected to the network compared with the overall population covered by the network
Nominal capacity of Waste Water Treatment Plant	Pollution load that can be treated by the Plant, expressed in terms of the number of inhabitants.
Use rate of the Waste Water Treatment Plant	Ratio of the global pollution load expressed in habitants compared with the nominal capacity of Waste Water Treatment Plant

Currently (2005 figures), only 1% of the rural population in Burkina Faso has access to what the JMP considers to be improved sanitation (DGRE, 2006, p.14). When traditional latrines are included coverage rises to 10%. In urban areas access to (JMP approved) sanitation is 14%. The Burkina Faso government has set targets for 2015 to ensure access in rural areas for an additional 5.7 million people, to raise the access rate from 10% to 54% (Ibid). In urban areas the target is to ensure coverage for an extra 2.1 million people by 2015, increasing coverage from 14% to 57% within the area covered by L'Office national de l'eau et de l'assainissement (ONEA), the state agency responsible for water and sanitation in urban areas.

The main method for reaching these targets will be sensitisation campaigns, sanitation promotion and sanitation and hygiene education.

3.2 Ghana

In Ghana sanitation includes not only faeces and urine but all kinds of solid waste and even the disposal of bodies. The minimum criteria for sanitation facilities/use are those that ensure a community becomes open defecation-free (ODF). This might in fact still include defecating outside so long as it is "deep and buried". A waste pit is the minimum criteria for liquid waste, and an uncontrolled pit for solid waste. There is no minimum level for hygiene, since without washing and food protection there is no hygiene – it is an 'all or nothing' concept.

Toilets may be private, semi-private (defined as shared but not communal), or communal. However, they must provide access for and be used by everyone, or sanitation does not meet the standard. In rural areas a soakage pit might be acceptable, but in towns a connection to a sewerage system is essential.

The Community Water & Sanitation Agency (CWSA, 2008) has articulated standards for latrine options for small towns. In the CWSA Framework, latrines are divided into two types with the following stipulations:

Figure 7: Standards for household and institutional latrines in small towns in Ghana

	Latrine Type	Nº people	Additional Design Parameters:	Siting of latrine
Household Latrines: individual households or cluster of houses	• 1-2 seater KVIP latrines	10 persons per drop hole	Sludge accumulation rate: 0.03 m^3/person/year Minimum pit depth: 3.5m	Minimum distance from water sources: 15m and always down slope from point source
	• Pour flush latrines			
	• Eco san			
	• VIP			
Institutional: Latrines schools and clinics	• 6 - 10 seater KVIP latrines	50 persons per drop hole		

Adapted from: CWSA, (2008). Pp 3 – 4.
KVIP latrine = Kumasi Ventilated Improved Pit latrine

These standards can be flexible. A low-cost improved traditional latrine could be considered with approval from the CWSA. Due to space constraints a common latrine (neighbourhood latrine) can be constructed and shared by 3-5 neighbours living in the same area. This type of latrine will allocate a compartment for each household to ensure proper maintenance

The framework says that, in special cases, flush toilets with septic tanks or small bore sewers may be used for modern houses, but it should be understood that these are above the basic service level and will only receive technical assistance.

Latrine construction should achieve the following standards:
1. Relatively free from flies and odour.
2. Dispose safely human excreta
3. Be structurally stable so that it does not collapse in use

Ghana attempts to monitor user satisfaction. The framework stipulates that there should be follow up by the District Water and Sanitation Team (DWST) for one year after the end of project on latrine users to see that they are satisfied with the latrines and are using them properly.

Hygiene

It is also stipulated in the framework that all latrines will have hand washing facilities and that messages promoting handwashing with soap should be included in the user education.

- Handwashing with soap should be an integral part of hygiene promotion in both communities and schools. Regional Water and Sanitation Teams (RWSTs) should integrate handwashing with soap activities in their work-plans.
- Water and Sanitation Development Board (WSDBs) should have action plans for promotion of handwashing with soap which should be emphasised in their training.
- The reviewed Information Education Communication (IEC) materials and hygiene syllabus for School Hygiene Education Programme should be adopted.

Latrine and hygiene promotion is delivered through a mixture of advocacy, IEC and subsidy. For hygiene there is an emphasis on teaching children in schools and on training teachers to provide hygiene education.

