



Sustainability and Value for Money: using data to improve the performance of WASH investments

**LHSTM
11th May 2015**



DFID's approach to Value for Money

maximise the impact of each pound spent to improve poor people's lives

- VfM applies at all levels: strategic, portfolio, programme, administrative
- Importance of comparability, quality, sustainability



Next Steps

Update to 'DFID's Approach to Value for Money (VfM)' (2011) to provide a broader view of VfM, explain what DFID means by VfM and how we aim to maximise VfM

Development of accompanying recommendations on VfM metrics including development of metrics, uses and limitations

Strengthening of sector guidance on VfM including potential VfM metrics



Examples

- Country poverty reduction diagnostic
- Global Partnership for Education (GPE)
- VfM metrics and the Girls Education Challenge Fund
- WASH results programme
- Development of sector VfM guidance



Operational Research Objectives

Objective 1

Identify how delivery of **DFID-funded WASH programmes** can be made more **sustainable, effective and efficient**, and identify the potential to **reduce unit costs**.

Operational research in six countries: Bangladesh, Ethiopia, Mozambique, Nigeria, Pakistan and Zambia



Operational Research Objectives

Objective 2

Provide updated **regional assessments** of the operational **sustainability** of provided water and sanitation services in **Africa and South Asia**.

Nationally representative **household surveys** in 4 countries (Ethiopia, Bangladesh, Mozambique and Pakistan)

Secondary data for all countries (e.g. Water Point Mapping initiatives)



Value for Money and Sustainability in WASH Programmes (VFM-WASH)

Operational sustainability of WASH services

Findings of nationally-representative household surveys and regional assessments

Ian Ross, Oxford Policy Management

11/5/15

Funded by



Structure

1. Background

- Background to the operational sustainability problem
- Conceptual framework for operational sustainability

2. Methodology

- Sampling
- Instruments

3. Headline results

- Water
- Link to VFM analysis

4. Conclusions and next steps

1. Background

Objectives of the VFM-WASH research project

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Two objectives:

1. Obj1

- To identify how Value for Money (VFM) and sustainability can be improved in DFID-funded WASH programmes using operational research.
- 6 countries: Bangladesh, Ethiopia, Mozambique, Nigeria, Pakistan and Zambia

2. Obj2

- assess “operational sustainability” of **rural** WASH services in Africa & S.Asia
- nationally-representative household surveys in 4 countries (Bangladesh, Ethiopia, Mozambique and Pakistan),
- Secondary data for all countries

Two years: September 2013 – August 2015

Background: the operational sustainability problem

“one third of handpumps in Africa are not working”
(RWSN, 2009)

“tolerance of this level of failure would not be contemplated in most other spheres of public service.” (Lockwood & Smits, 2011)

“Newly delivered WASH services often perform effectively for a period, and then either fall into disrepair or otherwise fail to provide continuing benefits to their users”
(WaterAid, 2011)

“data on overall sustainability of WASH services is weak ... very few high-quality studies that provide evidence on sustainability beyond [the] small-scale ... focused on specific programmes and commonly over relatively short-time lines. ... quite specific interventions and single countries.” TOR for this research (DFID, 2013)

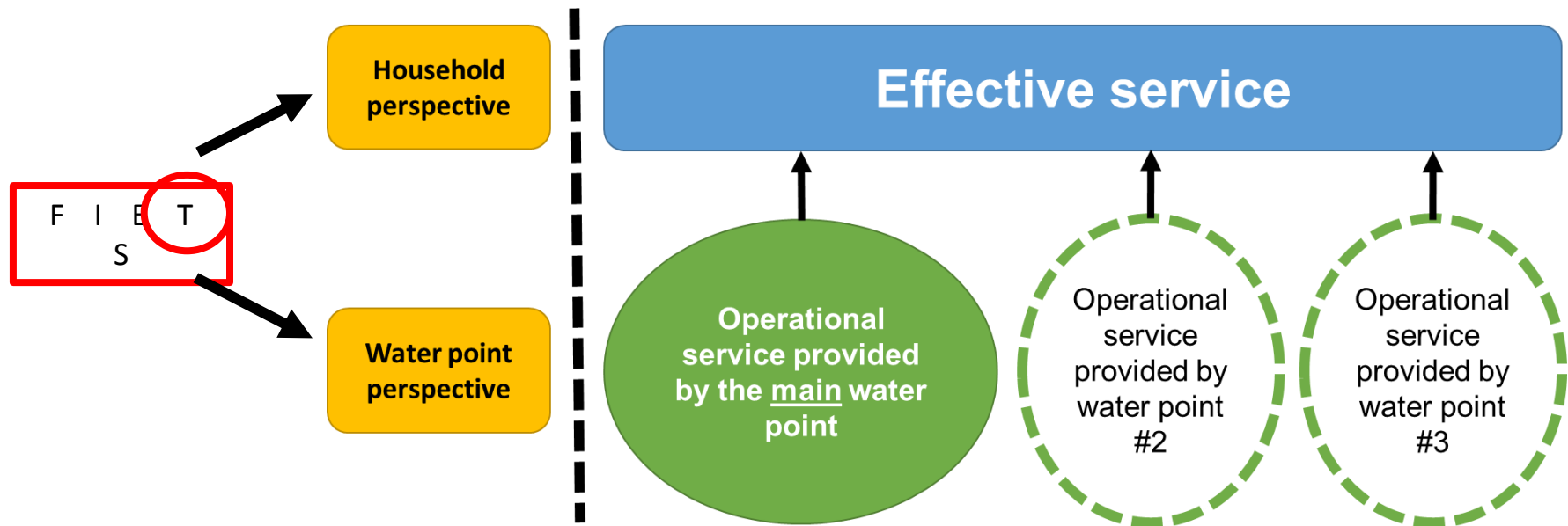
Background: RWSN (2009) handpump functionality estimates

Message – RWSN estimate very influential / useful, but reliability of “36% non-functional” is unknown (mostly based on expert opinion, unknown definitions)

Country	Informant	Estimated Rural Pop. (millions) ¹	Estimated Rural Coverage ¹	Estimated Rural Unserved ¹	Estimated % Served by Handpumps	Estimated Number using Handpumps	Total # Handpumps	# Functioning Handpumps	# Non-Funct. Handpumps	% Non-Functioning	Notes
Angola	Dauda	8.6	40%	5.2	90%	3.10	4,500	3,150	1,350	30%	UNICEF estimate
Benin	S Adokpo	3.7	60%	1.5	45%	1.00	6,700	5,200	1,500	22%	
Burkina Faso		10.5	44%	5.9	62%	2.86	22,400	16,800	5,600	25%	UNICEFCountry Profiles
Cameroon	J.Rihouey	7.7	41%	4.5	50%	1.58	9,000	6,750	2,250	25%	Estimate J. Rihouey
DRC	G. Kazad	35.3	29%	25.1	4%	0.41	1,500	500	1,000	67%	approx. 60% use springs
Ethiopia	B.Muluneh	58.7	11%	52.2	30%	1.94	30,046	19,667	10,379	35%	DHS 2000/HP # calculated
Cote d'Ivoire		9.2	74%	2.4	80%	5.45	19,500	6,825	12,675	65%	UNICEFCountry Profiles
Guinea		5.5	38%	3.4	85%	1.78	12,500	10,000	2,500	20%	UNICEFCountry Profiles
Kenya	P. Nduati	19.6	46%	10.6	15%	1.35	12,000	8,400	3,600	30%	DHS 2003/Estimates
Liberia		1.7	52%	0.8	75%	0.66	1,350	420	930	31%	UNICEFCountry Profiles 90% functioning rate includes
Madagascar	R.Herivelo	12.5	34%	8.3	19%	0.81	2,500	2,250	250	10%	other service types
Malawi		10.0	62%	3.8	77%	4.77	19,000	11,400	7,600	40%	MICS 2000 + 2006/WHO
Mali	S.Sutton	8.6	35%	5.6	50%	1.51	14,200	9,400	4,800	34%	Unicef summaries/Est.
Mozambique	J.Narkevic	12.6	24%	9.6	82%	2.48	17,000	12,700	4,300	25%	Nat. Water Directorate Data
Niger	I. Sanoussi	9.0	36%	5.8	56%	1.81	7,175	5,025	2,150	35%	Min. Hydraulics 2005 for # HP
Nigeria	B.Aleobua	65.3	49%	33.3	35%	11.20	80,000	40,000	40,000	50%	JMP and UNICEF sources/Est.
Sierra Leone		3.0	46%	1.6	55%	0.76	2,500	875	1,625	65%	Unicef summaries/Est./MICS2005
Uganda	S.Mutono	22.0	52%	10.6	60%	6.86	30,000	24,000	6,000	20%	
Zambia	P. Harvey	7.0	36%	4.5	54%	1.36	15,000	10,200	4,800	32%	MLGH estimate
Zimbabwe	P.Morgan	8.5	74%	2.2	60%	3.77	38,200	26,800	11,400	30%	UNICEF inventory/estimate
Totals		319	38%	197	45%	55.5	345,071	220,362	124,709	36%	

