

Annex 9C. Cost-Effectiveness and Cost-Benefit Studies on Water, Sanitation, and Hygiene

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Table 9C.1 Cost-effectiveness studies on water, sanitation and hygiene

Country (setting)	Interventions evaluated	Health benefits included	Cost per death averted	Cost per DALY averted	Cost per case averted	Reference
<i>Drinking water</i>						
Rural Uganda (2004)	Household disinfection and storage for HIV people	Diarrhea		US\$ 1,252	US \$5.2	Shrestha, Marseille, and others 2006
Kenya (2009)	Point of use water filters for HIV infected adults	Diarrhea	US\$3,400	US\$ 121	US \$1.3	Kern 2013
South Africa (n.d.)	Point of use water filters	Diarrhea, general population		US\$ 84		Cameron and others 2011
		Diarrhea, children		US\$ 47		
	Centralized water treatment system	Diarrhea, general population		US\$ 466		
		Diarrhea, children		US\$ 141		
Global and regional study* (2005)	Source-based protection	Diarrhea		US\$ 123		Clasen, Haller and others 2007
	Household chlorination	Diarrhea		US\$ 53		
	Household filtration	Diarrhea		US\$ 142		
	Household solar disinfection	Diarrhea		US\$ 61		
	Household flocculation	Diarrhea		US\$ 472		
Global and regional study* (2000)	Household water treatment	Diarrhea		US\$ 24		Haller, Hutton and others 2007

Global and regional (1996)	Safe water supply	WASH diseases	US\$ 1,000 (SSA) to US\$ 23,000 (China)			Larsen 2003
Global (generalized) (2006)	Hand pump or stand post	Diarrhea		US\$ 94		Cairncross and Valdmanis 2006
	House connection	Diarrhea		US\$ 223		
	Water sector regulation, surveillance, advocacy	Diarrhea		US\$ 47		
Sanitation						
Afghanistan (Kabul) (1999)	Latrine improvement (construction or rehabilitation)	Diarrhea	US\$3,436			Meddings, Ronald, and others 2004
Global (2004)	Basic sanitary latrines	Diarrhea		<US\$ 270		Cairncross and Valdmanis 2006
	Sanitation promotion only	Diarrhea		US\$11.15		
Global and regional (1996)	Safe sanitation facility	WASH diseases	US\$ 3,000 (SSA) to US\$ 23,000 (China)			Larsen 2003
Cambodia (2008)	Wet pit latrines, rural areas	Diarrhea, helminthes,	US\$ 16,377	US\$ 433	US\$ 12.3	Hutton and others 2015; Hutton and others 2014
Indonesia (2008)	(cost-effectiveness of other technologies and urban areas presented in Hutton et al (2015))	malnutrition and disease related to malnutrition	US\$ 45,031	US\$ 786	US\$ 4.7	
Lao PDR (2009)			US\$ 18,503	US\$ 953	US\$ 7.5	
Philippines (2008)			US\$ 56,799	US\$ 2,996	US\$ 10.7	
Vietnam (2008)			US\$ 6,965	US\$ 756	US\$ 8.0	
Yunnan Province, China (2009)			US\$ 18,921	US\$ 1,039	US\$ 9.3	
Hygiene						
Burkina Faso (Bobo-Dioulasso) (1999)	Health education for mothers	Health (diarrhea children under 5)	US\$51			Borghi, Guinness, and others 2002

Bangladesh (rural) (1995)	Health education	Health (intestinal parasites)				
Global and regional (1996)	Hygiene improvement	WASH diseases			US\$ 1 spent leads to 0.3% reduction in helminthes	Mascie-Taylor, Karim, and others 2003
Global (1996)	Social marketing and education (SME) on hygiene alone	Child diarrhea	US\$ 1520	US\$44	US\$6.5	Varley, Tarvid, and others 1998
	SME on top of existing hardware		US\$ 689	US\$20	US\$2.9	Varley, Tarvid, and others 1998
	SME and hardware together		US\$ 14253	US\$413	US\$60.1	Varley, Tarvid, and others 1998
Global (2004)	Hygiene interventions	Diarrhea		US\$ 3.4		Cairncross and Valdmanis 2006
<i>Combined Water, Sanitation and Hygiene Interventions</i>						
Guinea (1994)	Latrines and safe water	Health (diarrhea children under 5)		US\$343 (per life year saved)		Jha and others 1998
Global and regional (2000)	Water and sanitation	Health, VOSL, productivity, time savings		-	US\$534	Jha, Bangoura and others 1998
Global (1996)	Software interventions added to existing hardware	Health (diarrhea children under 5)	US\$689	US\$20		Varley, Tarvid, and others 1998
	Hardware and software combined		US\$14,253	US\$413		
	Hardware only		US\$39,720	US\$1152	US\$169	
	Software only			US\$44		