3.3 India

Unlike the situation for drinking water, there are no specified norms for sanitation in India. The Total Sanitation Campaign (TSC) is the flagship programme initiated in 1999 to ensure sanitation facilities in rural areas and with the broader goal of eradicating the practice of open defecation. TSC places a strong emphasis on IEC, capacity building and hygiene education for effective behaviour change with the involvement of panchayats (PRIs – local level government), CBOs, and NGOs, etc.

The key intervention areas are Individual household latrines (IHHL), School Sanitation and Hygiene Education (SSHE), Community Sanitary Complexes (where there is no room for IHHLs), Anganwadi (child care centre) toilets, Rural Sanitary Marts (RSMs) and production centres. Under the Nirmal Gram Puraskar (NGP) Awards, introduced in 2005, the central government gives cash awards of between US$ 1,000 and US$ 10,000 (depending on population size) to habitations that have achieved open defecation-free status and proper management of solid and liquid waste. Some state governments have also initiated their own incentive programmes. Andhra Pradesh makes Shubhram Awards, although these are not given out regularly. Some rural habitations have higher levels of sanitation such as underground drainage as observed in e.g. Ankushapur (a WASHCost test-bed habitation).

The Government of India has approved the National Urban Sanitation Policy which aims to make sanitation facilities universally available in urban areas. The policy specially focuses on hygienic and affordable sanitation facilities for the urban poor and women, and seeks to ensure improved cleanliness in cities and towns. The goals include awareness generation and behavioural change, elimination of open defecation, integrated city-wide sanitation, safe disposal and proper operation and maintenance of all sanitary installations. Nirmal Sahar Puraskar awards were initiated during 2008 for urban areas with similar criteria to those for rural areas. So far, only two states (Maharastra and West Bengal) have taken a lead in this regard. Apart from this, there are no specific norms for urban or peri-urban areas.
Figure 8 shows possible sanitation ladders standards proposed by WASHCost India, compatible with governmental norms and goals.

Figure 8: Sanitation ladder standards proposed by WASHCost India for use in India

LEVEL 6	Community managed sanitation of underground drainage, collection and disposal of solid and liquid waste disposal with treatment and hygiene practices both at household and community levels including the school sanitation
LEVEL 5	IHHLs with septic tanks/VIP latrines, covered drainage facilities with safe disposal practice including the school sanitation with separate complexes for boys and girls
LEVEL 4 (Nirmal Gram Puraskar / Nirmal Sahar Puraskar Norms of the Govt.)	IHHLs with septic tanks/VIP latrines, safe and hygienic solid and liquid waste disposal, including school sanitation
LEVEL 3	IHHL with septic tank with limited drainage and solid waste disposal facilities and shared/community sanitary complexes.
LEVEL 2	Ranging from dry latrine to pour flush latrine, no drainage facility and no proper solid waste management
LEVEL 1	Open defecation. No drainage system. No solid waste management

3.4 Mozambique

Under Mozambique government normative levels, an improved latrine is acceptable but a traditional latrine is not. However, it would seem necessary to make a distinction between those using a traditional latrine and those who are not served at all.

Sanitation is promoted as one per household. A shared latrine is considered below the norm and is not very common in Mozambique. For solid waste, any bury or burn or collect and dump method meets the national norm in rural areas. In peri-urban areas however, a collection and disposal system should be in place.

Figure 9: Proposed sanitation ladder standards by WASHCost Mozambique for use in Mozambique

	System	Nº people	Drainage	Solid waste management
Norm	Improved traditional latrine	One per household	Closed drainage	Bury or Burn System of collection and dumping
Minimal	Traditional latrine	Shared	Open drainage	Partial collection
Not served	Open defecation	Shared	Open drainage	On ground

3.5 Areas of commonality in country norms and standards

In reflecting on areas of commonality within these national norms and standards, and on the implications of preliminary findings on sanitation service levels in the focus countries, the following principles were agreed in 2010 by the WASHCost research team:

- An unimproved or traditional pit toilet should not be categorised as 'no service' as it is an improvement on open defecation.
- Service level assessments need to accommodate toilets that are provided within a compound for several families ('semi-collective'), in addition to household latrines.
- The basic service level should meet basic JMP criteria for global comparability.
- Safe burial of faeces (the 'cat method') is an improvement on open defecation and in dry, low population density conditions is relatively safe. A sub-standard level should be included in the service ladder which could include such practices where they apply, but this cannot be defined as a service.
- Keeping broad alignment with JMP criteria for global comparability, service level assessments and costing of containment, disposal, treatment and re-use (where applicable) of (i) excreta and urine, (ii) greywater, and (iii) solid waste, will be kept as separate assessments. Solid waste management is not included within national norms for sanitation but remains a significant challenge. A proposed solid waste service ladder is attached at Appendix A to this paper. Suggested service levels for greywater management are included in Appendix B.
- While re-use is not reflected in national norms and is not widely practised in any of the focus countries, it remains an important advocacy issue with respect to higher levels of sanitation service, and is therefore included in the 'highly improved' service level of the proposed service level ladder.

4. The proposed WASHCost sanitation service levels

4.1 Service parameters and indicators for sanitation

Proposed service parameters and indicators are outlined in Figure 10.

Figure 10: Proposed service parameters and indicators

Service Parameters[4]	Service Indicators
Accessibility	Distance from users, effort required for use, safety, privacy[5], dignity, minimises flies and bad odours, waiting time in the case of communal facilities.
Use	Safe and hygienic use by all members of the household, day and night and in all seasons, and infant faeces disposed in the latrine.
Reliability	Effort required for operation and maintenance of the toilet, e.g. pit desludging (mechanical) or emptying (manual). Operation and maintenance safe for users and service providers. Longevity and robustness of top and 'underground' structures.
Environmental protection	Environmentally safe containment, collection, treatment, disposal and re-use of excreta and urine. Productive re-use of safe by-products.

Scale and affordability are also crucial important service parameters. Scale refers to the number or proportion of people who are covered by a service in the area of study. In WASHCost this will be addressed, not through monitoring specific indicators but though data aggregation and analysis. Affordability can be analysed as a correlation between costs at different service levels and household income levels.

The service parameters in Figure 10 above are elaborated into broad service indicators, but can be further elaborated into more detailed indicators in the sanitation ladder set out in Figure 12. The parameters have been compiled from the sustainable sanitation system indicators set out in section 2, and are broadly in synergy with the indicators applied in the WASHCost water supply service ladder.

These proposed parameters and indicators have been developed from the perspectives of the user, the provider and the environment, and are based on the principle of **something better, for all, forever**.

4.2 The sanitation ladder: indicators and levels

This section of the paper sets out:

- Sanitation functional areas across the sanitation service delivery chain (Figure 11)
- The WASHCost sanitation service ladder (Figure 12)
- Indicators per service parameter for deciding overall service levels (Figure 13)

4 This indicator does not refer only to individual household latrines. Privacy is also possible with communal facilities and refers to having a door and walls for privacy and safety.

4.2.1 Service functional areas across the sanitation delivery chain

Given that sanitation services are fragmented across a chain of service delivery activities or functions, each with their own associated costs and institutions or actors, a full sanitation service implies both that these functions are fulfilled, and that the linkages in the chain are well articulated.

> Working definition: A full spectrum of sanitation services refers to the (i) containment (safe separation from the user, e.g. toilet, slab or drain), (ii) collection/ transport, (iii) treatment, (iv) disposal and (v) re-use, of excreta and solid and liquid waste. In this document we refer to each of these areas of service as functional areas.

This represents a substantial shift away from an MDG-driven focus on latrines or facilities for the containment of excreta, to a service delivery approach that takes the entire delivery chain into account.

This approach allows for context specific variations and operation and maintenance disparities in the ranking of sanitation facilities or technology options. For example, a well operated and maintained VIP is arguably a higher level of service than a badly maintained septic tank system or a full flush system with inadequate water supply. In fact, 'higher' or more sophisticated technology options that are not well operated or maintained represent a substantially graver public health and environmental risk than options lower down the traditional sanitation technology ladder.

The service delivery approach also accommodates the reality that appropriate technology options are highly contextual and dependent on a range of factors including settlement densities, soil conditions, geo-hydrological conditions, the availability of water and socioeconomic conditions.

Based on the four service parameters above and taking into account the reality of sanitation services in the focus countries and considering all the functional areas of the sanitation service delivery chain, we propose a service ladder of five broad categories or levels (Figure 11): highly improved service, improved service, basic service, limited service, and no/unacceptable service. 'Limited' service is included in recognition of the fact that there are some practices (such as deep burial of faeces) which do not meet the standards for a basic service, but which nevertheless have to be regarded as better than open defecation. A contradiction that emerges from these definitions is that while a 'limited service' may be better than nothing, it does not really qualify as a 'service' at all; it is a least-worst, self-help solution.