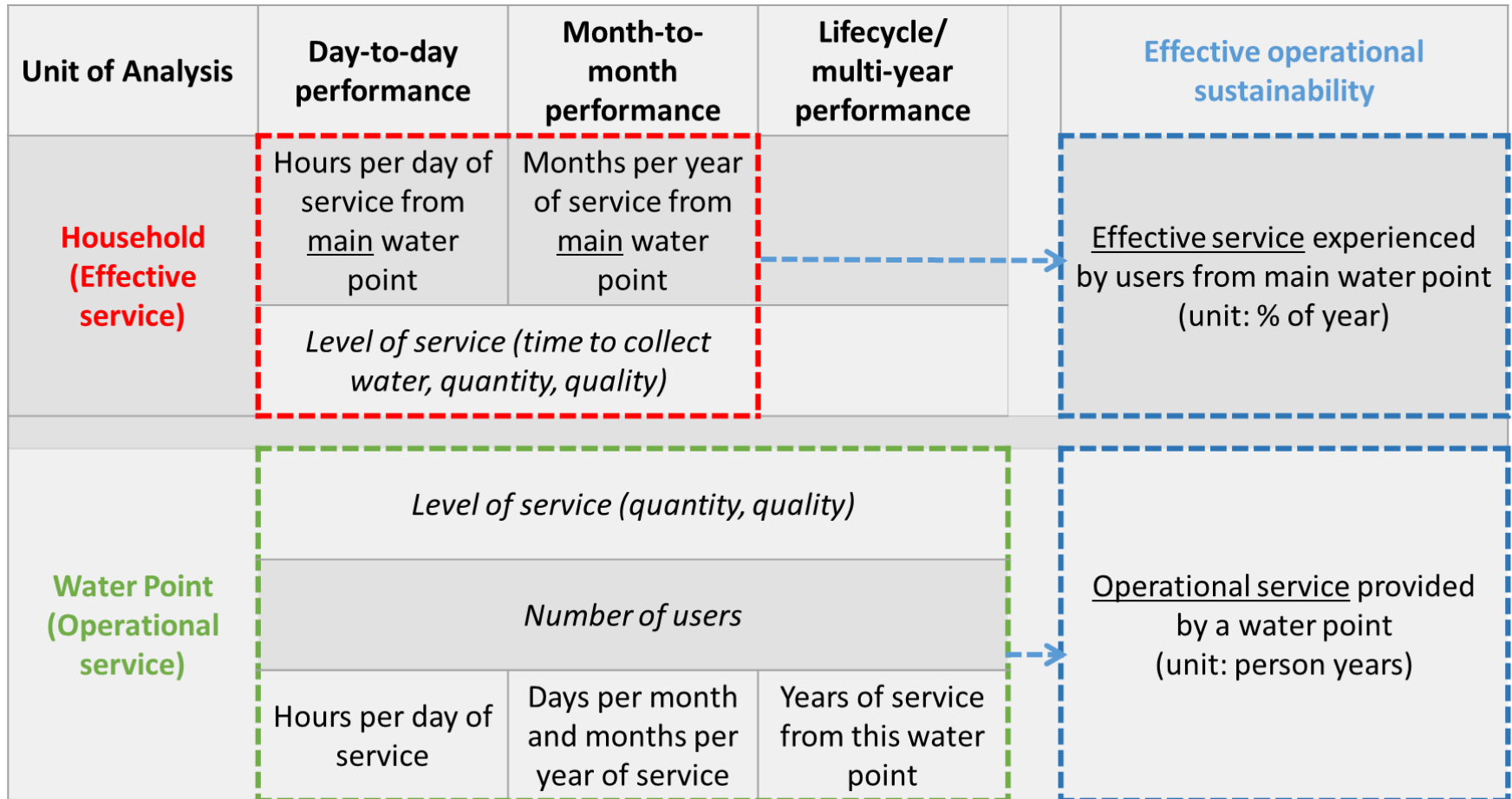
Definitions of (i) sustainability, and (ii) operational sustainability

“**Sustainability** is about whether or not WASH services and good hygiene practices continue to work and deliver benefits over time.” (DFID, 2011, after WaterAid, 2011, after Len Abrams)



“**Operational sustainability** is one dimension of the broader concept of service sustainability. The operational dimension is specifically concerned with the functionality of water and sanitation systems over time (operational service) and how these contribute to household’s experience of effective service over time (effective service).” (VFM-WASH, 2015)

Conceptual framework: operational sustainability



2. Methodology

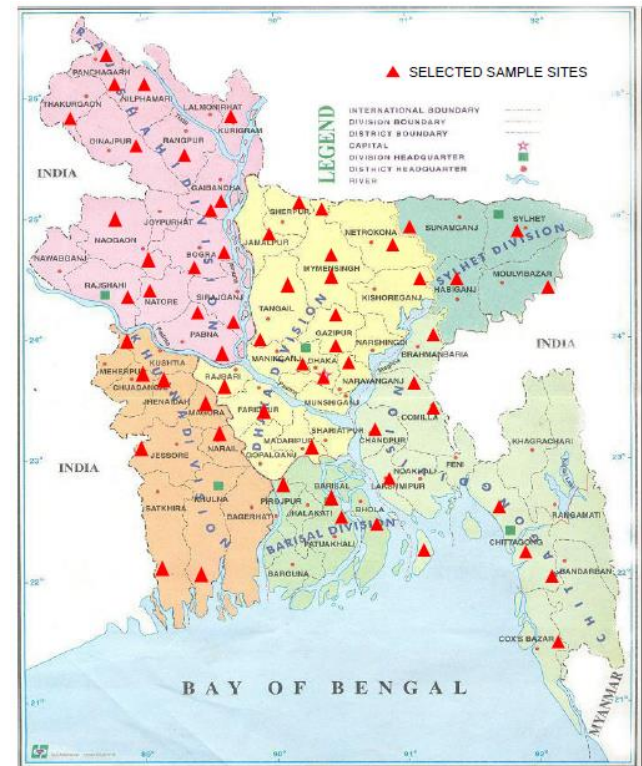
Methodology for VFM-WASH surveys in BGD, ETH, MOZ, PAK

Two units of analysis

- Households (HHs)
 - **National** representativeness of **rural** areas (some exclusions)
 - **1,200 HHs** using cluster random sampling (60 clusters * 20 HHs)
- Water points (WPs)
 - **Visit all "public WPs"** in those 60 clusters
 - c.2-5 WPs per PSU --> c.150-300 WPs per country

Primary sampling units (PSUs) / clusters

- Census enumeration areas
- 'Probability Proportionate to Size'



Survey designed to be rigorous at the household level not for WPs, so the WP sample is not representative.

Instruments and functionality

Power calculation

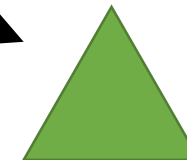
- Indicator of interest: 50%
- Design effect: 2.5
- Cluster size: 16
- Number of clusters: 60
- Margin of error: 5%

Three quant. instruments (plus qual.)

1. Household questionnaire (outcomes)
 - List of WPs used & service levels
 - **Functional at last visit? (yes/no)**
2. Community questionnaire (outputs)
 - List of all public WPs
 - **Functional “usually”? (yes/no/sometimes)**
3. Water point inspection (outputs)
 - Sanitary inspections
 - **Functional at time of enumerator visit? (yes/no)**

Definition of functionality

- Functional = “Water available”
- This is without ref. to
 - Quantity/flow rate
 - Quality/taste
- Blunt and binary – keep it simple when using non-specialist enumerators



WPID = 18873

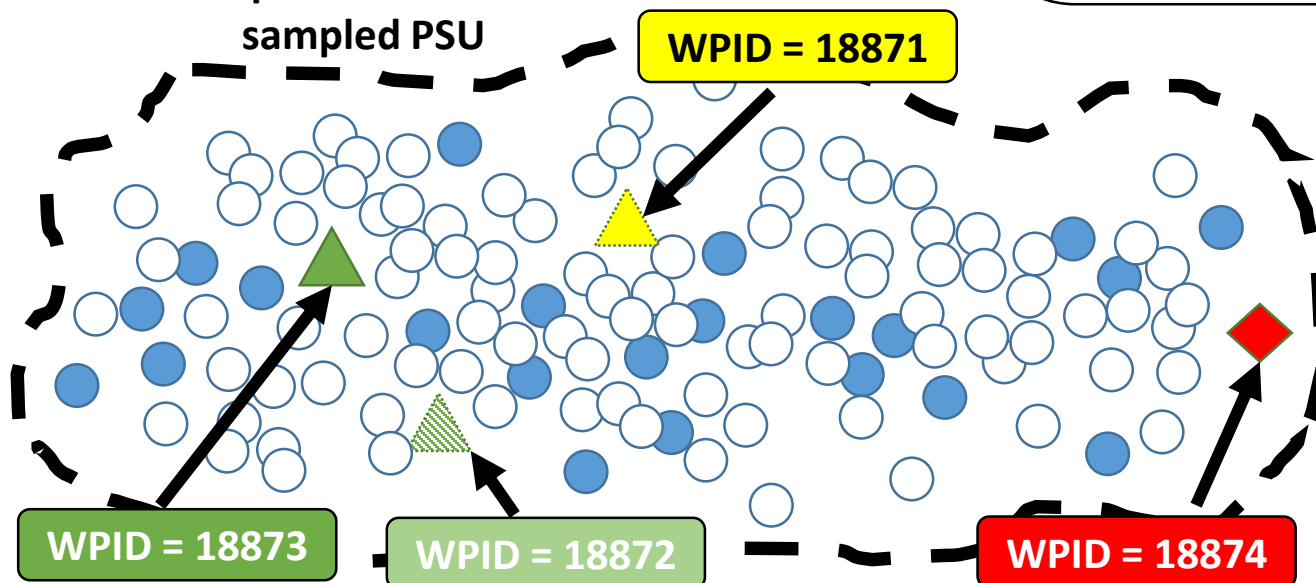
Triangulation of data

A theoretical community / PSU

WPs given ID codes during listing. This lets us triangulate, e.g. estimate number of users for each WP

- ▲ Improved public WP - functional
- ▲ Improved public WP – sometimes functional
- ▲ Improved public WP – non-functional
- ◆ Unimproved public WP
- Sampled HH
- Other HH

Map of theoretical sampled PSU



nb. Private WPs very important in S.Asia. % HHs owning their main WP

- BNG: 60%,
- PAK: 82%

3. Headline results

*(**little time, only headlines are shown** – publications to follow by August 2015. We have a lot more results for water, and results for sanitation as well)*

