

## Conceptualisation of MUS from the health economic perspective

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### Introduction

- Domestic and non-domestic uses require different quality and quantity of water
- Water quality required for domestic uses

   Drinking, cooking, food prep, HW HIGH
  - Showering & other kitchen uses MEDIUM-HIGH
  - House cleaning MEDIUM

International

- Water quality required for agricultural uses
  - Animal watering MEDIUM
  - Irrigation LOW-MEDIUM

### Health issues with D+ and I+

- Domestic+
  - Starting point: already improved DW source
  - Need to increase quantity for irrigation
    - New water sources may need to be tapped, due to low yielding sources (shallow well, rainwater harvesting)
  - Safeguarding (and improving) health
    - *Either* do not treat water off-site, and introduce point-of-use (POU) treatment at household level
    - Or separate systems from source, different quality
    - Or provide high quality water for all purposes

### Health issues with D+ and I+

- Irrigation+
  - Does I+ presuppose no existing improved DW source?
    - If none opportunities for low cost gains
    - If some marginal gains may be limited
  - Assume none, and I+ has to deliver water to HH
    - *Either* off-site treatment of <u>all</u> water (e.g. Well treatment)
    - Or off-site treatment HH water only (separation)
    - Or introduce POU treatment at household level

### Major water quality issues

- Will D+ or I+ lead to separate or combined water supply systems
  - Comparative costs

International

- Minimim water quality for each use
- How reliable and cost-effective is POU treatment?

 Review:
 Interventions to improve water quality for preventing diarrhoea (Sept 05 Version 01)

 Comparison:
 02 Water quality intervention versus control, by type of intervention