Note: For illustrative purposes, Africa epidemiological stratum E (AFR-E) is shown here

Table 9C.2. Cost-Benefit Studies on Water, Sanitation, and Hygiene

Country (setting)	Interventions evaluated	Benefits included	Economic return per \$ spent	Reference
<i>Water supply</i>				
Global and regional* (2000)	Improved water supply (access)	Time savings, health (diarrhea)	11.5	Hutton and Haller 2004
	Improved water supply and household treatment		15.0	
Global and regional* (2000)	Improved water supply (access)	Time savings, health (diarrhea)	4.9	Hutton, Haller, and others 2007
	Improved water supply and household treatment		6.3	
Global (2006)	Borehole and Public Hand Pump	Time savings, water quantity, health (diarrhea)	3.4	Whittington, Hanemann, and others 2008
	Biosand filters for point-of-use water treatment	Health (diarrhea)	2.9	
	Large multi-purpose dams in Africa	Hydropower, irrigation, carbon offsets, flood prevention	2.5	
China, Henan Province	Central water supply system	Health benefits	4.4	Lou 1990
Multi-country (2012)	Chlorination	Health benefits (morbidity and mortality reduction), time savings, Esthetic benefits	3.5**	Whittington 2012
	Biosand filters		5.7**	
Pakistan, Rural Abbottabad (2011)	Improved water supply	Time savings	0.43	Sher 2012
Global (2010)	Improved drinking water sources (universal access)	Time savings, health (direct and indirect)	2.0	Hutton 2012a
South Africa (1998)	Improved drinking water	Time savings, health costs, education benefits	3.1	Cameron and others 2011
<i>Sanitation</i>				
Global (2010)	Improved sanitation (universal access)		5.5	Hutton 2012a
Global (2008)	Community-led total sanitation (CLTS)	Time savings, health (diarrhea)		Whittington, Hanemann, and others 2008
Global and regional study* (2004)	Basic sanitation	Time savings, health (diarrhea)	6.6	Hutton, Haller and others 2007

Multi-country (model year, 2012)	Total Sanitation	Time savings, health (diarrhea)	2.2	Whittington 2012
Indonesia, Surabaya (2001)	DEWATS + EcoSan	User fees; health	1.1	Prihandrijanti, Malisie and others 2008
	DEWATS + biogas	costs; productivity	0.92	
	STP		0.66	
China (Qing, Beijing) (2007)	Decentralized wastewater treatment and reuse	Project revenue, water saving	3.0	Liang and van Dijk 2008
Philippines, San Fernando city (2006)	UDDT (light materials)	Willingness to pay	0.86	Ignacio 2006
	UDDT(concrete structure)		0.54	
	Pit latrine		1.02	
	Flush toilet to septic tank		0.36	
Uganda, Kabale (2007)	UDDT	Health, environmental, reuse	NPV = - US\$345 to +US\$111	Schuen, Parkinson, and others 2008
	VIP		NPV = - US\$124 to - US\$492	
	Sewerage		NPV = - US\$890	
South Africa, eThekweni (2007)	UDDT	Health, environmental, reuse	NPV = - US\$1,518	Schuen, Parkinson, and others 2008
	VIP		NPV = - US\$1,148	
	Sewerage		NPV = - US\$1,578	
Burkina Faso, Ouagadougou (2007)	UDDT	Health, environmental, reuse	NPV = - US\$396 to - US\$560	Schuen, Parkinson, and others 2008
	VIP		NPV = - US\$842 to - US\$380	
	Sewerage		NPV = - US\$1,055	
Pakistan, Rural Abbottabad (2011)	Sanitation	Time savings, health (diarrhea)	1.04	Sher 2012
Cambodia (2008) Indonesia (2008) Lao PDR (2008) Philippines (2008) Vietnam (2008) China (2009)	Wet pit latrines, rural areas	Health (diarrhea,	2.8	Hutton and others 2015; Hutton and others 2014
		helminthes,	7.0	
		trachoma,	8.2	
		malnutrition), time	7.8	
		savings, water costs	8.0	
		averted, excreta reuse	6.2	
Hand washing				
Multi-country (2012)	Hand washing	Health (diarrhea)	2.6	Whittington 2012

Global and regional (2000)	Water and sanitation	Health; VOSL; productivity, time savings	6.0	Hutton, Haller, and others 2007
Africa-wide, Uganda, Rwanda, Ethiopia (2006)	Integrated biogas, latrine and hygiene programme	Fuel, health, productivity, VOSL, forest, greenhouse gases, time, lighting	> 4.5	Renwick, Sagar, and others 2007
China (rural areas of East Fujian)	Drinking water, health education and community outreach (environmental interventions)	Health benefits	4.9 – 6.5	Xiao, Lin, and others 1997

Notes: VOSL – value-of-statistical-life

For illustrative purposes, Africa epidemiological stratum E (AFR-E) is shown here

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