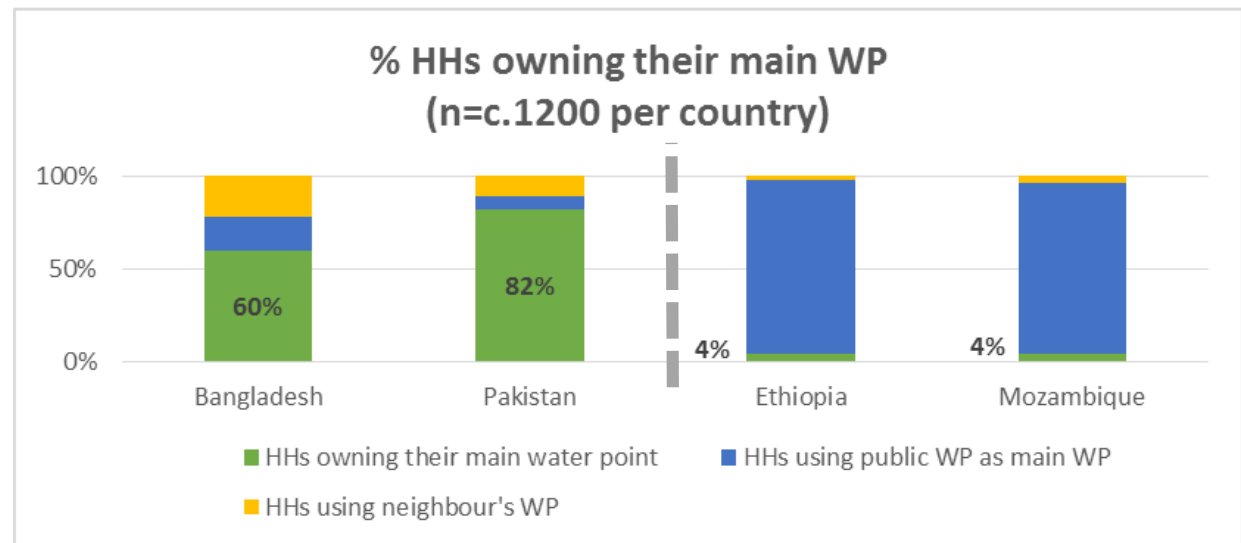
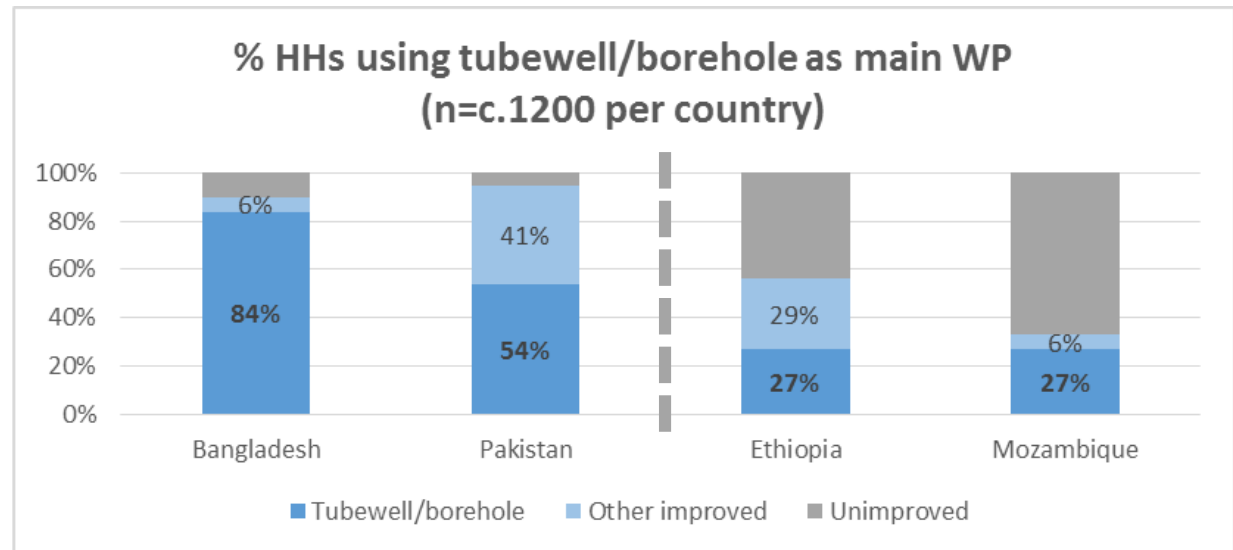
Context – household perspective – use of water by JMP category

In BNG and MOZ, high chance that users of improved WPs are using tubewell / borehole. Less so in ETH/PAK

High reliance on public WPs in Africa. This is low in Asia, where there are very high levels of private WP ownership.

However, note that for HHs ever using a public WP:

- BNG = 45%
- PAK = 18%



Operational sustainability – household perspective – hours/day

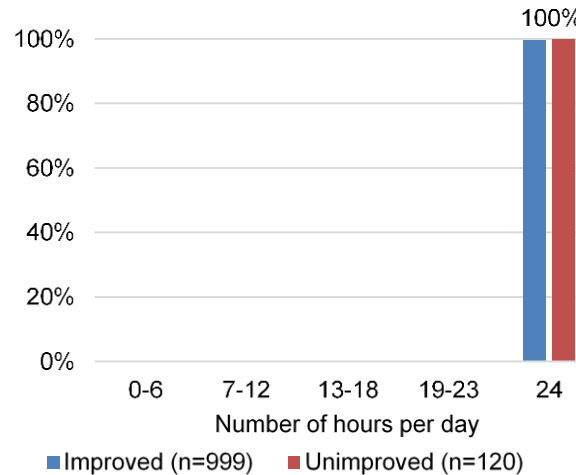
South Asia

Almost 24/24 service in both countries (nb. **rural**). No difference across wealth quintiles

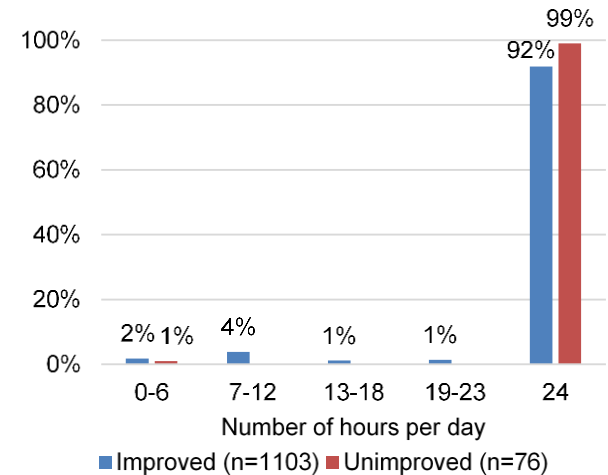
Means:

- BNG – 24.0 hrs
- PAK – 23.0 hrs

a. Bangladesh



b. Pakistan



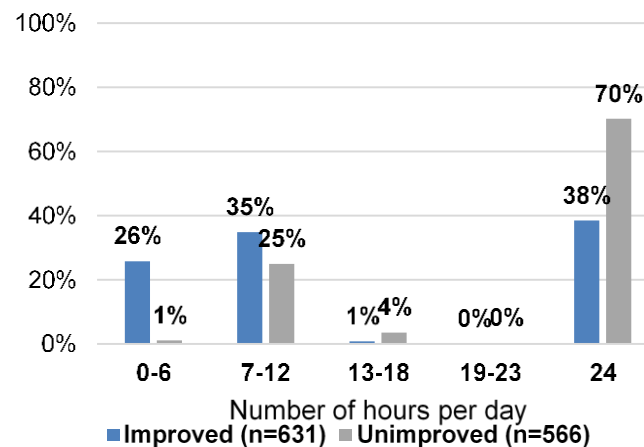
Africa

Some occurrence of low intra-day availability. No difference across wealth quintiles.

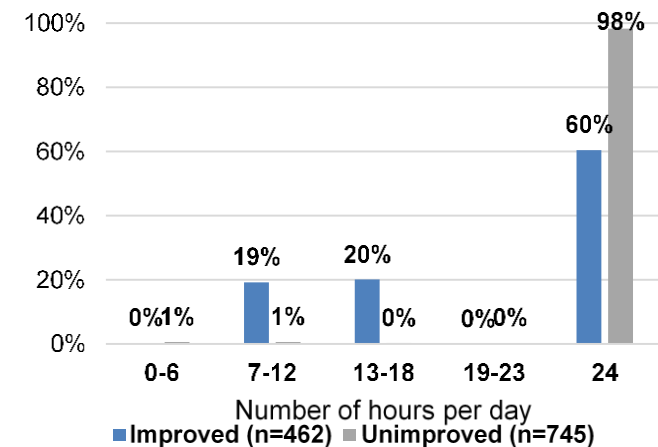
Means:

- ETH - 16.8 hrs
- MOZ - 22.3 hrs

a. Ethiopia



b. Mozambique



Operational sustainability – household perspective – months/year

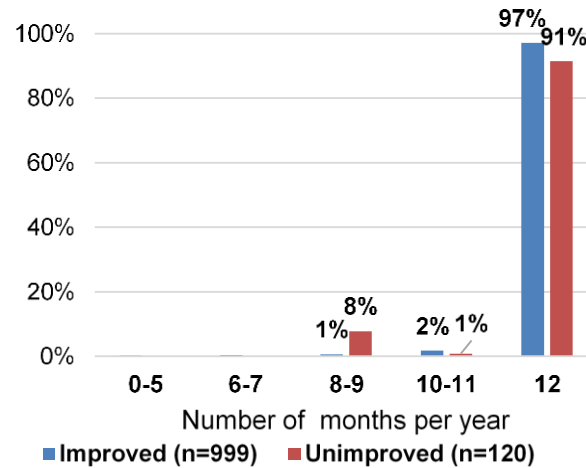
South Asia

Few issues in month-to-month service.

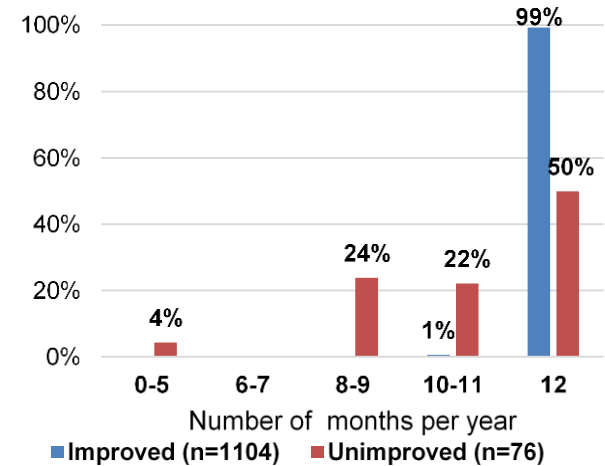
Means:

- BNG – 11.9 mths
- PAK – 11.9 mths

a. Bangladesh



b. Pakistan



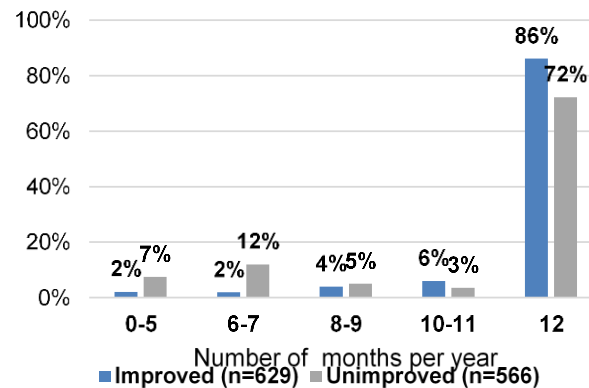
Africa

Significant month-to-month issues but mainly related to HHs using unimproved WP as main WP.