Outcome: 01 Diarrhoea, all ages

Support         Support         Support           Support         -0.1863 (0.0795) Attr 1980         -0.2877 (0.025) 3.06 (0.077)         -0.798 (0.2025) 3.06 (0.077)         -0.798 (0.2025) 3.06 (0.077)         -0.65 (0.45 (0.470, 0.60) 3.05 (0.45 (0.470, 0.421) 3.05 (0.45 (0.45 (0.470, 0.421) 3.05 (0.47 (0.200, 1.13) 3.05 (0.47 (0.400, 1.200) 3.05 (0.47 (0.45 (0.400) 3.05 (0.47 (0.45	Study or sub-category	log[ratio] (SE)	ratio (random) 95% Cl	Weight %	ratio (random) 95% Cl
Alam 1989 -0.1663 (0.0755) Att 1980 -0.277 (0.0252) Att 1980 -0.277 (0.0252) Att 1980 -0.578 (0.075, 0.641) Att 1980 -0.657 (0.080) 2.75 (0.72, 0.80) 2.75 (0.72, 0.81) 2.75 (0.72, 0.81) 2.76 (0.72, 0.81) 2.76 (0.72, 0.92) 2.76 (0.72, 0.92) 2.77 (0.25, 0.92) 2.79 (0.41, 0.60, 0.92) 2.90 (0.41, 0.60, 0.92) 3.00 (0.17, 0.52) 2.91 (0.62, 0.92) 2.92 (0.79 (0.62, 0.92) 2.94 (0.60, 0.92) 2.94 (0.6	01 Source Treatment				
Az: 1980 - 0.2277 (0.0325) - 0.2775 (0.0325) - 0.2277 (0.0325) - 0.2277 (0.0325) - 0.2277 (0.0325) - 0.2277 (0.0325) - 0.2277 (0.0327) - 0.2277 (0.227) - 0.227 (0.277) - 0.227 (0.277) - 0.2	Alam 1989	-0.1863 (0.0795)		3.00	0.83 [0.71, 0.97]
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Aziz 1990	-0.2877 (0.0329)	-	3.04	0.75 [0.70, 0.80]
Xab 1987 $-0.7985$ $0.0222$ $3.055$ $0.450$ $0.421$ Genam 2003 $-0.0030$ $(0.0222)$ $3.055$ $0.450$ $0.430$ $0.491$ $0.273$ $0.491$ $0.273$ $0.491$ $0.273$ $0.491$ $0.735$ $0.421$ $0.293$ $0.491$ $0.735$ $0.421$ $0.273$ $0.491$ $0.735$ $0.421$ $0.735$ $0.421$ $0.735$ $0.421$ $0.735$ $0.421$ $0.735$ $0.1223$ $0.471$ $0.224$ $0.471$ $0.224$ $0.471$ $0.224$ $0.471$ $0.224$ $0.471$ $0.224$ $0.471$ $0.224$ $0.471$ $0.241$ $0.741$ $0.224$ $0.251$ $0.471$ $0.241$ $0.251$ $0.125$ $0.351$ $0.125$ $0.351$ $0.252$ $0.351$ $0.252$ $0.351$ $0.252$ $0.351$ $0.252$ $0.351$ $0.252$ $0.576$ $0.657$ $0.581$ $0.252$ $0.576$ $0.657$ $0.581$ $0.521$ $0.551$ $0.525$	Messou 1997	-0.5798 (0.2069)		2.75	0.56 [0.37, 0.84]
Gesama 2002 0.0000 (0.0578) Jonana 2003 0.000 (0.0578) Jonana 2003 0.0000 (0.0578) Jonana 2004 0.0000 (0.05788) Jonana 2004 0.0000 (0.05788) Jona	Xaio 1997	-0.7985 (0.0222)	-	3.05	0.45 [0.43, 0.47]
Jensen 2003       -0.0619 (0.1268)       2.93       0.73 (0.55, 1.21)         Vertical (3%) Charter (1)       -0.7550 (0.4476)       1.90 (0.26, 1.13)         Vertical (3%) Charter (1)       -0.7550 (0.4476)       2.02 (0.47 (0.13, 0.22))         Vertical (3%) Charter (1)       -0.7550 (0.4476)       2.02 (0.47 (0.13, 0.22))         Vertical (3%) Charter (1)       -0.7550 (0.4276)       2.03 (0.75, 0.13)         Vertical (3%) Charter (1)       -0.7550 (0.253, 1.12)       2.03 (0.12, 0.47)         Vertical (1)       -1.0499 (0.223, 1.13)       1.99 (0.26, 1.13)         Vertical (1)       -1.0499 (0.223, 1.12)       2.03 (0.12, 0.22)         Claser 2003 (0.12, 0.26)       -1.0499 (0.223, 1.12)       2.03 (0.12, 0.22)         Suttotal (3%) Charter (1)       -0.050 (0.223)       -1.07 (0.08, 1.30)         Vertical (1)       -0.013 (0.7240)       -1.013 (0.22, 2.93)         Austin 1950(mn2)       -0.013 (0.7240)       -2.98 (0.100, 1.02, 2.93)         Austin 1950(mn2)       -0.013 (0.123)       -2.98 (0.26, 0.020)         Charter 2002 (2)       -0.010 (0.223)       -2.98 (0.26, 0.020)         Charter 2002 (2)       -0.023 (0.123)       -2.98 (0.26, 0.26)         Charter 2002 (2)       -0.023 (0.172)       -2.98 (0.26, 0.26)         Charter 2004 (0.102)       -0.253 (0.123)	Gasana 2002	0.0000 (0.0578)	+	3.03	1.00 [0.89, 1.12]
Skatted (8% C) 17.80 1.81 1.81 1.92	Jensen 2003	-0.0619 (0.1288)		2.93	0.94 [0.73, 1.21]
Lest or intercognetity: Let = 13.0 (a) = 5 (4 = 0.00) 27.8 findion URL 1995(erm 1) - 0.7550 (0.4476) URL 1995(erm 2) - 1.0429 (0.4931) Colorer 2003 - 0.6152 (0.3420) 2.35 0.54 (0.24, 0.52] Calibration 2.35 0.54 (0.24, 0.52] Calibration 2.35 0.54 (0.24, 0.52] Calibration 2.35 0.54 (0.24, 0.52] 2.35 0.54 (0.24, 0.52] 2.35 0.57 (0.25, 0.49] 2.35 0.57 (0.25, 0.49] 2.40 (0.25, 0.49] 2.40 (0.25, 0.49] 2.56 0.57 (0.54, 0.30] 2.56 0.57 (0.54, 0.50] 2.56 0.57 (0.54, 0.50] 2.55 0.57 (0.55, 0.67] 2.59 0.57 (0.54, 0.52] 2.59 0.57 (0.55, 0.67] 2.59 0.55 (0.55, 0.67] 2.59 0.55 (0.55, 0.67] 2.59 0.55 (0.55, 0.67] 2.59 0.55 (0.55, 0.77] 2.50 0.55 (0.55, 0.77]	Subtotal (95% CI)	014 00 - W - 5 (D - 0 00004) IB - 00 40	. 🗢	17.80	0.73 [0.53, 1.01]
02 Enterion       0.47 (0.25, 1.13)         UR1 1993(am 0)       -1.0490 (0.4931)         Cleare (Bolvia 1)       -0.755 (0.4476)         Cleare (Bolvia 1)       -0.755 (0.4477)         Cleare (Bolvia 1)       -1.0490 (0.2231)         Jult 1993(am 1)       -0.204 (0.2231)         Jult 1993(am 2)       -0.415 (0.4420)         Jult 1993(am 2)       -0.651 (0.5441)         Jult 1993(am 2)       -0.651 (0.5441)         Jult 1993(am 2)       -0.651 (0.5441)         Jult 1993(am 2)       -0.652 (0.9491)         Jult 1993(am 2)       -0.651 (0.170, 0.93)         Austri 1993(am 2)       -0.651 (0.170, 0.93)         Jult 1993 (0.226, 0.591 (0.2000))       -0.557 (0.093)         Jult 1993 (0.226, 0.591 (0.207, 0.335)       -0.577 (0.629, 1.30)         Jult 1993 (0.226, 0.591 (0.277, 0.325)       -0.577 (0.629, 0.431 (0.127, 0.521 (0.135))         Jult 2004(am 1)       -0.510 (0.1727)       -0.511 (0.177, 0.521 (0.135))         Jult 2004(am 1)       -0.510 (0.172)       -0.511 (0.177, 0.521 (0.135))         Jult 2004(am 1)       -0.510 (0.0001)       -0.510 (0.177, 0.523 (0.142)         Jult 2004(am 1)       -0.510 (0.1225)       -0.57 (0.62, 0.75)         Chard 2004 (0.226, 0.56)       -0.580 (0.461, 1.001       -0.581 (0.462, 0.75)	Test for overall effect: Z = 1	= 314.68, at = 5 (P < 0.00001), P = 98.4% I.92 (P = 0.06)	•		
$ \begin{aligned} & \text{LFL} 1995(mn 1) & -0.755 (0.4476) \\ & \text{LR} 1995(mn 2) & -1.049 (0.4930) \\ & -1.648 (0.930) \\ & -0.648 (0.930) \\ & -0.648 (0.930) \\ & -0.648 (0.930) \\ & -1.636 (0.6440) \\ & -1.636 (0.6440) \\ & -1.636 (0.6441) \\ & -1.636 (0.6461) \\ & -1.636 (0.6461) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.676 (0.6983)) \\ & -2.66 (0.676 (0.678 (0.6983)) \\ & -2.66 (0.676 (0.678 (0.6983)) \\ & -2.66 (0.676 (0.678 (0.6983)) \\ & -2.66 (0.676 (0.677 (0.638) (0.6383)) \\ & -2.66 (0.676 (0.677 (0.638 (0.638)) \\ & -2.66 (0.676 (0.677 (0.638 (0.638)) \\ & -2.66 (0.676 (0.677 (0.638 (0.638)) \\ & -2.66 (0.676 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.677 (0.638 (0.638)) \\ & -2.68 (0.638 (0.638 (0.638)) \\ & -2.68 (0.638 (0.638 (0.63$	02 Filtration				