The different services are illustrated diagrammatically below, against the five functional areas of the sanitation chain. Figure 11 outlines which functional areas need to be covered for each 'rung' of the ladder, while Figure 12 details the indicators for each of the service parameters.

Figure 11: WASHCost Sanitation Service Functional Areas – the Delivery Chain

	Containment	Collection	Treatment	Disposal	Re-use
Highly improved service	X	X	X	X	X
Improved service	X	X	X	X	
Basic service	X	X			
Limited	X				
No or unacceptable service					

4.2.2 The sanitation service levels

Figure 12: WASHCost Sanitation Service Levels with detailed indicators per service parameter for deciding overall service levels

	Accessibility	Use	Reliability	Environmental protection
Highly improved service	Each family dwelling has sufficient toilets for all members Immediate access for all family members Private/ enclosed Means for anal and toilet cleaning immediately available Handwashing facility, water and soap on hand and secure Sealed against flies and odours	All family members use toilet Used day and night in all seasons Infant faeces are disposed of in toilet	Routine O&M service requiring little or no user effort Robust, secure structure Lasts 10-20 years	Positive environmental impact, e.g. productive re-use of safe by-products No groundwater or surface water contamination
Improved service	Each family dwelling has a toilet in the compound Easy access for all family dwellings Private facility Means for anal and toilet cleaning available Handwashing facility, water and soap nearby Sealed against flies and odours	All family members use toilets Used day and night in all seasons Infant faeces disposed of in toilet	Regular O&M service requiring minimal user effort Lasts 5-10 years	Non problematic environmental impact/ Safe disposal No ground or surface water contamination
Basic service	Cement or impermeable slab at national norm distance from households (per household or shared) Private opening Means for anal and facility cleaning available Handwashing facility, water and soap or ashes available and secure	All family members use toilets	Weak O&M requires high level of user effort Lasts 2-5 years	Non problematic environmental impact/ Safe disposal
Limited 'service'	Platform or deep burial separates faeces from user	NA	NA	Significant environmental pollution, increasing with increased population density
No service	No separation between user and faeces, e.g. open defecation	No use	NA	Significant environmental pollution, increasing with increased population density

Notes:

- This service ladder is designed for consideration of domestic sanitation at household level only. Equivalent service levels also need to be achieved at workplaces and in schools/colleges for people to be able to access these service levels in their daily lives, rather than only in their homes.
- The service ladder refers to the containment, disposal, treatment and re-use (where applicable) of excreta and urine. Suggested service levels for solid waste and greywater are attached as Appendices A and B respectively.
- Adequate water supply commensurate with the sanitation technology is assumed. Where the water supply is inadequate for a full flush facility for example, the collection of excreta would not be possible.
- No/unacceptable[5] service is where facilities do not effectively separate faeces or urine from the user or the environment, e.g. open defecation, no or insufficient safe handwashing provisions, and/or groundwater contamination.

Separating out greywater and solid waste: In reality, while conceptually part of sanitation services, the management of excreta and urine, of greywater, and of solid waste, are separate from both a hardware and service perspective. It is proposed that systems and services for greywater and solid waste be assessed against separate service ladders as described in Appendices A and B of this paper.

4.2.3 Deciding on sanitation service levels

As shown above, each service level parameter has a number of indicators and can only be fully met where all these indicators are satisfied. There is no effective way of combining different indicators to arrive at a 'combined' service level, except where they are all met. In Working Paper 2, "Ladders for assessing and costing water service delivery", a principle was established that the overall service level for water at household level is decided by the lowest composite indicator. That principle also applies to sanitation services. For example, having a household toilet of good quality does not deliver an improved service level if most members of the family do not use it or if the toilet causes significant environmental pollution. The service level is decided by its weakest point.

This is significant when trying to relate particular toilet options to service levels. At the risk of overstating the case, the ladders in Figures 12 and 13 refer to service levels rather than technology options. Depending on the availability of O&M systems and support, environmental protection and proper use, examples of technology options at the various levels could include, but are not limited to:

- Basic service - traditional latrine, unimproved pit latrine, etc.
- Improved service - ventilated improved pit (VIP) latrine, improved pit latrine, septic tank, etc.
- Highly improved service - Arboloo, composting toilet, Blair latrine, septic tank, full flush, etc.