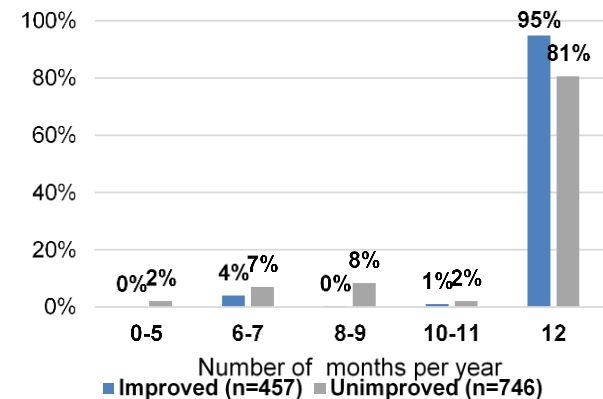
Means:

- ETH – 11.0 mths
- MOZ - 11.3 mths

a. Ethiopia



b. Mozambique



Operational sustainability – water point perspective – functionality

Data from community questionnaire (whether “usually” functional)

	MOZ (n=73)			ETH (n=169)			BNG (n=249)			PAK (n=412)		
	Yes	Sometimes	No	Yes	Sometimes	No	Yes	Sometimes	No	Yes	Sometimes	No
Public tap	86	14	0	81	11	8	-	-	-	19	72	9
Tube well/borehole	74	15	11	85	1	13	89	7	4	77	7	16
Protected dug well	78	0	22	-	-	-	100	0	0	-	-	-
Protected spring	-	-	-	95	3	2	-	-	-	-	-	-

Surprising results from WP inspections for Africa?

cf. RWSN: “one third of handpumps non-functional”

Reasons for high confidence in method:

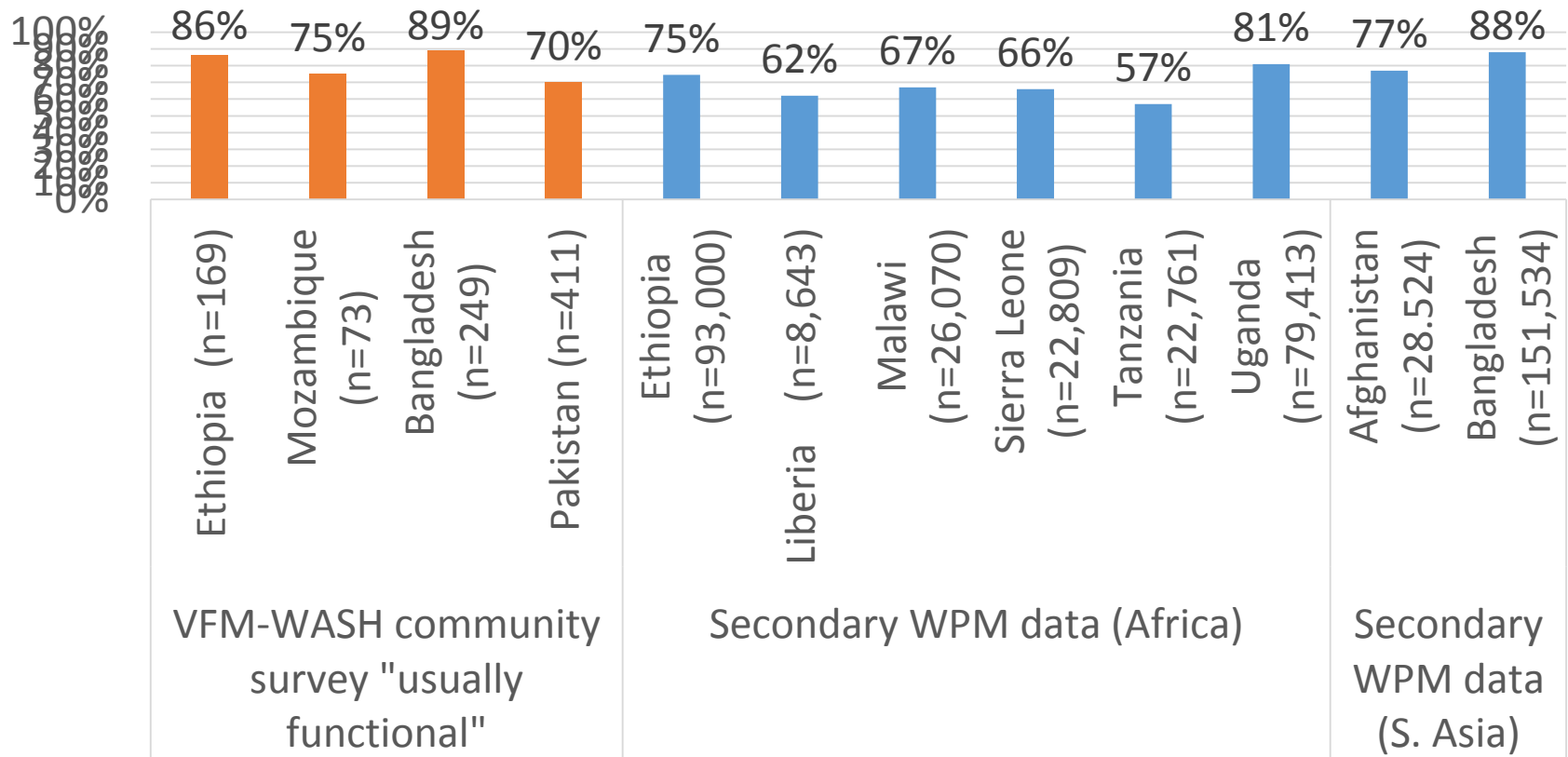
1. Trained enumerators to include even abandoned WPs if physical evidence
2. Triangulation check using WP IDs - HH view and community view on functionality concurs in >95% cases

BUT our WP sample not representative of all WPs in the country, so can't really draw strong conclusions

Data from WP inspection (enumerators visit all public WPs)

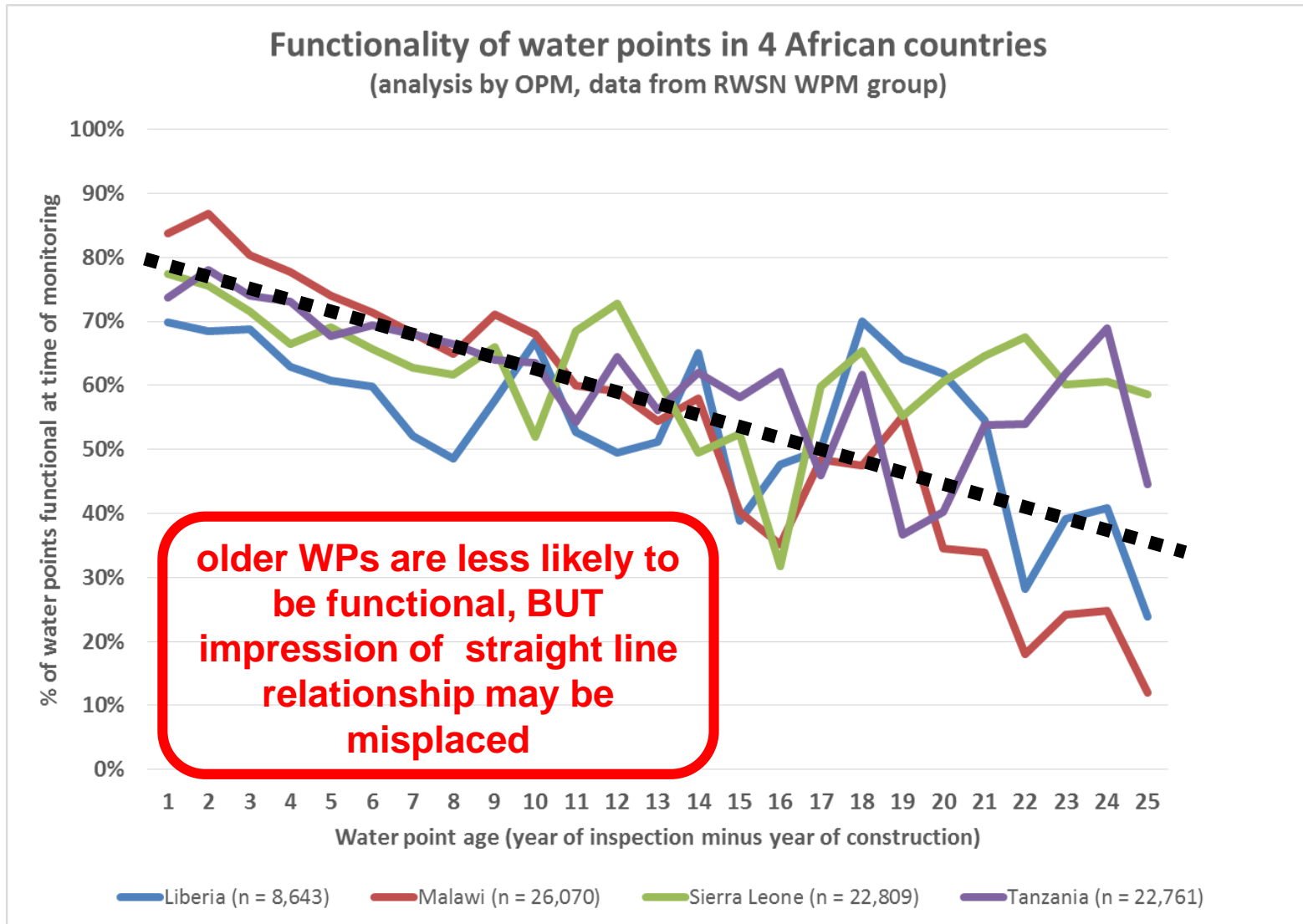
	MOZ	ETH	BNG	PAK
% improved public WPs functioning at time of survey (from inspection)	96%	92%	89%	70%