URL 1995(em 2)       -1.0498 (0.4921)         Claser (Bohis 0)       -0.6126 (0.3420)         Claser (Bohis 0)       -1.2040 (0.2291)         Justicial (8% C)       -1.2040 (0.2291)         Test for overal effect Z = 638 (P - 0.0001)       -0.657 (0.993)         Austin 1938(em 2)       -0.057 (0.993)         Austin 1938(em 2)       -0.058 (0.3841)         School (1980)       -1.0400 (0.2291)         Test for overal effect Z = 638 (P - 0.0001)       -0.057 (0.993)         Austin 1938(em 2)       -0.057 (0.993)         Austin 1938(em 2)       -0.0584 (0.393)         Justin 1938(em 2)       -0.0584 (0.393)         Justin 1938(em 2)       -0.0305 (0.1335)         Claser (2004)       -0.6539 (0.2778)         Justicial (1980)       -1.0492 (0.393)         Course 2003(em 2)       -0.6539 (0.278)         Justicial (1980)       -1.0492 (0.278)         Course 2003(em 2)       -0.6539 (0.278)         Justicial (1980)       -1.0210 (0.1335)         Course 2003(em 2)       -0.6539 (0.228)         Justicial (1980)       -0.211 (0.2286)         Luby 2004(em 1)       -0.2241 (0.1278)         Justicial (1980)       -0.211 (0.0422)         Course 2003(em 2)       -0.618 (0.1409) <t< td=""><td>URL 1995(arm 1)</td><td>-0.7550 (0.4476)</td><td><b>-</b></td><td>2.02</td><td>0.47 [0.20, 1.13]</td></t<>	URL 1995(arm 1)	-0.7550 (0.4476)	<b>-</b>	2.02	0.47 [0.20, 1.13]
College 2002 Classes 2003 Classes (Dokvis 0) - 0.7555 (0.3420) Classes (Dokvis 0) - 1.2040 (0.2291) du Prez 2004 - 1.5656 (0.5841) - 1.2040 (0.2291) du Prez 2004 - 1.5656 (0.5841) - 1.74 (0.21 (0.70, 0.61) - 1.61 (0.70, 0.31) - 2.96 (0.77 (0.32) - 2.96 (0.77 (0.52, 0.95) - 2.97 (0.62, 0.95) - 2.96 (0.74 (0.36) (0.92) - 2.96 (0.74 (0.36) (0.46) - 2.96 (0.63, 0.78] - 2.96 (0.64) (0.22 (0.5) - 2.96 (0.64) (0.64) (0.22 (0.5) - 2.96 (0.64) (0.64) (0.22 (0.5) - 2.96 (0.64) (0.64) (0.23 (0.75) - 2.96 (0.79 (0.64) (0.23 (0.75) - 2.96 (0.64) (0.64) (0.75) - 2.96 (0.64) (0.64) (0.75) - 2.97 (0.64) (0.23 (0.75) - 2.96 (0.64) (0.64) (0.23 (0.75) - 2.96 (0.64) (0.64) (0.23 (0.75) - 2.96 (0.75) (0.46) (0.23 (0.75) - 2.96 (0.75) (0.46) (0.23 (0.75) - 2.96 (0.75) (0.46) (0.23 (0.75) - 2.97 (0.64) (0.23 (0.75) - 2.96 (0.79 (0.64) (0.23 (0.75) - 2.96 (0.75) (0.46) (0.23 (	URL 1995(arm 2)	-1.0498 (0.4931) -	<b>_</b>	1.89	0.35 [0.13, 0.92]
Cleare (2003) Cleare (2004) Cleare	Colford 2002	-0.6162 (0.3420)	<b>_</b>	2.35	0.54 [0.28, 1.06]
Claser (Bolwis 0)       -1.2040 (0.2291)	Clasen 2003	-0.7550 (0.3427)	<b>_</b>	2.35	0.47 [0.24, 0.92]
du Prezz 20041. 5505 (0. 5441) Subtol (95% C) 1. 74 0. 21 [0.07], 0. 61] 1. 74 0. 25 [0.13], 0. 37 [0.28], 0. 49] 2. 90 1. 07 [0.58], 0. 39] 2. 91 1. 07 [0.58], 0. 39] 2. 95 0. 75 [0.33], 0. 31 1. 74 1. 1. 51 [0.13], 0. 31 [0.07], 0. 31] 0. 97 [0.53], 0. 31 1. 74 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Clasen (Bolivia I)	-1.2040 (0.2291)	_ <b>_</b>	2.69	0.30 [0.19, 0.47]
Subtol (95% C) 13. 05 13. 05 14. 07 14. 0	du Preez 2004	-1.5606 (0.5441)	_ <b>_</b>	1.74	0.21 [0.07, 0.61]
Test for intercognenty: Ch <sup>2</sup> = 3.83, df = 5 (P = 0.56), P = 0% Test for overall effect Z = 6.88 (P = 0.00001) 33 Choination Michoir 1985 0.0677 (0.0993) Austin 1993(arm 1) 0.0105 (0.1093) Austin 1993(arm 1) 0.0105 (0.1093) Hindrodz 1988 - 0.6057 (0.0974) Esterization 2.247 (0.55 (0.30, 0.001) Hindrodz 1988 - 0.6057 (0.0974) Carde 2003(arm 2) -0.613 (0.0774) Carde 2003(arm 2) -0.613 (0.0177) Carde 2003(arm 2) -0.610 (0.2255) Carde 2003(arm 2) -0.610 (0.2255) Carde 2004(arm 2) -1.2640 (0.2665) Luby 2004(arm 1) -0.2510 (0.0225) Carde 2004(arm 2) -1.2640 (0.2665) Luby 2004(arm 1) -0.7955 (0.1409) Correct 2004(arm 2) -1.2640 (0.2665) Luby 2004(arm 1) -0.7955 (0.1409) Correct 1986 -0.4155 (0.1409) Correct 1986 -0.4156 (0.1001) Correct 1986 -0.4156 (0.1001) Correct 2097 -0.2357 (0.1551) Subtod (65% C) Test for overall effect Z = 13(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z = 16(P = 0.00001), P = 98.0% Test for overall effect Z =	Subtotal (95% CI)		•	13.05	0.37 [0.28, 0.49]
O: Choination Kirchoff 1985 0.0677 (0.0993) Austin 1993(km 1) 0.0100 (0.8544) 4.1 (0.1000) Handzel 1988 0.0651 (0.1093) 4.1 (0.110, 12, 5.39] L.07 (0.86, 1.30) L.07 (0.86, 1.00) L.07 (0.80, 1.00) L.07 (0.80, 1.00) L.07 (0.80, 1.00) L.08 (0.080) Lasset (0.1970) Lasset (0.1970) Lasset (0.1335) Luby 2004(wm 1) -0.281 (0.138) Luby 2004(wm 1) -0.281 (0.138) Luby 2004(wm 1) -0.280 (0.123) Luby 2004(wm 1) -0.281 (0.118) Luby 2004(wm 1) -0.281 (0.118) Luby 2004(wm 1) -0.281 (0.1409) Luby 2004(wm 1) -0.3711 (0.0425) Luby 2004(wm 1) -0.281 (0.1409) Lasset (0.160, 0.63 (0.52, 0.82) Lasset (0.160, 0.64, 0.69 (0.63, 0.75) Lasset (0.160, 0.64, 0.70) Last for heterogenety: Ch <sup>2</sup> = 0.38(d - 6 (0.50, 0.82)	Test for heterogeneity: Chi <sup>2</sup> Test for overall effect: Z = 6	= 3.93, df = 5 (P = 0.56), l² = 0% 3.88 (P < 0.00001)	-		
0.0 Channels in the second s	00 Oblighter time				
Austin 1390 (sm 1)       0.087 / (0.085 / 1.00)         Austin 1390 (sm 2)       0.010 (0.854 / 1.00)         Handruz 1395 (sm 2)       0.010 (0.874 / 1.00)         Semenza 1398 (sm 1)       0.057 (0.1233)         Quek 1399 (sm 2)       0.0305 (0.1033)         Caret 2003 (sm 2)       0.0327 (9) (2.89 / 1.00)         Reler 2003 (sm 3)       0.0327 (9) (2.89 / 1.00)         Reler 2003 (sm 3)       0.0327 (9) (2.89 / 1.00)         Luby 2004 (sm 1)       0.0228 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 1)       0.0280 (9) (2.28 / 1.00)         Luby 2004 (sm 2)       0.031 (9) (2.28 / 1.00)         Luby 2004 (sm 2)       0.031 (9) (2.28 / 1.00)         Luby 2004 (sm 2)       0.041 (1.00 / 1.11)         Luby 2004 (sm 2)       0.041 (	US Chionnation Kirchoff 1985	0.0677.40.00003	L	2 00	1 07 10 20 1 201
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Austin 1993(ave 1)	0.0677 (0.0993)		2.98	1.07 [0.88, 1.30]
Decamin 1302(m 2)       1.000 (0.0000)         Mathrax 1392       -0.500 (0.0000)         Hendred 1938       -0.4005 (0.1093)         Leg 10.000 (0.0000)       2.95 (0.500 (0.0000)         Care 1938       -0.6521 (0.13704)         Care 1938       -0.6521 (0.13704)         Care 1938       -0.6523 (0.12799)         Care 12003(am 2)       -0.6533 (0.2799)         Care 12003(am 1)       -0.2557 (0.1383)         Peler 2003(am 1)       -0.2521 (0.1272)         Care 12004(am 1)       -0.2521 (0.1279)         Care 12004(am 1)       -0.2521 (0.1228)         Luby 2004(sym 1)       -0.5108 (0.1717)         Luby 2004(sym 1)       -0.5231 (0.1283)         Luby 2004(sym 1)       -0.7958 (0.3203)         Luby 2004(sym 1)       -0.7958 (0.3203)         Luby 2004(sym 1)       -0.7958 (0.3123)         Luby 2004(sym 1)       -0.7958 (0.3123)         Luby 2004(sym 1)       -0.7958 (0.3123)         Luby 2004(sym 1)       -0.661 (0.50, 0.671         Carroy 1959       -0.4155 (0.1409)         Carroy 1959       -0.4155 (0.1409)         Carroy 1959       -0.4155 (0.1409)         Carroy 1950       -0.4155 (0.1409)         Chard 2000(am 1)       -0.2577 (0.151) <td>Austin 1993(arm 1)</td> <td>-0.0513 (0.7240)</td> <td></td> <td>1.31</td> <td>0.95 [0.23, 3.93]</td>	Austin 1993(arm 1)	-0.0513 (0.7240)		1.31	0.95 [0.23, 3.93]