However, a well-made and well-maintained double pit VIP latrine, where the composted material is safely used in a vegetable garden offers the potential for a highly improved service (where all members of the family use it and wash their hands); while a flush toilet that discharges effluent in such a way to threaten groundwater and/or human health, does not.

For aggregation and analysis, single service levels will not be assigned to a service area (village/ town) where different users have different levels of service. This is for similar reasoning to the point made above about composite indicators: one family's service levels cannot be 'averaged' with another to provide a meaningful figure. But in this case, we cannot say that a community service level should be decided by the lowest household level, because that would lead to

5 In some remote and sparsely populated areas people practise the 'cat method' of burial of faeces, combined with use of soil or leaves to cleanse hands. Although clearly sub-optimal, such methods may, where they do not threaten water sources, be considered as a 'limited service' rather than 'no service'.

many (most) communities being registered as having 'no service' and there would be no distinction between a community where 80% of households have an improved service, and one where only 5% do so. Instead, and as agreed in the water services paper, percentages of households at each service level within each service parameter will be recorded so as to provide a comprehensive picture of service levels in a particular area.

Figure 13: WASHCost Sanitation Service Levels with summarised composite indicators for deciding overall service levels

	Accessibility	Use	Reliability (O&M)	Environmental protection
Highly improved service	Each family dwelling has sufficient toilets for all members	Used by all family members and infant faeces disposed of in toilet	Routine O&M service requiring little user effort	Positive environmental impact, e.g. productive re-use of safe by-products
Improved service	Each family dwelling has a toilet in the compound		Regular O&M service requiring minimal user effort	Non problematic environmental impact/ Safe disposal
Basic service	Cement slab (hh or shared) at national norm distance from hh	All family members use toilets	Weak O&M requiring high user effort	
Limited 'service'	Platform separates faeces from user	Not applicable	Not applicable	Significant environmental pollution, increasing with increased population density
No service	No separation between user and faeces, e.g. open defecation	No use	Not applicable	

5. Summary and next steps

In this working paper, we have used Kvarnström's concept of functional areas across the sanitation service delivery chain and proposed parameters and indicators for sustainable sanitation services across each functional area. It is suggested that this approach is not only useful for the WASHCost research, but could also be considered more broadly by those involved in planning and monitoring sanitation service delivery.

We propose that service levels be assigned separately for excreta and urine management, for greywater, and for solid waste, which are all parts of a sanitation service. The sanitation service level ladder outlined here covers excreta and urine management and comprises five levels, three of which represent different types of acceptable service and two represent a limited or below standard service, which do not meet basic norms and do not properly merit the description of a service. The three levels of acceptable services can be described in the following terms:

Basic service: At this level all households have reasonable access to a safe, relatively robust, private sanitation facility, available handwashing facilities, relatively weak desludging and other long term maintenance provisions, and non problematic environmental impact or safe disposal of sludge. This is typical of most acceptable rural and peri-urban sanitation services.

Improved service: At this level, all users have easy access at all times to a convenient, private, safe, robust sanitation facility which seals against flies and bad odours, has nearby handwashing facilities, where minimal effort is required for desludging and long term maintenance, and there is non-problematic environmental impact or safe disposal of sludge.