Operational sustainability – water point perspective – secondary data

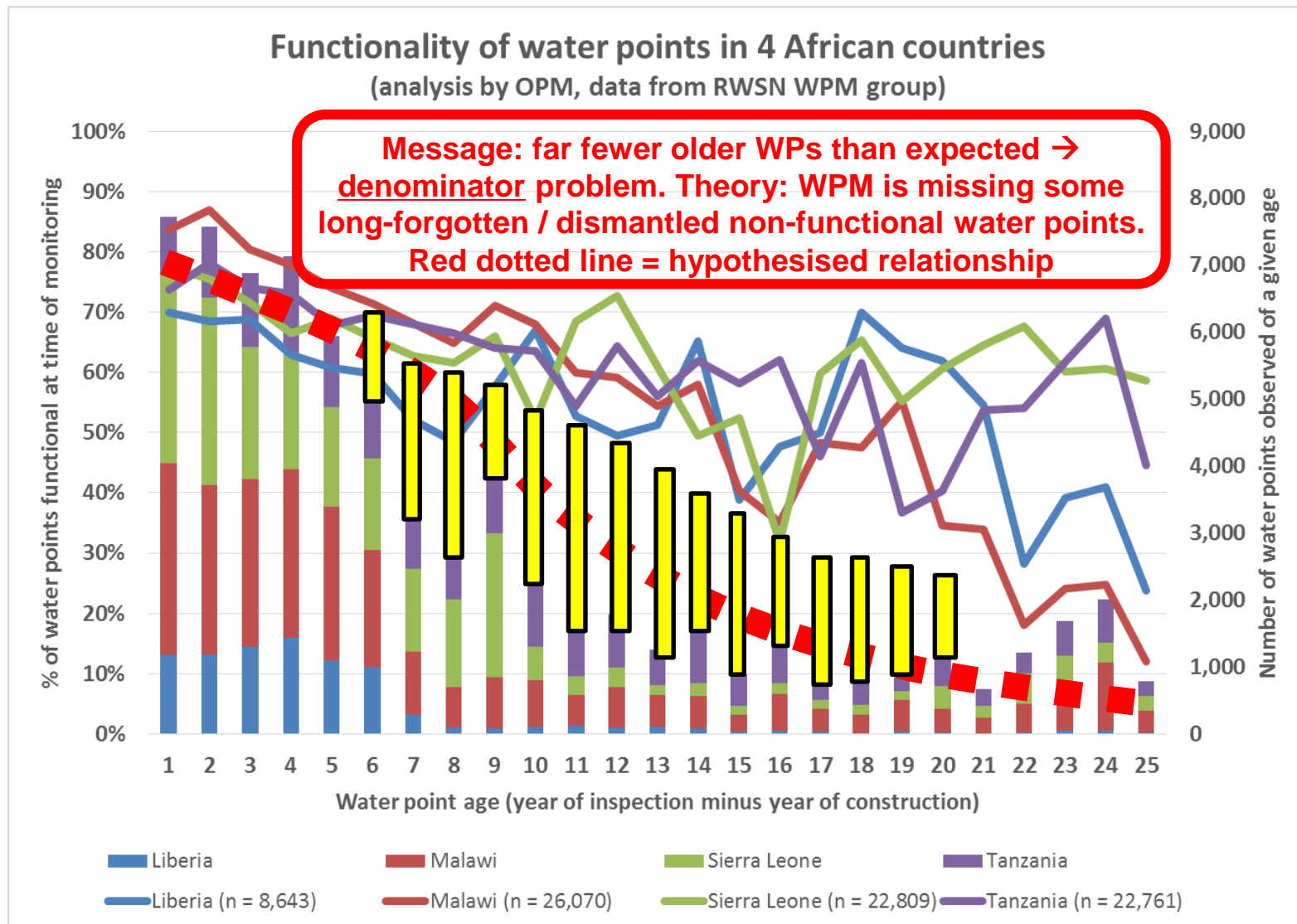


- Six WPM datasets in **Sub-Saharan Africa** found functionality ranges between **c.60-80%** (slightly lower than VFM-WASH “usually functional” data)
- Many **biases inherent in estimating mean functionality** (in terms of definitions, scope of data collection and the “denominator problem”)

Secondary data – African WPM – functionality by age



Secondary data – African WPM – functionality by age and no. of obs

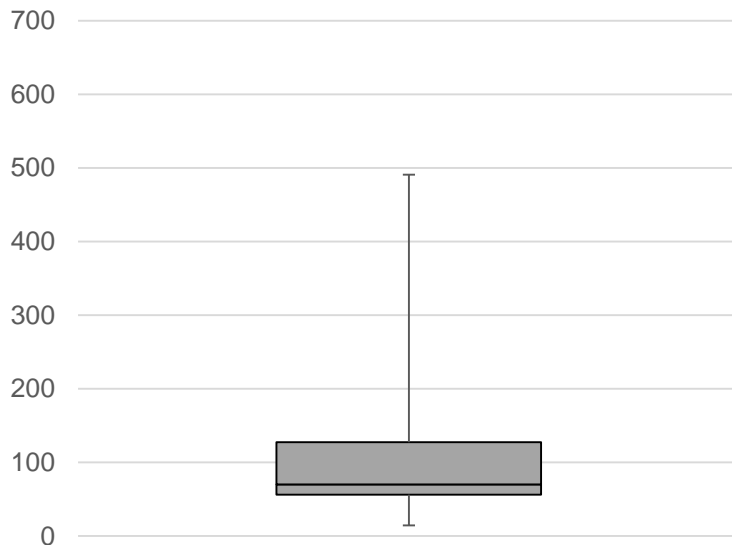


Applications to VFM analysis – number of users per WP

Effectiveness (outputs → outcomes)

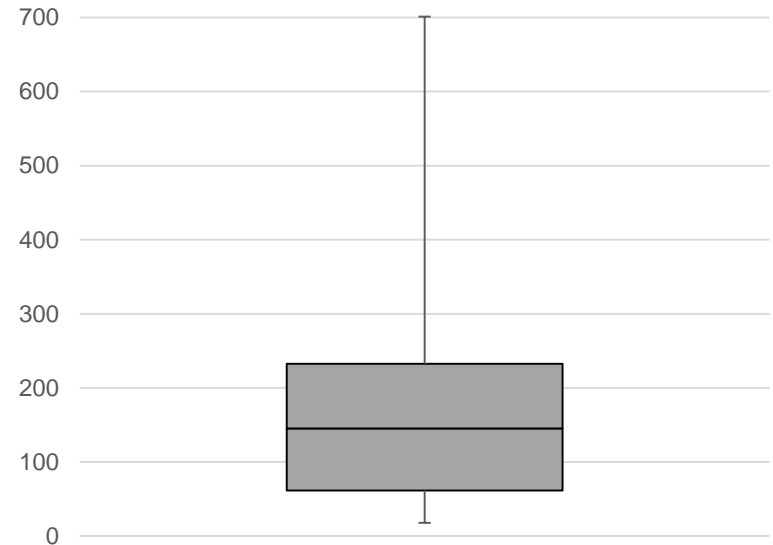
- Governments often use hardware assumptions to calculate beneficiaries
- We triangulate WP IDs with HHs reporting using that WP
- Enables estimation of actual user numbers (calc. using mean HH size)
- *nb.* this is ever using, not just main WP. We could do same for main WP

Bangladesh



Median = 70
Mean = 104
Govt. assumption = 60

Mozambique



Median = 145
Mean = 178
Govt. assumption = 300

Applications to VFM analysis – household sanitation expenditure

Leveraging household contributions for sanitation

- HH survey questions:
 - “Which of the following did your household contribute to build the toilet?” (cash/labour/materials)
 - “If your household spent cash to build the toilet, how much did you spend at the time when it was built?” (local currency)

Household cash expenditure on latrine in Ethiopia

Quintile	Mean (GBP)	No. of households
Lowest	2.96	8
Second	2.16	19
Middle	4.48	29
Fourth	5.98	50
Highest	10.26	80
Total	7.03	186

*Exchange rate: 1 Ethiopian Birr = 0.032 GBP

N. b.: We are excluding all households that did not contribute (i.e. contribution = £0)

Conclusions and next steps

Conclusions:

Household perspective (nb. rural)

- **Day-to-day** – Most rural households in BNG/PAK have 24/7 access, 365 days a year. BUT qualifications around
 - Water quality
 - Equity, e.g. around service levels (round trip time, water quantity, etc.)
- **Month-to-month** – ETH/MOZ households can't get water from their main WP for c.1 month per year on average, and this hits those using unimproved WPs the hardest

Water point perspective

- c.75% - 85% of public improved WPs “usually” functional (community interview), but our WP sample is not representative (designed for HH representativeness).
- Secondary WPM datasets often unclear in definitions & scope
- Denominator problem (kinds of non-functional WPs to be included in analysis) needs further work

Next steps:

- Update regional assessments and share externally before publication (July/August)
- Further detailed data analysis on key research questions for journal articles
- Model the denominator problem to allow estimates of true denominator



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Value for Money and Sustainability in WASH programmes (VFM- WASH)

How can VFM analysis be used in the WASH sector? Evidence from 6 DFID programmes' studies

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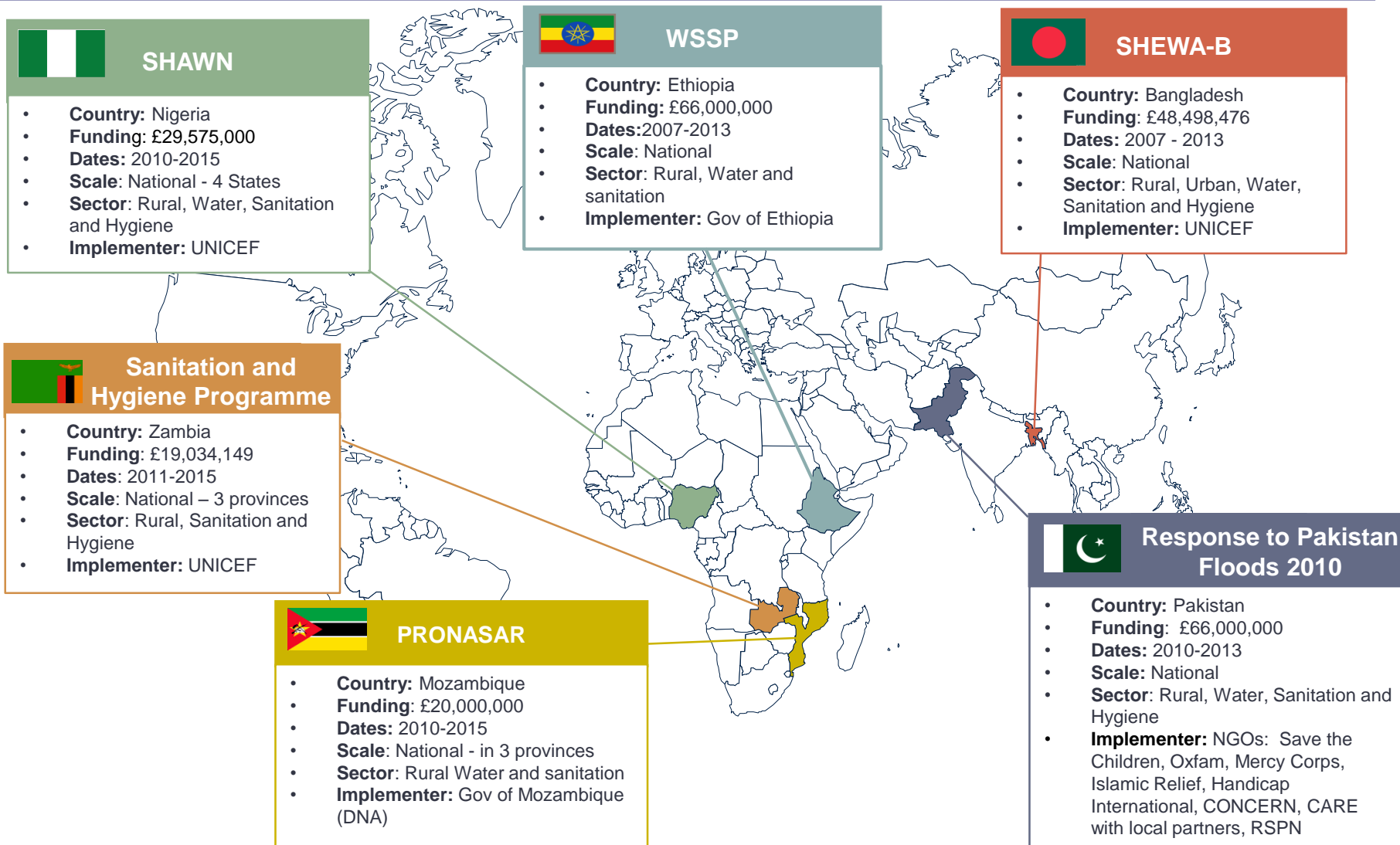
11th May 2015

VFM-WASH research project – Objective 1

- **Objective: identify how VFM and sustainability can be improved in DFID-funded WASH programmes using operational research**
 - Developed a methodology to assess VFM in WASH sector
 - Used the methodology in 6 DFID WASH programmes in 6 countries: Bangladesh, Ethiopia, Mozambique, Nigeria, Pakistan and Zambia
 - Refined methodology and produced a note on how to do VFM analysis for WASH programmes – which could be further expanded

- **Country level activities**
 - Programme visit: interviewed programme stakeholders and sector actors, collected programme data and field visits
 - Remote discussion of results with programme stakeholders
 - Interviews with comparators and collection /discussion of their data
 - Workshop to present results and methodology to sector stakeholders

Six countries, six DFID-funded programmes



What is Value For Money?