$\begin{array}{c} \text{Marting Ligss} & -0.3576 (0.303) \\ \text{Handzel 1930} & -1.6976 (0.303) \\ \text{Semenza 1930} & -1.6971 (0.3704) \\ \text{Charler 2003(arm 2)} & -0.5621 (0.1978) \\ \text{Ouck 1939} & -0.5621 (0.1978) \\ \text{Ouck 2002} & -0.6539 (0.2799) \\ \text{Charler 2003(arm 3)} & -0.0305 (0.1335) \\ \text{Crung 2004(arm 1)} & -0.2614 (0.1072) \\ \text{Crung 2004(arm 1)} & -0.2614 (0.1072) \\ \text{Luby 2004a(arm 1)} & -0.2616 (0.2295) \\ \text{Luby 2004a(arm 1)} & -1.2040 (0.2806) \\ \text{Luby 2004a(arm 1)} & -0.2786 (0.3123) \\ \text{Luby 2004a(arm 1)} & -0.2781 (0.1138) \\ \text{Subtotal (65% C)} \\ \text{Test for heterogeneity: Ch2 = 6191, df = 15 (P < 0.00001), P = 75.8\% \\ \text{Test for overall effect: Z = 5.05 (P < 0.00001) \\ \text{OS Floculation/Disinfection} \\ \text{Corroy 1986} & -0.4155 (0.1409) \\ \text{Test for overall effect: Z = 9.21 (P < 0.00001) \\ \text{OS Floculation/Disinfection} \\ \text{Felier 2003(arm 4)} & -0.2357 (0.1151) \\ \text{Test for overall effect: Z = 9.21 (P < 0.00001) \\ \text{OS Floculation/Disinfection} \\ \text{Corroy 1986} & -0.4155 (0.1409) \\ \text{Corroy 1986} & -0.4155 (0.1409) \\ \text{Corroy 1986} & -0.4155 (0.1409) \\ \text{Subtotal (65% C)} \\ \text{Test for overall effect: Z = 9.21 (P < 0.00001) \\ \text{OS Floculation/Disinfection} \\ \text{Felier 2003(arm 4)} & -0.2357 (0.1151) \\ Test for heterogeneity: Ch2 = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for overall effect: Z = 1.53 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 188002, df = 37 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 188002, df = 37 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 188002, df = 37 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 188002, df = 37 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Ch2 = 188002, df = 37 (P < 0.$	Austin 1995(arm 2) Mebteur: 1995	0.0100 (0.8544)		- 1.07	1.01 [0.19, 8.39]
$\begin{array}{c} \text{Converse 1938} & -0.4005 (0.1033) \\ \text{Converse 1938} & -0.6521 (0.13704) \\ \text{Converse 1938} & -0.653 (0.2799) \\ \text{Converse 1939} & -0.653 (0.1335) \\ \text{Converse 1938} & -0.653 (0.2275) \\ \text{Converse 1938} & -0.5108 (0.1277) \\ \text{Converse 1938} & -0.5108 (0.1277) \\ \text{Converse 1938} & -0.2537 (0.1138) \\ \text{Converse 1938} & -0.2537 (0.1138) \\ \text{Converse 1938} & -0.3711 (0.0425) \\ \text{Converse 1938} & -0.3711 (0.1221) \\ \text{Converse 1938} & -0.3711 (0.1221) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.3711 (0.1425) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.3711 (0.1425) \\ \text{Converse 1938} & -0.3711 (0.1425) \\ \text{Converse 1938} & -0.3711 (0.1425) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.3711 (0.1425) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.4155 (0.1131) \\ \text{Converse 1938} & -0.4155 (0.1409) \\ \text{Converse 1938} & -0.415 (0.1409) $	Mantouz 1995 Hondral 1998	-0.5978 (0.3050)		2.47	0.55 [0.30, 1.00]
$\begin{array}{c} \text{Selfinitizat 1386} & -1.871 (0.3704) \\ \text{Ouck 1398} & -0.6621 (0.1978) \\ \text{Ouck 1398} & -0.6621 (0.1978) \\ \text{Ouck 1398} & -0.6621 (0.1978) \\ \text{Teller 2003(arm 2)} & -0.3015 (0.1335) \\ \text{Teller 2003(arm 3)} & -0.0305 (0.1335) \\ \text{Curmp 2004(arm 1)} & -0.2614 (0.1022) \\ \text{Ouck 10.1022} & 2.97 (0.75, 1.26) \\ \text{Curmp 2004(arm 1)} & -0.2610 (0.2295) \\ \text{Luby 2004(a(mr 1))} & -0.2231 (0.1138) \\ \text{Test for heterogeneity: Chi2 = 5.05 (P < 0.00001) \\ \text{Orroy 1936} & -0.4155 (0.1409) \\ \text{Corroy 1936} & -0.4155 (0.1409) \\ \text{Test for heterogeneity: Chi2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogeneity: Chi2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogeneity: Chi2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogeneity: Chi2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogeneity: Chi2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogeneity: Chi2 = 0.032 (0.0408) \\ \text{Juby 2004(arm 2)} & -0.2357 (0.1151) \\ \text{Luby 2004(arm 2)} & -0.2357 (0.1353) \\ \text{Suttoful (95\% C)} \\ Test for heterogeneity: Chi2 = 4831, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Chi2 = 4831, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity: Chi2 = 4831, df = 6 (P < 0.00001), P = 99.0\% \\ \text{Test for heterogeneity: Chi2 = 4831, df = 6 (P < 0.00001), P = 99.0\% \\ \text{Test for heterogeneity: Chi2 = 4831, df = 6 (P < 0.00001), P = 99.0\% \\ \text{Test for heterogeneity: Chi2 = 4866 (0.2, df = 37 (P < 0.00001), P = 99.0\% \\ \text{Test for heterogeneity: Chi2 = 4866 (0.2, df = 37 (P < 0.00001), P = 99.0\% \\ \text{Test for heterogeneity: Ch$	Fight	-0.4003 (0.1093)		2.96	0.67 [0.54, 0.83]
$\begin{array}{c} \text{duck 1385} & -0.6821 (0.1978) & -0.681 (0.2798) & -0.681 (0.2798) & -0.681 (0.2798) & -0.681 (0.2798) & -0.681 (0.2798) & -0.681 (0.2798) & -0.681 (0.2798) & -0.821 (0.1111) & -0.2614 (0.1072) & -2.96 & 0.74 (0.60, 0.92) & -2.96 & 0.74 (0.60, 0.92) & -2.92 & 0.97 (0.75, 1.261) & -2.96 & 0.74 (0.60, 0.92) & -2.92 & 0.97 (0.75, 1.261) & -2.96 & 0.74 (0.62, 0.95) & -2.69 & 0.44 (0.28, 0.69) & -2.821 (0.1138) & -2.97 & 0.77 (0.62, 0.95) & -2.644 (0.28, 0.69) & -2.844 (0.28, $	Senieliza 1990	-1.8971 (0.3704)	_	2.26	
Adda 2002       -0.8359       (0.2195)       2.85       0.52       (0.30, 0.90)         Feller 2003(srm 2)       -0.3035       (0.111)       2.95       0.77       (0.62, 0.95)         Crump 2004(arm 1)       -0.2614       (0.1022)       2.97       0.77       (0.62, 0.95)         Gerrett 2004       -0.8210       (0.2295)       2.69       0.44       (0.22, 0.95)         Luby 2004(arm 1)       -0.7955       (0.323)       2.45       0.45       (0.44, 10.80, 0.92)         Luby 2004(arm 1)       -0.2614       (0.127)       2.84       0.60       (0.43, 0.84)         Luby 2004(arm 1)       -0.2785       (0.3123)       2.45       0.45       (0.44, 10.80, 0.84)         Luby 2004(arm 2)       -1.2040       (0.2806)       2.95       0.66       (0.43, 0.83)         Luby 2004(arm 2)       -1.0217       (0.1138)       40.69       0.65       (0.52, 0.75)         Test for heterogeneity: Chi* = 61.91, df = (P = 0.76), P = 0%       5.94       0.69       (0.63, 0.74)         Test for heterogeneity: Chi* = 0.09, df = (P = 0.76), P = 0%       5.94       0.69       (0.63, 0.74)         Test for heterogeneity: Chi* = 0.31 (0.1402)       -       2.95       0.79       (0.63, 0.99)         Peller 2003(srm 4)	Quick 1999	-0.3621 (0.1978)		2.78	0.57 [0.39, 0.84]