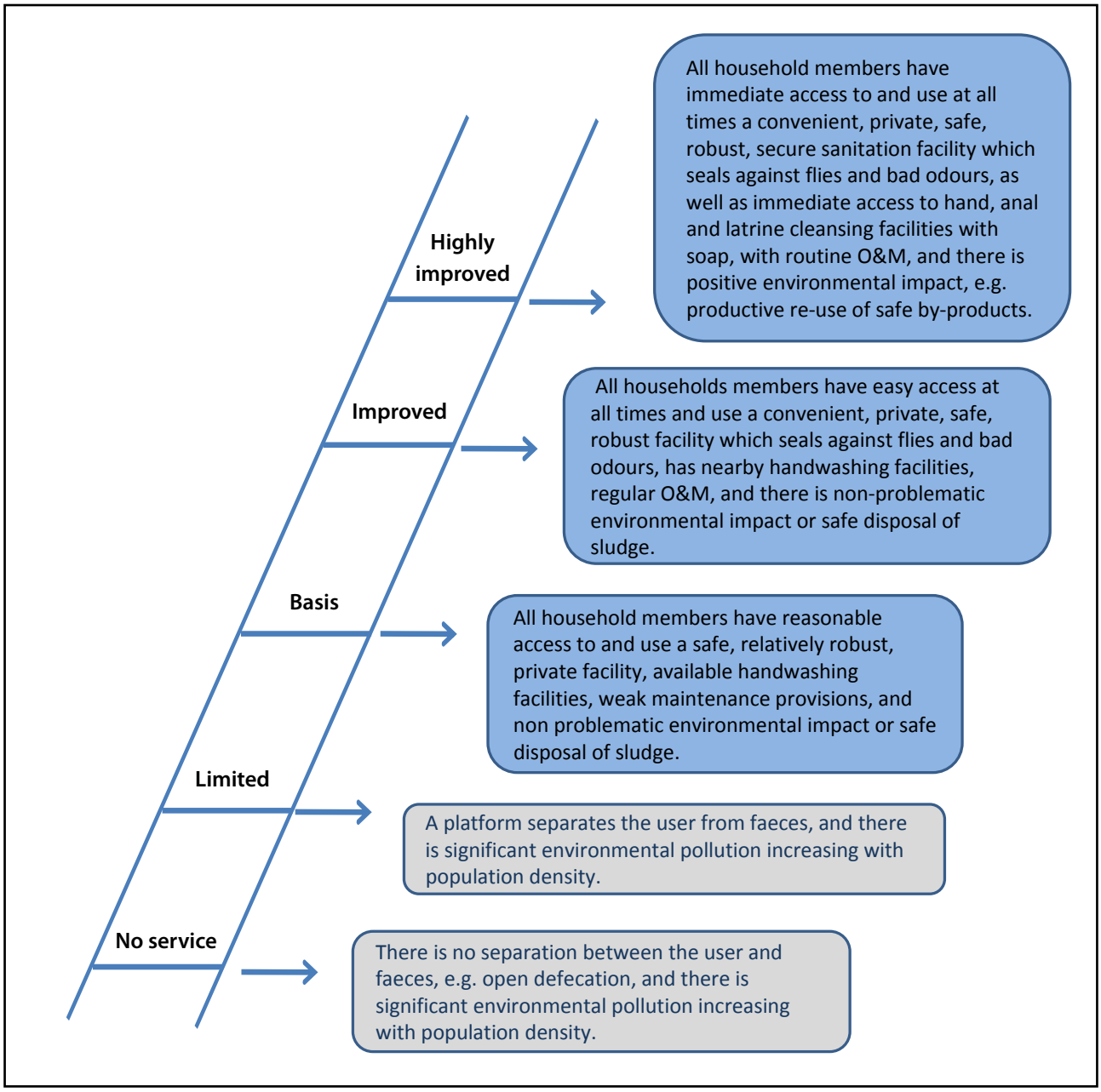
Highly improved service: At this level, users have immediate access at all times to a convenient, private, safe, robust, secure sanitation facility which seals against flies and bad odours, as well as having immediate access to hand, anal and latrine cleansing facilities with soap, where minimal or no effort required for desludging or long term maintenance, and there is positive environmental impact, e.g. productive re-use of safe by-products. Figure 14 on the opposite page provides a diagrammatic representation of the WASHCost service ladder.

In order to test and refine the sanitation service level ladders, WASHCost countries need to identify country specific sub-indicators under each composite indicator, and the means for their calculation based on data that can realistically be collected through in-country research.

The composite indicators and service parameters set out in this paper are useful for advocacy and international comparison; the sub-indicators are essential for research and in-country monitoring. These levels and composite indicators will be tested against field data on costs. Solid and greywater waste management levels should also be determined and analysed as part of sanitation service level and cost assessments.

With respect to field testing, it is suggested that country teams try to ensure that sampling includes examples of all different service levels, and that household data collection can be analysed against the service level indicators so that a measure of the actual service received can be attained.

Figure 14: WASHCost Sanitation Service Ladder



6. Hygiene services

Hygiene covers a range of health and environmental issues, including the use of water and sanitation to block the transmission of related diseases and towards better health. Hygiene is a central component in both water and sanitation services and is cannot simply be an add-on to either the water or sanitation service ladders.