Making the best use of available resources so as to achieve **sustained** development outcomes

*“maximising the impact of each pound spent to improve poor people’s lives”
(DFID, 2011)*

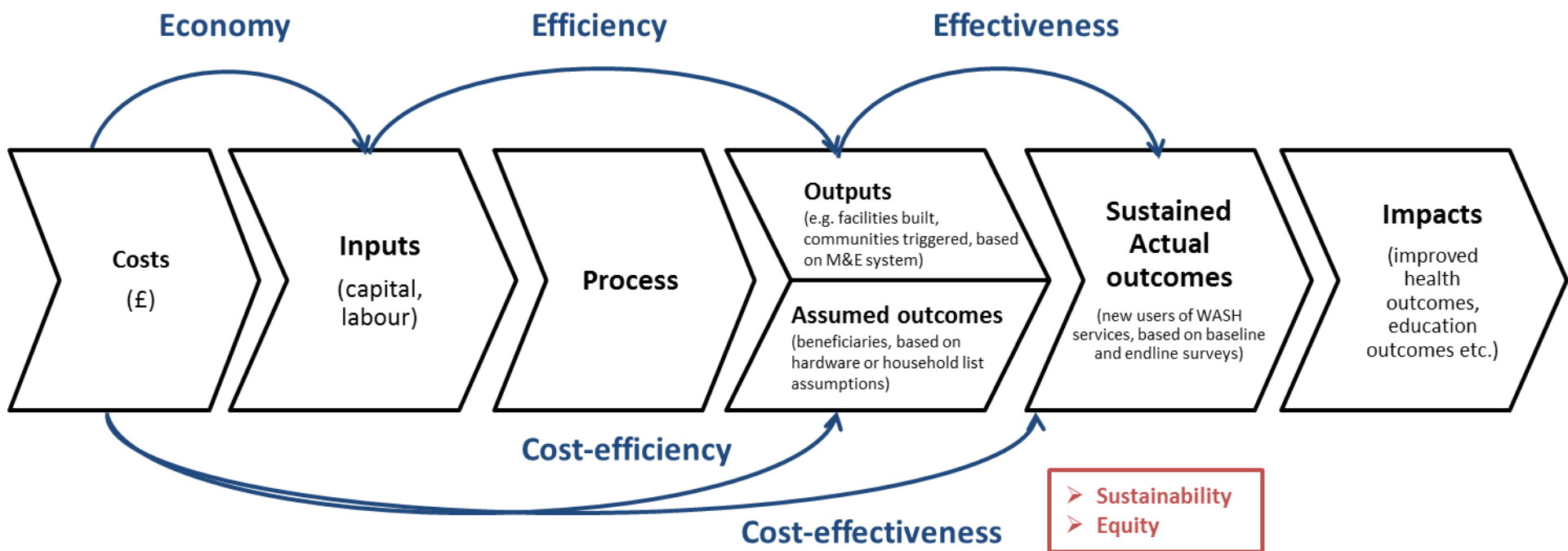
*“optimal use of resources to achieve intended actual outcomes”
(UK Audit Office, 2009)*

VFM is not necessarily about saving money and reducing unit costs:
It is about **maximising** actual outcomes and impacts

How can VFM analysis be used?

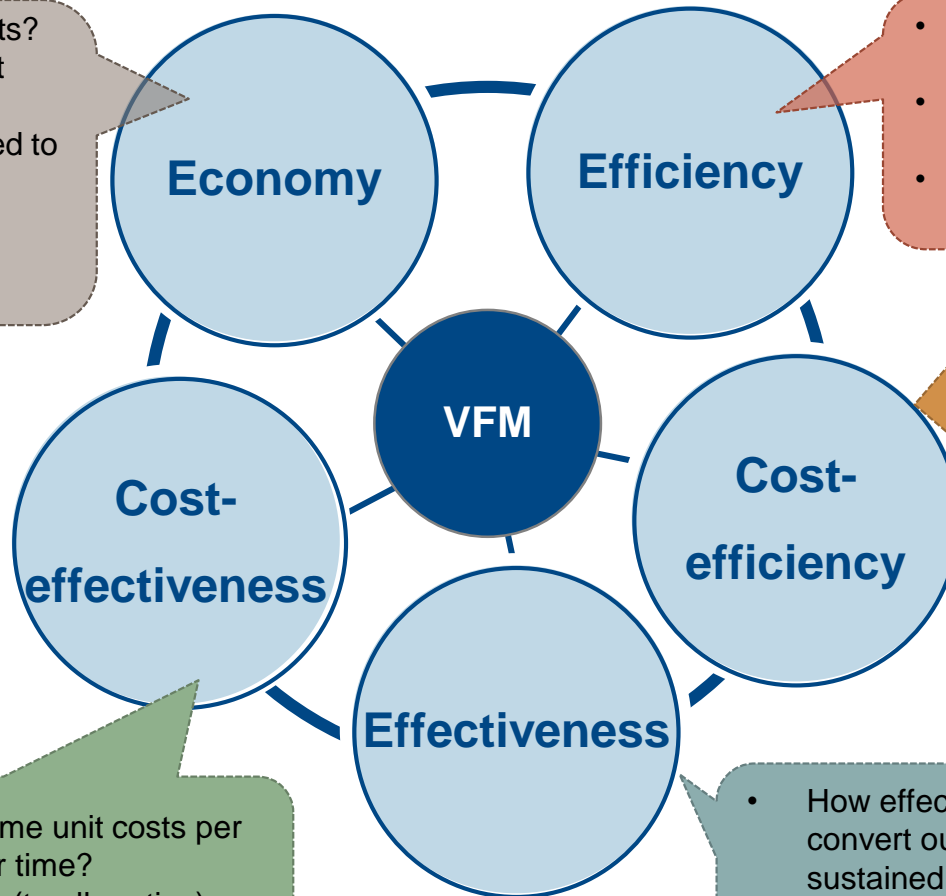
- To create a **culture of transparency** around programme results
- To **monitor the use of public funding**– Accountability to taxpayers
- To **demonstrate results** and **attract funding based on evidence**
- To **help managers better understand** and analyse performance issues they see on the ground, and their associated cost
- To identify **what drives VFM** as part of a broader programme evaluation
- To **improve programming** through evidence-based decisions

Components of VFM : The WASH results chain



Source: Adapted by authors from DFID WASH Portfolio Review (2013)

Key VFM questions



- Unit costs of key inputs?
- Were inputs bought at right quality and right price? When compared to budget and to other organisations?
- Efficiency of procurement?

- How well have inputs been converted into outputs ?
- Have planned outputs been achieved?
- If not, why not? What were key implementation challenges?

- What are unit costs per output (e.g. to build one water point, trigger one community)?
- What are equivalent costs per assumed beneficiary?
- How much funding was leveraged from other sources of finance?

- What are the programme unit costs per actual beneficiary over time?
- What are overall costs (to all parties) per actual beneficiary?

- How effective has the programme been to convert outputs been converted into sustained actual outcomes?
- Are the services from the programme sustainable over time?

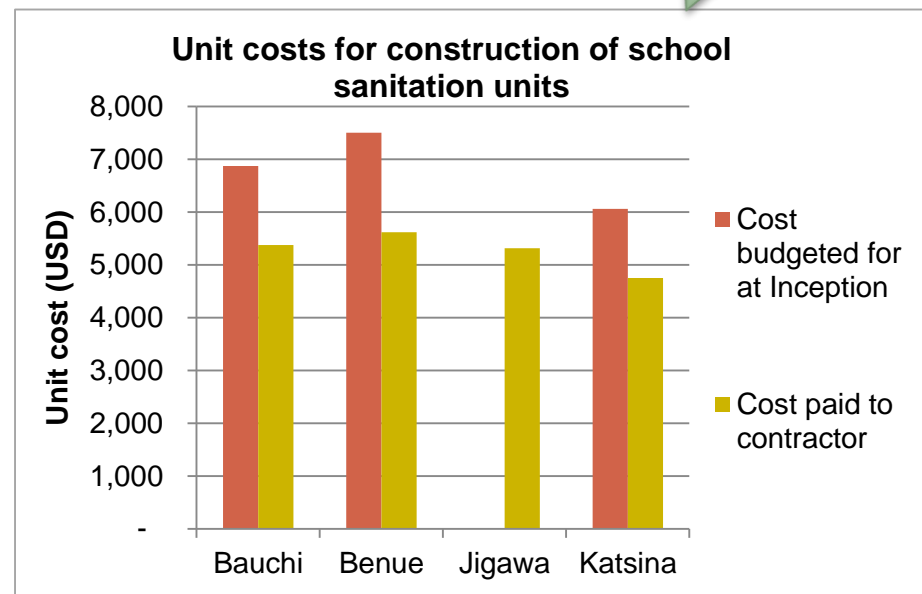
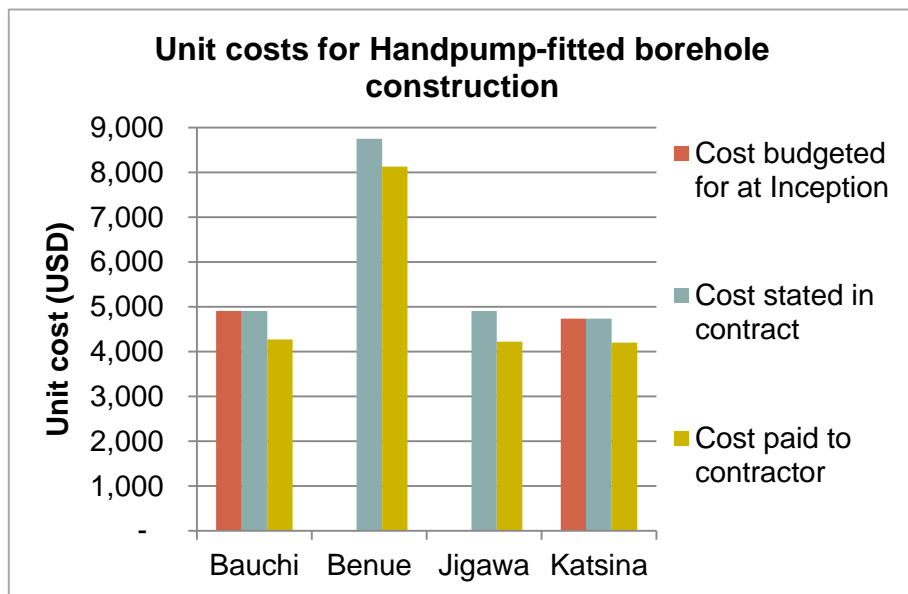
Summary of VFM-WASH findings