$\begin{array}{c} \text{Keller} 2003(arm 2) & -0.3011 (0.1111) & -0.211 (0.001, 0.52] \\ \text{Crump 2004(arm 1)} & -0.2814 (0.1072) & 2.92 & 0.77 (0.52, 0.95] \\ \text{Crump 2004(arm 1)} & -0.2814 (0.1072) & 2.97 & 0.77 (0.52, 0.95] \\ \text{Crump 2004(arm 1)} & -0.2814 (0.1072) & 2.97 & 0.77 (0.52, 0.95] \\ \text{Luby 2004a(arm 1)} & -0.5108 (0.1717) & & & & & & & & & & & & & & & & & & &$	Baller 2002	-0.6539 (0.2799)		2.55	
$\begin{array}{c} \text{Comp 2004(arm 1)} & -0.2630 (0.1333) \\ -0.0830 (0.1333) \\ -0.08210 (0.2235) \\ -0.08210 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.2235) \\ -0.0810 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.138) \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.163, 0.84] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.163, 0.84] \\ -0.0800 (0.17, 0.52] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.163, 0.75] \\ -0.0800 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1151) \\ -0.080 (0.1101) \\ -0.080 (0.120 (0.1151) \\ -0.080 (0.1101) \\ -0.080 (0.120 (0.1151) \\ -0.080 (0.1101) \\ -0.080 (0.120 (0.1101) \\ -0.080 (0.120 (0.1151) \\ -0.080 (0.120 (0.1101) \\ -0.080 (0.1101) \\ -0.080 (0.1101) \\ -0.080 (0.1101) \\ -0.080 (0.11010 (0.1101) \\ -0.080 (0.1101) \\ -0.080 (0.1101) \\ -0.080 (0$	Relier 2003(arm 2) Roller 2003(arm 2)	-0.3011 (0.1111)		2.96	0.74 [0.60, 0.92]
Computed with the second seco	Crump 2003(arm 3)	-0.0308 (0.1338)		2.92	0.37 [0.73, 1.26]
$\begin{array}{c} \text{Converse 1} \\ \text{Luby 2004q(arm 1)} & -0.5126 (0.1213) \\ \text{Luby 2004q(arm 2)} & -1.2040 (0.2806) \\ \text{Luby 2004q(arm 2)} & -1.2040 (0.2806) \\ \text{Luby 2004q(arm 2)} & -0.795 (0.3123) \\ \text{Luby 2004q(arm 1)} & -0.795 (0.3123) \\ \text{Luby 2004q(arm 1)} & -0.2231 (0.1138) \\ \text{Subtolal (5% C)} \\ \text{Test for heterogenetity: ChP = 61 81, df = 15 (P < 0.00001), P = 75.8\% \\ \text{Test for heterogenetity: ChP = 61 81, df = 15 (P < 0.00001), P = 75.8\% \\ \text{Test for heterogenetity: ChP = 0.03, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogenetity: ChP = 0.000, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogenetity: ChP = 0.00001) \\ \text{Of Flocculation/Disinfection} \\ \text{Conroy 1996} & -0.4155 (0.1161) \\ \text{Conroy 1996} & -0.3711 (0.0425) \\ \text{Subtolal (5% C)} \\ \text{Test for heterogenetity: ChP = 0.00001) \\ \text{Of Flocculation/Disinfection} \\ \text{Felier 2003(arm 1)} & -0.2357 (0.1151) \\ \text{Test for heterogenetity: ChP = 0.03, df = 1 (P = 0.76), P = 0\% \\ \text{Test for heterogenetity: ChP = 0.03, 0.101 (0.1221) \\ \text{Luby 2004k(arm 2)} & -0.1863 (0.1101) \\ \text{Luby 2004k(arm 2)} & -0.1863 (0.1101) \\ \text{Luby 2004k(arm 2)} & -0.2795 (0.3062) \\ \text{Luby 2004k(arm 2)} & -0.2795 (0.3062) \\ \text{Luby 2004k(arm 2)} & -0.2357 (0.1353) \\ \text{Subtolal (95% C1)} \\ \text{Test for heterogenetity: ChP = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogenetity: ChP = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogenetity: ChP = 1886.02, df = 37 (P < 0.00001), P = 98.0\% \\ \text{Test for overall effect: Z = 1.74 (P = 0.08) \\ \text{Test for heterogenetity: ChP = 1886.02, df = 37 (P < 0.00001), P = 98.0\% \\ \text{Test for overall effect: Z = 5.18 (P < 0.00001)} \\ \hline 0.1  0.2  0.5  1  2  5  10 \\ \hline \text{Ensures control} \\ \hline \ensures control \\ \hline \ensu$	Cramp 2004(ann 1) Corrett 2004	-0.2014 (0.1072)		2.57	0.77 [0.82, 0.93]
Luby 2004(a(m 1)) -0.220 (0.1217) Luby 2004(a(m 1)) -0.220 (0.1217) Luby 2004(a(m 1)) -0.2357 (0.145) Test for heterogeneity: Ch <sup>2</sup> = 61.91, df = 15 (P < 0.00001), P = 75.8% Test for overall effect: Z = 5.05 (P < 0.00001) 04 Solar Disinfection Conroy 1996 -0.4155 (0.1409) -0.2357 (0.1151) +0.59 Subtotal (95% CI) 05 Flocculation/Disinfection Relier 2003(arm 4) -0.2357 (0.1151) +0.205 (0.147, 0.82] Crump 2004(arm 2) -0.1863 (0.1101) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1151) +0.2357 (0.1212) +0.2357 (0.1212) +0.2357 (0.1221) +0.2357 (0.1212) +0.2357 (0	Luby 2004e(arm 1)	-0.8210 (0.2298)		2.65	0.44 [0.28, 0.85]
Luby 2004(sim 1) -0.7985 (0.1203) Luby 2004(sim 1) -0.7985 (0.00001), P = 75.8% Test for heterogeneity: Ch <sup>2</sup> = 61.91, df = 15 (P < 0.00001), P = 75.8% Test for heterogeneity: Ch <sup>2</sup> = 61.91, df = 15 (P < 0.00001), P = 75.8% Test for heterogeneity: Ch <sup>2</sup> = 61.91, df = 15 (P < 0.00001), P = 75.8% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for heterogeneity: Ch <sup>2</sup> = 64.831, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 64.831, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 64.831, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 64.831, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 64.831, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 99.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001),	Luby 2004a(arm 2)	-1 2040 (0.2906)		2.04	
Lui 2004 Lui 2004 Lui 2004 -0.2231 (0.138) Subtal (95% C) 2.133 -0.43 [0.2231 (0.138) Lui 2004 -0.2231 (0.138) -0.43 [0.2231 (0.138) -0.43 [0.2231 (0.138) -0.43 [0.2231 (0.140] -0.43 [0.2231 (0.140] -0.41 [0.2000] -0.41 [0.2000]	Luby 2004b(arm 1)	-0 7985 (0.3123)		2.04	0.30 [0.17, 0.32]
Subtol (95% C)       0.000 (10.00)         Test for heterogeneity: Ch <sup>2</sup> = 61.91, df = 15 (P < 0.00001), P = 75.8%	Lule 2004	-0 2231 (0 1138)		2.40	
Test for heterogeneity: $Ch^{2} = 61.91$ , $df = 15 (P < 0.00001)$ , $P = 75.8\%$ Test for overall effect $Z = 5.05 (P < 0.00001)$ 04 Solar Disinfection Corroy 1996 -0.3711 (0.0425) 3.04 0.69 [0.63, 0.75] Subtotal (95% CI) -0.3711 (0.0425) 3.04 0.69 [0.63, 0.74] Test for heterogeneity: $Ch^{2} = 0.09$ , $df = 1 (P = 0.76)$ , $P = 0\%$ Test for overall effect $Z = 9.21 (P < 0.00001)$ 05 Flocustion/Disinfection Relier 2003(arm 1) -0.2357 (0.1151) 2.94 0.74 [0.58, 0.94] Crump 2004(arm 2) -0.1863 (0.1101) 2.94 0.74 [0.58, 0.94] Luby 2004(arm 2) -0.7985 (0.3062) 2.44 0.45 [0.25, 0.362] Luby 2004(arm 3) -1.0217 (0.3455) 2.34 0.36 [0.18, 0.71] Subtotal (95% CI) -0.2357 (0.1353) 2.44 0.48 [0.20, 1.16] Test for heterogeneity: Ch <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Ch <sup>2</sup> = 1.83 (P = 0.08) Total (95% CI) -0.2357 (0.1353) 2.92 0.79 [0.61, 1.03] Z.92 0.79 [0.61, 1.03] Discussion of the expression of the expressio	Subtotal (95% CI)	0.2201 (0.1100)		40.69	0 63 10 52 0 751