It is widely accepted that effective, sustainable hygiene promotion cannot be achieved through a once-only intervention and requires ongoing activities from multiple sources. Hygiene promotion can be seen as a public or environmental health function and therefore 'a service', either undertaken by public or environmental health departments, or by the sanitation provider or utility. However, water and/or sanitation infrastructure related hygiene promotion is usually 'an intervention' that happens between once and five times in a project cycle, and is unlikely on its own to result in sustainable improvement in hygiene practices.

Arguably, hygiene promotion will only result in sustainable behaviour change if it is an ongoing, integrated service. This is an important advocacy issue, and also has important implications for the development of a WASHCost hygiene ladder.

It seems likely therefore that a hygiene service ladder could be described as:

- 'Ideal': Environmental or public health driven hygiene promotion integrated/ linked to water and sanitation infrastructure development promotion activities
- 'Basic': Adequate water and sanitation infrastructure-related hygiene promotion
- 'Unimproved': Inadequate water and sanitation infrastructure-related hygiene promotion

It would be beyond the realistic scope of WASHCost research to collect cost and service level data for the full range of hygiene services in any focus country; it will be necessary to concentrate data collection on hygiene promotion related to water and sanitation infrastructure development. WASHCost will cost selected hygiene interventions that are believed to be successful and where there is cost data available. Hygiene cost data collection will focus on CapEx software (hygiene promotion and sanitation demand creation) and direct and indirect support costs for hygiene interventions linked to water and sanitation infrastructure improvement.

Where possible, WASHCost will also develop case studies on water and sanitation related hygiene services such as those delivered through schools, mass campaigns or other programmes, for example, HIV/AIDS prevention and awareness initiatives. In order to understand hygiene as an integrated public health service, these case studies will need to look beyond the current WASHCost focus countries to include countries where more developed services can be found.

The use of the term 'adequate' as a criterion for a basic hygiene service begs the question 'what is adequate'? Very little has been done to draw together disparate claims with respect to different approaches and effective, sustainable hygiene behaviour change interventions: indeed no widely accepted benchmarks currently exist in the sector. As noted above, a single round, or even a few rounds of hygiene promotion, are unlikely to prove effective and this makes it problematic to accept the concept of such interventions as being 'adequate'.

IRC's Sanitation and Hygiene Thematic group is currently completing a review of the literature on 'good practice' in order to identify key elements widely believed to make hygiene promotion more effective and safe hygiene practices more sustainable. This will help to distinguish between adequate and inadequate interventions for cost data analysis, and help to ensure that global advocacy is properly focused on adequate hygiene promotion.

It is argued that the key indicators of adequate hygiene interventions are: (i) handwashing with soap or ash at critical moments, (ii) the use of a latrine, and (iii) safe water management at household level. These key indicators will be used to assess the effectiveness of water and sanitation improvement related hygiene interventions in the WASHCost focus countries.

Appendix A: Suggested Service Levels for Solid Waste

Figure 15: Proposed WASHCost Sanitation Service Ladder for Solid Waste

	Containment	Collection	Disposal	Treatment	Re-use
High service	Source sorting Separate container for paper, glass, etc Safe container protected from flies, domestic animals	Mechanised collection Community based management with system which avoid dispersion	Safe disposal on protected landfills Leachate containment	Incineration Recycling Composting	Systematic productive reuse (compost, energy, etc)
Improved service	Safe container protected from flies, animals,	Community based management	Safe disposal on protected landfill	Recycling Composting	No or unsystematic productive reuse
Basic service	Safe container protected	Individual (household member is in charge of collection	Disposal on specific dumping site	No treatment	No or problematic productive reuse
No or unacceptable service	No container	No collection	No treatment	No treatment	No reuse

Note: Under the community management system, solid waste management is managed at household level.

Appendix B: Suggested Service Levels for Greywater Management

Figure 16: Functional areas: WASHCost Sanitation Service Ladder for Greywater

	Description	Containment	Collection	Disposal	Treatment	Re-use
Highly improved	Covered drainage for greywater	X	X	X	X	X
Improved service	Drainage for greywater	X	X	X	X	X
Basic service	Soakage pit for greywater	X	X			
No or unacceptable service	No management of greywater					

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