VFM indicators: averaged values across years evaluated, incl. Indirect cost for programme support			Bangladesh	Ethiopia	Mozambique	Nigeria	Pakistan	Zambia
			(UNICEF programme)	(Government programme)	(Government programme)	(UNICEF programme)	(NGO humanitarian projects)	(UNICEF programme)
Cost-efficiency								
Water	Outputs	Cost per public water point	\$779	no data	\$23,755	\$6,688	\$361	--
	Assumed outcomes	Cost per person served by a public water point	\$17	\$27	\$79	\$24	\$5.0	--
Sanitation	Outputs	Cost per community triggered by CLTS	--	no data	\$4,035	no data	--	no data
		Cost per community certified / verified as ODF	--	no data	\$11,941	\$5,668	--	\$1,584
	Assumed outcomes	Cost per person served by a new latrine	\$1.5	no data	\$14	\$11	no data	\$3.4
Hygiene	Assumed outcomes	Cost per person with a place for hand-washing	\$7.0	no data	--	no data	--	\$3.5
School WASH	Outputs	Cost per school with functional latrines	\$1,441	--	--	--	--	no data
	Assumed outcomes	Cost per beneficiary of SSHE	\$2	--	--	--	--	no data
Cost-effectiveness								
Water	Sustained actual outcomes	Cost per person using a public water point	\$11.4*	no data	\$122	no data	no data	--
Sanitation	Sustained actual outcomes	Cost per person using a latrine	\$2.3	no data	no data	no data	no data	\$4
Hygiene	Sustained actual outcomes	Cost per person observed HWWS after defecation	\$2.4	no data	no data	no data	--	no data

(*) For Bangladesh, this is the cost per new person who gained access to a higher level of water service and is using it

Economy - Are key inputs bought at the right quality and price?

- Paradoxically little data is available to monitor unit cost of inputs
- Some implementers monitor contract costs (UNICEF in SHAWN, SHEWA-B)



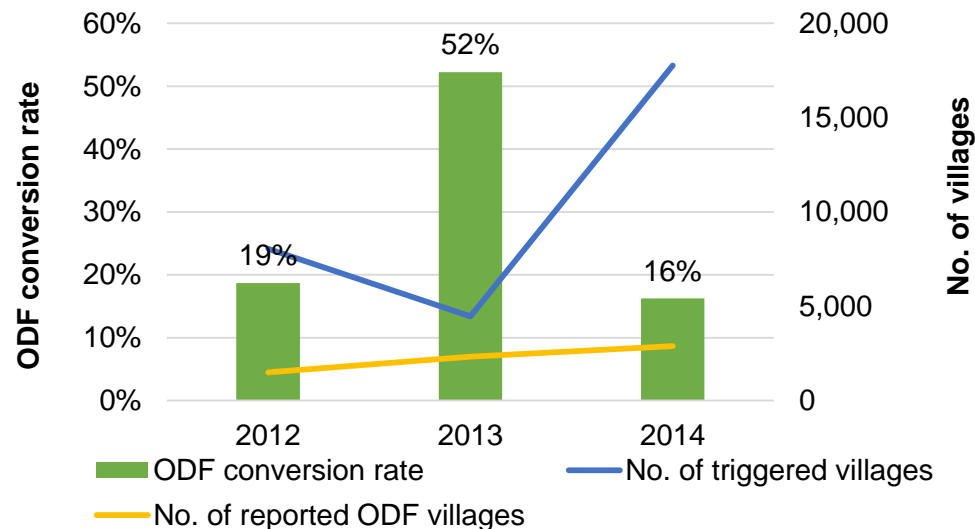
Source: UNICEF cost data. All costs are direct hardware costs and do not include software or indirect costs.

Efficiency - How well have inputs been converted into outputs ?

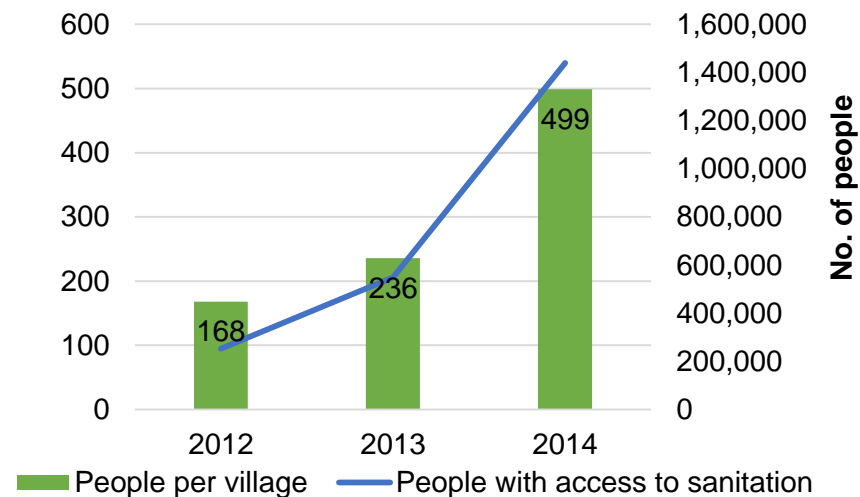
- Answering this question requires detailed M&E output data on the quality and service level achieved which often does not exist
 - As proxy: we calculated planned vs. achieved outputs (imperfect indicator)
 - Example for sanitation : how efficient has the programme been at converting triggered villages into ODF villages ?



No. villages triggered and reported ODF



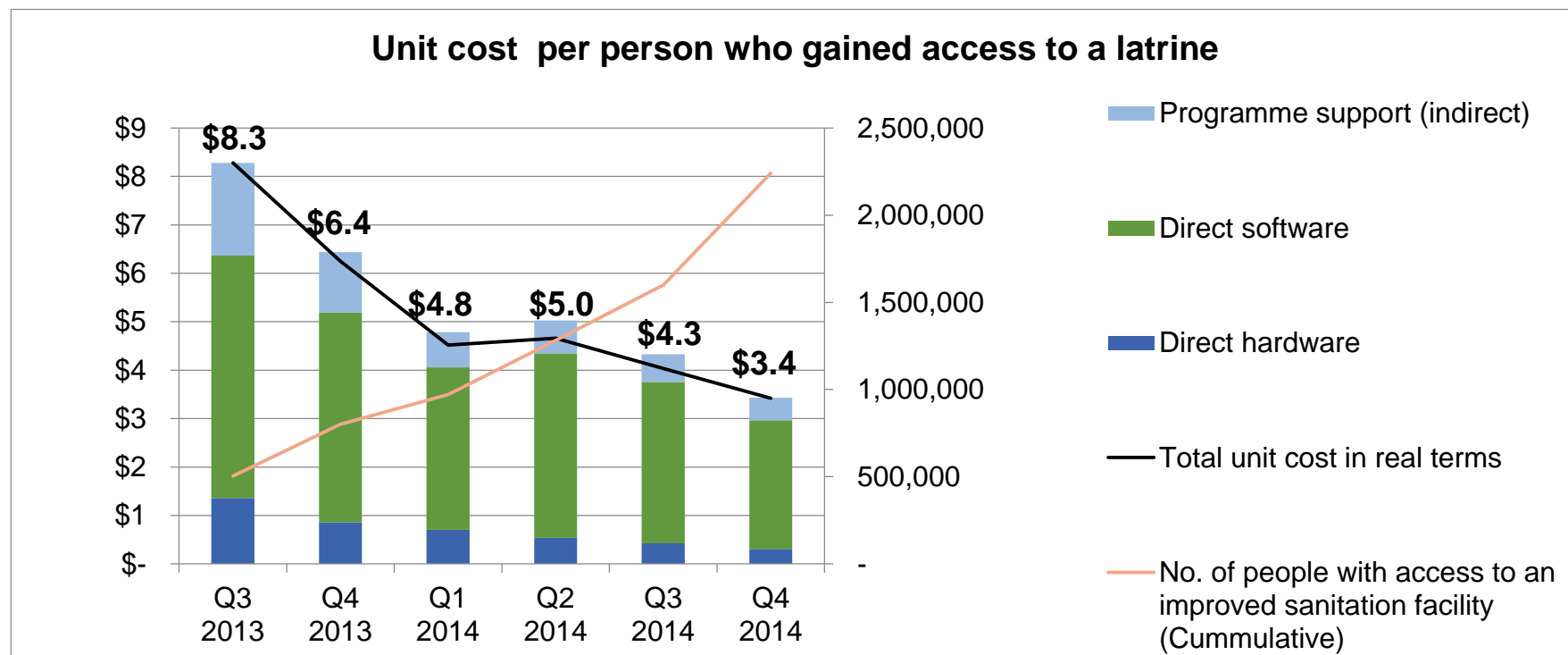
No. persons who gained access to a latrine



Cost- Efficiency – Unit cost per assumed outcomes

Zambia
S&H P

- The unit cost per person who gained access to a latrine has decreased by 58% between Q3 2013 and Q4 2014
 - Unit costs in real terms confirm this finding