$\begin{array}{c} \text{Od Solar Distinction} \\ \text{Corroy 1996} & -0.4155 (0.1409) \\ \text{Corroy 1996} & -0.3711 (0.0425) \\ \text{Subtat (95\% CI)} \\ \text{Test for heterogeneity. Ch2 = 0.09, df = 1 (P = 0.76), P = 0\% \\ \text{Test for overall effect: Z = 9.21 (P < 0.00001) \\ \text{OS Flocculation/Distinction} \\ \text{Relier 2003(smr 1)} & -0.2357 (0.1151) \\ \text{Relier 2003(smr 4)} & -0.3011 (0.1221) \\ \text{Chiller 2004} & -0.4780 (0.1426) \\ \text{Corroy 1990} & -0.1263 (0.1101) \\ \text{Luby 2004(arm 2)} & -0.7885 (0.3062) \\ \text{Luby 2004(arm 3)} & -1.0217 (0.3465) \\ \text{Subtatial (95\% CI)} \\ \text{Test for heterogeneity. Chi2 = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity. Chi2 = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity. Chi2 = 648.31, df = 6 (P < 0.00001), P = 99.1\% \\ \text{Test for heterogeneity. Chi2 = 1.63 (P = 0.10) \\ \text{O6 Improved Storage} \\ \text{Roberts 2001} & -0.2357 (0.1353) \\ \text{Subtatial (95\% CI)} \\ \text{Test for heterogeneity. Chi2 = 1886.02, df = 37 (P < 0.00001), P = 98.0\% \\ \text{Test for heterogeneity. Chi2 = 1886.02, df = 37 (P < 0.00001), P = 98.0\% \\ \text{Test for overall effect: Z = 1.74 (P = 0.08) \\ \hline \text{OL 1 0.2 0.5 1 2 5 10 \\ \hline \text{Excurse intervations control} \\ \hline \text{Excurse intervations control}$	Test for heterogeneity: Chi <sup>2</sup>	= 61.91, df = 15 (P < 0.00001), l <sup>2</sup> = 75.89	6 <b>*</b>		,
$\begin{array}{c} 04 \ \text{Solar Disinfection} \\ \hline \text{Correy 1996} & -0.4155 \ (0.1409) \\ \hline \text{Correy 1996} & -0.3711 \ (0.0425) \\ \hline \text{Subtrat (85\% CI)} \\ \hline \text{Test for heterogeneity: Chi2 = 0.09, df = 1 \ (P = 0.76), P = 0\% \\ \hline \text{Test for heterogeneity: Chi2 = 0.09, df = 1 \ (P = 0.76), P = 0\% \\ \hline \text{Test for heterogeneity: Chi2 = 0.09, df = 1 \ (P = 0.76), P = 0\% \\ \hline \text{Test for overall effect: } Z = 9.21 \ (P < 0.00001) \\ \hline \text{OS Flocculation/Disinfection} \\ \hline \text{Relier 2003(arm 1)} & -0.2357 \ (0.1151) \\ \hline \text{Relier 2003(arm 4)} & -0.3011 \ (0.1221) \\ \hline \text{Chiller 2004} & -0.4780 \ (0.1426) \\ \hline \text{Crump 2004(arm 2)} & -0.1863 \ (0.1101) \\ \hline \text{Luby 2004b(arm 3)} & -1.0217 \ (0.3465) \\ \hline \text{Subtrat (65\% CI)} \\ \hline \text{Test for heterogeneity: Chi2 = 648.31, df = 6 \ (P < 0.00001), P = 99.1\% \\ \hline \text{Test for heterogeneity: not applicable} \\ \hline \text{Test for heterogeneity: not applicable} \\ \hline Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), P = 98.0\% \\ \hline \text{Tes$					
Conroy 1999 -0.3711 (0.0425) Subtotal (95% C) Total (95% C) Conroy 1999 -0.3711 (0.0425) Subtotal (95% C) Conroy 1999 -0.2357 (0.1151) Reler 2003(arm 4) -0.3011 (0.1221) Chiller 2003(arm 4) -0.3011 (0.1221) Chiller 2004 -0.4780 (0.1101) Doocy 2004 -2.1203 (0.0408) Luby 2004b(arm 3) -1.0217 (0.3465) Subtotal (95% C) Total (95% C	04 Solar Disinfection Coprov 1996	-0 4155 (0 1409)		2 91	0 66 10 50 0 871
Subtotal (95% C) Test for heterogeneity: Ch <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for overall effect: $Z = 9.21$ (P < 0.00001) OS Flocculation/Disinfection Reller 2003(arm 1) -0.2357 (0.1151) Reller 2003(arm 4) -0.3011 (0.1221) Crump 2004(arm 2) -0.1853 (0.1101) Docy 2004 $-2.1203$ (0.0408) Luby 2004b(arm 2) -0.7985 (0.3062) Luby 2004b(arm 2) -0.2357 (0.1353) Subtotal (95% C) Test for heterogeneity: Ch <sup>2</sup> = 60.83, 1 df = 6 (P < 0.00001), P = 99.1% Test for overall effect: $Z = 1.74$ (P = 0.08) Total (95% C) Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001)	Coprov 1999	-0 3711 (0 0425)		3.04	
Test for heterogeneity: Chi <sup>2</sup> = 0.09, df = 1 (P = 0.76), P = 0% Test for overall effect: $Z = 9.21$ (P < 0.00001) 05 Flocculation/Disinfection Reller 2003(arm 1) -0.2357 (0.1151) Reller 2003(arm 4) -0.3011 (0.1221) Chiller 2004 -0.4780 (0.1426) Crump 2004(arm 2) -0.1863 (0.1101) Doocy 2004 -2.1203 (0.0408) Luby 2004b(arm 3) -1.0217 (0.3465) Subtotal (95% Cl) Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), I <sup>2</sup> = 99.1% Test for overall effect: $Z = 1.53$ (P = 0.08) Total (95% Cl) Total (95% C	Subtotal (95% CI)	0.0/11 (0.0420)	<b>↓</b>	5 94	0.69 [0.63 0.74]
Test for overall effect: $Z = 9.21 (P < 0.00001)$ OS Flocculation/Disinfection Reller 2003(arm 1) -0.2357 (0.1151) Reller 2003(arm 4) -0.3011 (0.1221) Chiller 2004 -0.4780 (0.1426) Crump 2004(arm 2) -0.1863 (0.1101) Doocy 2004 -2.1203 (0.0408) Luby 2004b(arm 3) -1.0217 (0.3465) Luby 2004b(arm 3) -1.0217 (0.3465) Luby 2004b(arm 3) -1.0217 (0.3465) Subtotal (95% CI) Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0	Test for heterogeneity: Chi <sup>2</sup>	= 0.09. df = 1 (P = 0.76). l <sup>2</sup> = 0%	•	0.01	0.05 (0.00, 0.11)
05 Flocculation/Disinfection         Reller 2003(arm 1)       -0.2357 (0.1151)         Reller 2003(arm 4)       -0.3011 (0.1221)         Chiller 2004       -0.4780 (0.1426)         Crump 2004(arm 2)       -0.1863 (0.1101)         Doccy 2004       -2.1203 (0.0408)         Luby 2004kgarm 3)       -1.0217 (0.3465)         Subtotal (95% CI)       -0.2357 (0.1353)         Subtotal (95% CI)       -0.2357 (0.1353)         Test for heterogeneity: chi² = 1886.02, df = 37 (P < 0.00001), I² = 98.0%	Test for overall effect: Z = 9	9.21 (P < 0.00001)			
$ \begin{array}{c} \mbox{Reler 2003(arm 1)} & -0.2357 \ (0.1151) \\ \mbox{Reler 2003(arm 4)} & -0.3011 \ (0.1221) \\ \mbox{Reler 2003(arm 4)} & -0.4780 \ (0.1426) \\ \mbox{Reler 2003 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2003 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2003 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2003 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2003 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2004 (arm 2)} & -0.1863 \ (0.1101) \\ \mbox{Reler 2003 (arm 3)} & -1.0217 \ (0.3465) \\ \mbox{Subtotal (95% CI)} \\ \mbox{Test for heterogeneity: chi2 = 648.31, df = 6 (P < 0.00001), I2 = 99.1\% \\ \mbox{Test for overall effect: } Z = 1.33 \ (P = 0.10) \\ \mbox{O6 improved Storage} \\ \mbox{Reler 2001} & -0.2357 \ (0.1353) \\ \mbox{Subtotal (95\% CI)} \\ \mbox{Test for heterogeneity: chi2 = 1886.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for heterogeneity: Chi2 = 1866.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for heterogeneity: Chi2 = 1866.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for heterogeneity: Chi2 = 1866.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for overall effect: } Z = 5.18 \ (P < 0.00001) \\ \mbox{Old} \mbox{Test for overall effect: } Z = 5.18 \ (P < 0.00001) \\ \mbox{Test for heterogeneity: Chi2 = 1866.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for overall effect: } Z = 5.10 \\ \mbox{Test for overall effect: } Z = 5.18 \ (P < 0.00001) \\ Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001), I2 = 98.0\% \\ \mbox{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001) \\ \mbox{Test for heterogeneity: Chi2 = 1886.02, df = 37 \ (P < 0.00001) \\ \mbox{Test for heterogeneity: Chi2 = 1866.02,$	05 Flocculation/Disinfection				