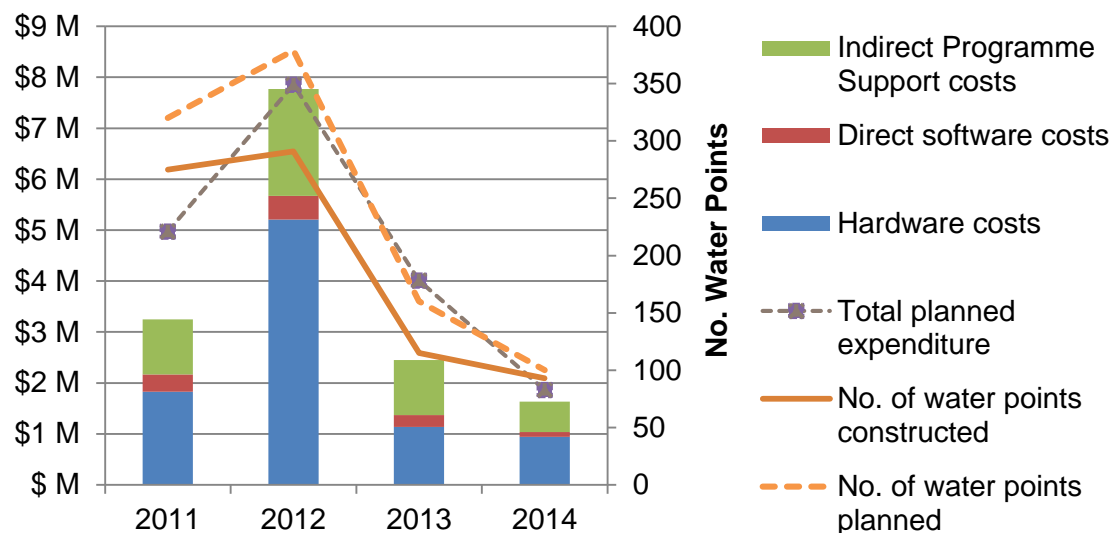


Cost-efficiency – Unit cost per assumed outcome

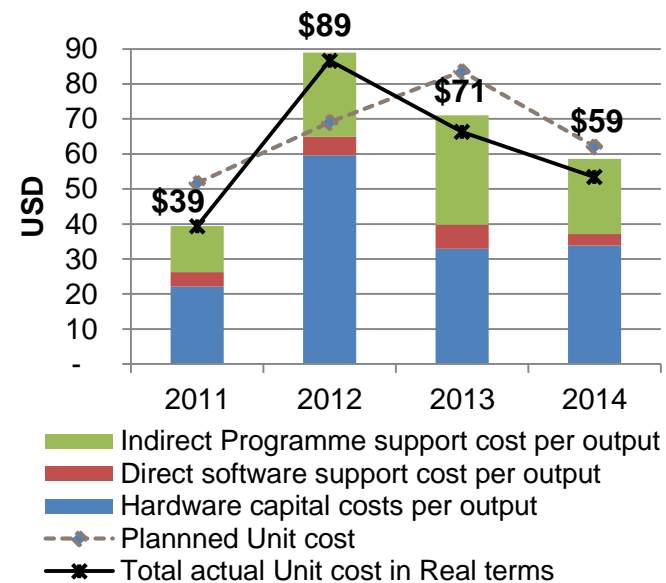
- Example for the water intervention of PRONASAR
 - Unit cost per water beneficiary has decreased by 15 to 20% per year since 2012
 - Mainly due to a reduction in hardware cost per water point
 - Actual average unit cost per beneficiary (2012-14) was higher than planned (\$79 vs \$72)
 - Unit cost expressed in real terms is slightly below unit cost expressed in nominal terms



Water points constructed: Annual expenditure and outputs



Unit cost per assumed water point beneficiary per year



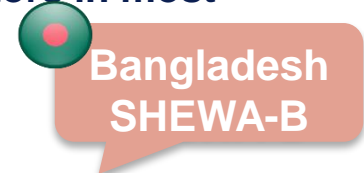
Cost-efficiency and cost-effectiveness

- **Lack of outcome data: Impossible to calculate cost-effectiveness indicators in most cases**

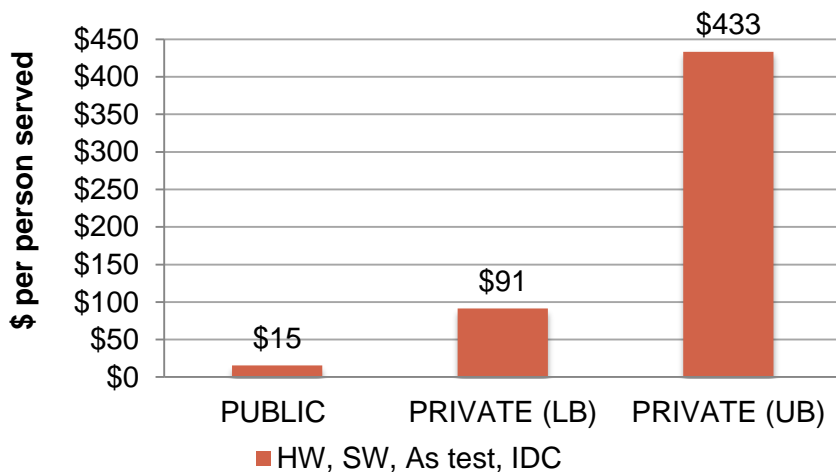
- Outcomes are often estimated based on assumed numbers of “users”

- **Example for a water intervention (SHEWA-B)**

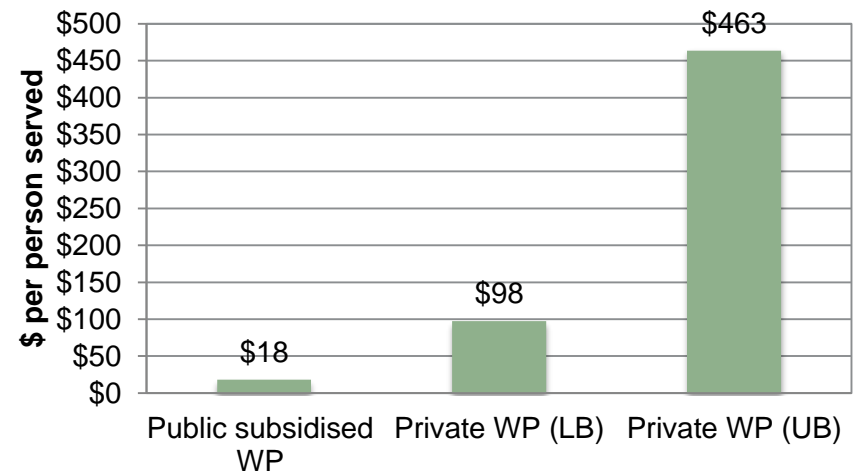
- Because there is almost universal access to improved services, cost effectiveness in this case can be measured in terms of cost per person who gained in water service level, rather than in cost per person who gained access to water
- Only a partially cost-effectiveness indicator
 - Calculated based on number of functional and arsenic-free water points (82.2%)
 - Assumed 13.5 families per water point



Cost-efficiency: Unit Cost per person served with an Arsenic-Safe Water Point (\$)



Cost-Effectiveness: Unit cost per person served with Arsenic-safe and functional Water Point (\$)



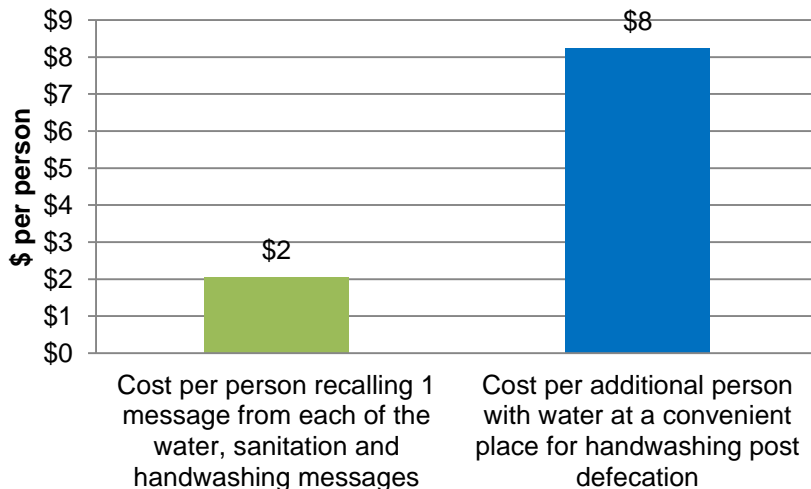
Cost-efficiency and cost-effectiveness



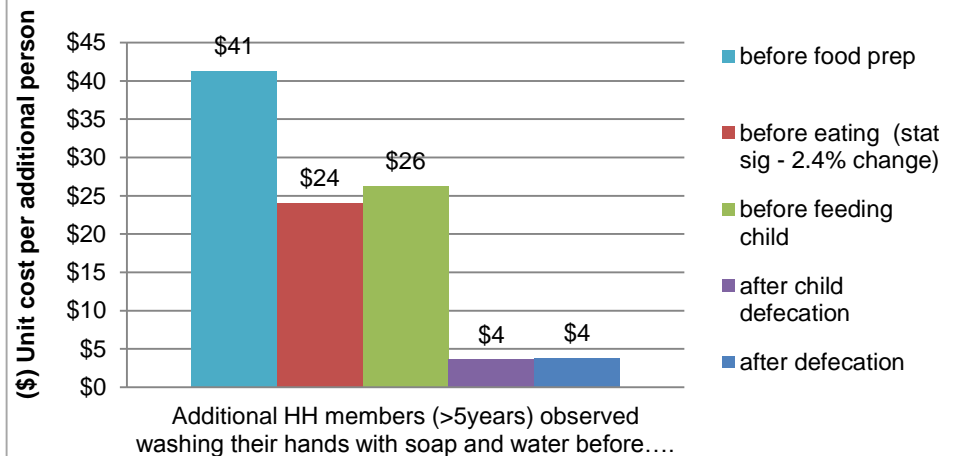
Example for an hygiene intervention - SHEWA-B

- Cost efficiency :
 - Cost per person with water to wash only their hands after defecation (hardware provision)
 - Cost per person who recalls one message of the WASH messages (software)
- Cost-effectiveness of behaviour change

Cost-efficiency of hygiene intervention (\$)



Cost-effectiveness of Hygiene intervention : Observed handwashing with soap and water (\$)



VFM analysis: challenges and solutions

Potential challenges	Potential solutions
<ul style="list-style-type: none">• Programme results are not tracked in manner that is coordinated with cost tracking	<ul style="list-style-type: none">• Link M&E and financial reporting formats• Use contract information or bills of quantities to obtain additional data• Better understand the spending cycle• Shift to activity-based financial reporting
<ul style="list-style-type: none">• Outcome data is seldom collected	<ul style="list-style-type: none">• Support development of M&E frameworks• Complete with ad-hoc surveys
<ul style="list-style-type: none">• Risk of not comparing like with like	<ul style="list-style-type: none">• Collect detailed data on programmes expenditure• Adjust for external differences (inflation / geographical)
<ul style="list-style-type: none">• Variations in VFM are difficult to attribute to a specific cost driver	<ul style="list-style-type: none">• Can only be an indication – not a causal relationship• Undertake more detailed analysis on this driver
<ul style="list-style-type: none">• Non-programme costs that contribute to outcomes are not captured	<ul style="list-style-type: none">• Capture life cycle costs where significant and where possible (in the present case, sought to focus on the most pressing)

Conclusions: can a VFM culture be fostered in the WASH sector?

- **Current status**

- Demand for VFM analysis currently stems from donors: most VFM estimates are based on fairly crude analysis, yielding figures that are usually not comparable
- Programme implementers are not always embracing VFM analysis as they fear that the results be interpreted out of context / used against them

- **But there are clear potential benefits in doing VFM analysis which means that a “change in sector culture” needs to take place**

- Demonstrate potential benefits to programme implementers – so that they adjust their M&E systems and compute VFM data on a routine basis
- Promote a consistent methodology so that comparable figures can be generated on a wider scale and be compared across
- Develop the methodology:
 - ✦ To collect data on non-programme costs
 - ✦ To compare data across time and geographies
 - ✦ To identify and measure VFM drivers



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Thank you

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