Reler 2003(arm 4)       -0.3011 (0.1221)         Chiller 2004       -0.4780 (0.1426)         Crump 2004(arm 2)       -0.1663 (0.1101)         Doocy 2004       -2.1203 (0.0408)         Luby 2004b(arm 2)       -0.7985 (0.3062)         Luby 2004b(arm 3)       -1.0217 (0.3465)         Subtotal (95% CI)       -0.2357 (0.1353)         Subtotal (95% CI)       -0.2357 (0.1353)         Subtotal (95% CI)       -0.2357 (0.1353)         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0%	Reller 2003(arm 1)	-0.2357 (0.1151)		2.95	0.79 [0.63, 0.99]
Chiler 2004 -0.4780 (0.1426) Crump 2004(arm 2) -0.1863 (0.1101) Doocy 2004 -2.1203 (0.0408) Luby 2004b(arm 2) -0.7985 (0.3062) Luby 2004b(arm 3) -1.0217 (0.3465) Subtotal (95% C) Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogeneity: not applicable Test for heterogeneity: not applicable Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for overall effect: Z = 5.18 (P < 0.00001)	Reller 2003(arm 4)	-0.3011 (0.1221)		2.94	0.74 [0.58, 0.94]
$\begin{array}{c} \text{Crump 2004(arm 2)} & -0.1663 (0.1101) \\ \text{Doocy 2004} & -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.1203 (0.0408) \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.36 [0.18, 0.71] \\ -2.34 \\ 0.48 [0.20, 1.16] \\ -2.92 \\ 0.79 [0.61, 1.03] \\ -2.92 \\ -2.92 \\ 0.79 [0.61, 1.03] \\ -2.92 \\ -2.$	Chiller 2004	-0.4780 (0.1426)		2.90	0.62 [0.47, 0.82]
Doocy 2004       -2.1203 (0.0408)         Luby 2004b(arm 2)       -0.7985 (0.3062)         Luby 2004b(arm 3)       -1.0217 (0.3465)         Subtotal (95% CI)       2.46         Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1%	Crump 2004(arm 2)	-0.1863 (0.1101)		2.96	0.83 [0.67, 1.03]
Luby 2004b(arm 2) -0.7985 (0.3062) Luby 2004b(arm 3) -1.0217 (0.3465) Subtotal (95% CI) Test for heterogeneity: Ch <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for overall effect: $Z = 1.63$ (P = 0.10) 06 Improved Storage Roberts 2001 -0.2357 (0.1353) Subtotal (95% CI) Test for heterogeneity: not applicable Test for heterogeneity: not applicable Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogeneity: Ch <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for overall effect: $Z = 5.18$ (P < 0.00001) 0.1 0.2 0.5 1 2 5 10 Exercise intervention	Doocy 2004	-2.1203 (0.0408) -		3.04	0.12 [0.11, 0.13]
Luby 2004b(arm 3)       -1.0217 (0.3465)         Subtotal (95% C)       2.34       0.36 [0.18, 0.71]         Test for heterogeneity: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), l <sup>2</sup> = 99.1%       19.60       0.48 [0.20, 1.16]         06 Improved Storage Roberts 2001       -0.2357 (0.1353)       2.92       0.79 [0.61, 1.03]         Subtotal (95% C)       2.92       0.79 [0.61, 1.03]       2.92       0.79 [0.61, 1.03]         Total (95% C)       100.00       0.57 [0.46, 0.70]       100.00       0.57 [0.46, 0.70]         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), l <sup>2</sup> = 98.0%       100.00       0.57 [0.46, 0.70]         Exercise intervention	Luby 2004b(arm 2)	-0.7985 (0.3062)	<b>-</b>	2.46	0.45 [0.25, 0.82]
Subtrate (55% CI) Test for heterogenety: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogenety: Chi <sup>2</sup> = 648.31, df = 6 (P < 0.00001), P = 99.1% Test for heterogenety: not applicable Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), P = 98.0% Test for heterogenety: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001)	Luby 2004b(arm 3)	-1.0217 (0.3465)		2.34	0.36 [0.18, 0.71]
Test for overall effect: $Z = 1.63$ (P = 0.10) 06 Improved Storage Roberts 2001 -0.2357 (0.1353) Subtotal (95% Cl) Total	Suptotal (95% CI)	040.04 -14 - 0.45 - 0.000043 -7 - 00.40	, - <b></b>	19.60	0.48 [0.20, 1.16]
06 Improved Storage Roberts 2001       -0.2357 (0.1353)         Subtotal (95% CI) Test for heterogeneity: not applicable Test for overall effect: Z = 1.74 (P = 0.08)         Total (95% CI) Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0% Test for overall effect: Z = 5.18 (P < 0.00001)	Test for overall effect: Z = 1	= 648.31, at = 6 (P < 0.00001), P = 99.19 I.63 (P = 0.10)	•		
Roberts 2001       -0.2357 (0.1353)         Subtotal (95% CI)       2.92         Test for heterogeneity: not applicable         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0%         Test for overall effect: Z = 5.18 (P < 0.00001)	06 Improved Storage				
Subtotal (95% CI)       2.92       0.79       (0.61, 1.03)         Test for heterogeneity: not applicable       100.00       0.57       (0.61, 1.03)         Total (95% CI)       100.00       0.57       (0.46, 0.70)         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0%       100.00       0.57       (0.46, 0.70)         Test for overall effect: Z = 5.18 (P < 0.00001)	Roberts 2001	-0.2357 (0.1353)		2.92	0.79 [0.61, 1.03]
Test for heterogeneity: not applicable         Test for overall effect: Z = 1.74 (P = 0.08)         Total (95% Cl)         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0%         Test for overall effect: Z = 5.18 (P < 0.00001)	Subtotal (95% Cl)			2.92	0.79 [0.61, 1.03]
Total (95% Cl)       100.00       0.57 [0.46, 0.70]         Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0%       100.00       0.57 [0.46, 0.70]         Test for overall effect: Z = 5.18 (P < 0.00001)	Test for heterogeneity: not a Test for overall effect: 7 = 1	applicable Z4 (P = 0.08)	Ť		
Total (95% Cl)         100.00         0.57         [0.46, 0.70]           Test for heterogeneity: Chi <sup>2</sup> = 1886.02, df = 37 (P < 0.00001), I <sup>2</sup> = 98.0%         100.00         0.57         [0.46, 0.70]           Test for overall effect: Z = 5.18 (P < 0.00001)					
Test for neterogenetry: Chi* = 1885.02, dt = 37 (P < 0.00001), P = 98.0%	Total (95% CI)	1000 00 // 07 //	<b>+</b>	100.00	0.57 [0.46, 0.70]
	Test for heterogeneity: Chi <sup>2</sup> Test for overall effect: 7 = 5	= 1886.02, df = 37 (P < 0.00001), l² = 98. 5.18 (P < 0.00001)	0%		
U.1 U.2 U.5 1 2 5 10 Escours intervention - Escours control				<u>+                                    </u>	
		0.1	U.2 U.5 1 2 Instation Followic con	5 10 atrol	

POU treatment - efficacy

Intervention type (no. of trials)	Estimate of effect (random effects model)		
Source (6)	0.73		
Household (32)	0.53		
Filtration (6)	0.37		
Chlorination (16)	0.63		
Solar Disinfection (2)	0.69		
Flocculation/Disinf* (6)	0.69		

Claeson, Haller, Walker, Bartam & Cairncross, 2007



Product	Unit Cost	Volume of Water Treated	\$/10,000L of Water Treated	First Year Cost <sup>1</sup>	Three Year Cost <sup>1</sup>
WaterGuard <sup>™</sup> (PSI brand of sodium hypochlorite <sup>1</sup>	\$0.45	1,000	\$4.50	\$4.10	\$12.32
Gravity filter with two 24 cm Katadyn® candles <sup>3</sup>	\$25.0	100,000L	\$2.50	\$25.00	\$25.00
Gravity filter with two 15cm Stefani® candles <sup>4</sup>	\$15.0	20,000L	\$7.50	\$15.00	\$30.00
Sodis Solar Disinfection <sup>5</sup>	\$0.40	730L	\$5.48	\$0.80	\$2.40
Procter & Gamble PUR® Sachet <sup>6</sup>	\$0.10	10L	\$100.00	\$91.25	\$273.75

POU treatment - cost

Claeson, Haller, Walker, Bartam & Cairncross, 2007

#### Cost per person per year





### POU treatment - cost-effectiveness

## Cost per healthy life-year gained

#### AFRICA





Claeson, Haller, Walker, Bartam & Cairncross, 2007

### POU treatment - other issues

Selection of optimal POU treatment method depends on various factors, e.g.

- Water quantity required per day
- Uses of treated water only DW or other?
- Water quality differences
- Maintenance required, its cost, and reliability
- Cash flow: higher investment or higher recurrent costs?



# Other issues: nutritional benefits

- Food security is one of the issues of this and the following centuries – encourage self-production
- What proven impacts does MUS have on nutrition?
- In D+, what are cost-effective ways to achieve nutritional gains?

### Other issues: water rationing

- Especially in D+, there are significantly greater demands on water resources
- Even in water rich countries there are (seasonal) shortages; in water scarce countries, it is almost permanent
- How to ration water supplies: Differential pricing? Metering? Community mechanisms?
- Other mechanisms to protect the poor?

### Other issues: sanitation

- More than twice the number of households without improved DW source do not have improved sanitation (around 2.5 billion)
- There are major health, environmental and economic impacts of poor sanitation



Source: Economic impacts of sanitation in Southeast Asia. WSP/World Bank. 2008.

### Other issues: sanitation

- More than twice the number of households without improved DW source do not have improved sanitation (around 2.5 billion)
- There are major health, environmental and economic impacts of poor sanitation
- Poor sanitation threatens the usability of scarce water resources
- It is highly cost-beneficial to invest in sanitation

### Sanitation is a good buy !



Solutions International

> Including value of health (diarrhea) and access time gains only – the **return on investment is at least 6 times**

Source: Global cost-benefit analysis of countries off-track to meet WSS MDGs. WHO. 2004.

### Other issues: sanitation

- More than twice the number of households without improved DW source do not have improved sanitation (around 2.5 billion)
- There are major health, environmental and economic impacts of poor sanitation
- Poor sanitation threatens the usability of scarce water resources
- It is highly cost-beneficial to invest in sanitation
- Can MUS+ include low cost sanitation interventions, without 'breaking the back' of the MUS intervention?

### DSI Development Solutions International

### Other issues: program effectiveness

- CBA usually takes intervention impact from efficacy trials or model projects
- In practice, these impacts are not achieved due to program delivery inefficiency or non-uptake by the population
- Actual cost-benefit can be from 10% to 90% lower than the projected efficiency



Sanitation programs as implemented in Southeast Asia have lower actual benefit-cost ratios than under ideal conditions



Source:Draft results. Economic assessment of sanitation in Southeast Asia. WSP/World Bank. 2010.

DSI Development Solutions International

## Thank You !