TABLE 52: RURAL AREA (LAMONGAN DISTRICT) EFFICIENCY MEASURES FOR MAIN GROUPINGS OF SANITATION INTERVENTIONS, COMPARING DIFFERENT POINTS ON THE SANITATION LADDER

Efficiency measure	Scenario	Moving from shared latrine to:	Moving from private wet latrine to:
		Improved private Septic tank	Improved private Septic tank
COST-BENEFIT MEASURES			
Benefits per US$ input (US$)	Optimal	3	2
	Actual	2	2
Internal rate of return (%)	Optimal	92%	36%
	Actual	62%	21%
Pay-back period	Optimal	2 years 1 month	3 years 9 months
	Actual	2 years 8 months	5 years 8 months
Net present value (US$)	Optimal	812	404
	Actual	601	195
COST-EFFECTIVENESS MEASURES			
Cost per DALY averted (US$)	Optimal	1,249	1,374
	Actual	1,540	1,694
Cost per case averted (US$)	Optimal	9	10
	Actual	11	12
Cost per death averted (US$)	Optimal	114,542	125,990
	Actual	141,235	155,352

TABLE 53: RURAL AREA (TANGERANG DISTRICT) EFFICIENCY MEASURES FOR MAIN GROUPINGS OF SANITATION INTERVENTIONS, COMPARING DIFFERENT POINTS ON THE SANITATION LADDER

Efficiency measure	Scenario	Moving from community latrine to:	Moving from shared latrine to:	Moving from private wet latrine to:
			Improved private Septic tank	
COST-BENEFIT MEASURES				
Benefits per US$ input (US$)	Optimal	4	4	1.5
	Actual	3	3	1.2
Internal rate of return (%)	Optimal	86%	69%	17%
	Actual	58%	50%	15%
Pay-back period	Optimal	2 years 2 months	2 years 5 months	6 years 7 months
	Actual	2 years 9 months	3 years	9 years 3 months
Net present value (US$)	Optimal	1,176	1,070	223
	Actual	783	719	180
COST-EFFECTIVENESS MEASURES				
Cost per DALY averted (US$)	Optimal	2,780	2,553	3,007
	Actual	3,395	3,118	3,671
Cost per case averted (US$)	Optimal	15	13	16
	Actual	3,395	16	19
Cost per death averted (US$)	Optimal	110,800	101,757	119,829
	Actual	110,800	124,245	146,311

FIGURE 72: ECONOMIC PERFORMANCE OF MOVING UP THE RURAL SANITATION LADDER

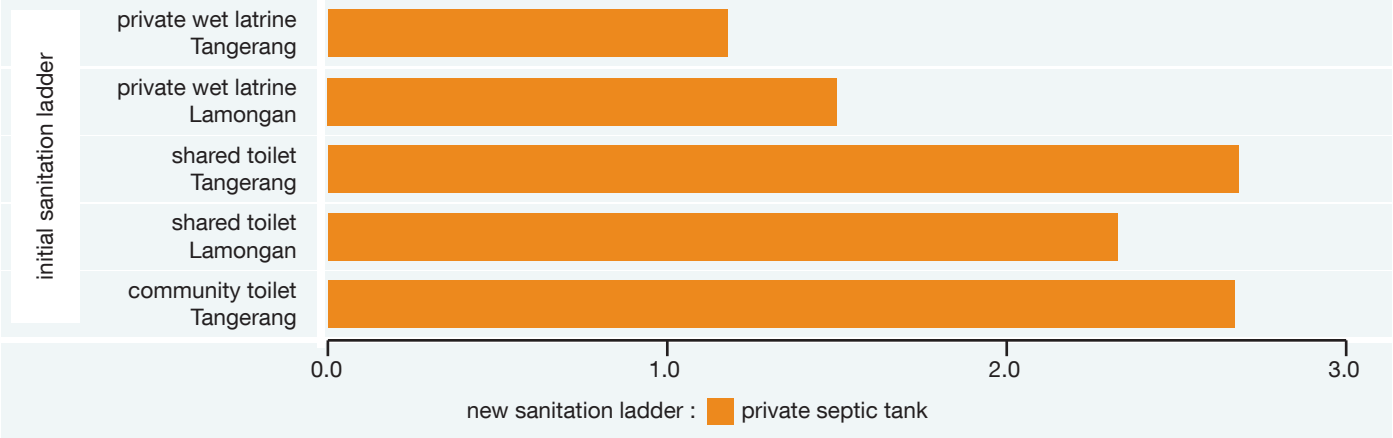

TABLE 54: URBAN AREA (BANJARMASIN) EFFICIENCY MEASURES FOR MAIN GROUPINGS OF SANITATION INTERVENTIONS, COMPARING DIFFERENT POINTS ON THE SANITATION LADDER

Efficiency measure	Scenario	Moving from shared/community latrine to:		Moving from private wet pit latrine to:
		Private septic tank	Private sewerage	Private septic tank
COST-BENEFIT MEASURES				
Benefits per US$ input (US$)	Optimal	2	1.7	0.9
	Actual	1.2	0.7	0.5
Internal rate of return (%)	Optimal	48%	31%	2%
	Actual	17%	-3%	-4%
Pay-back period	Optimal	3 years 1 month	4 years 2 months	16 years
	Actual	6 years 8 months	>20 years	>20 years
Net present value (US$)	Optimal	324	255	(54)
	Actual	72	(102)	(104)
COST-EFFECTIVENESS MEASURES				
Cost per DALY averted (US$)	Optimal	2,529	2,862	2,807
	Actual	3,607	34,900	4,004
Cost per case averted (US$)	Optimal	15	17	17
	Actual	22	212	24
Cost per death averted (US$)	Optimal	82,204	93,033	91,250
	Actual	117,266	1,134,549	130,171

Note: Figures in parentheses are negative values

Banjarmasin is a special case. Land scarcity is more of an issue here than at any of the other study sites. As mentioned in the previous chapter, many poor households live along riverbanks and use the rivers as their toilets as well as for washing, bathing and children playgrounds. Larger rivers are also used for public transportation. The provision of improved toilets such as SANIMAS or shared toilets connected to the sewerage system would certainly give these poor households access to technically adequate and economically viable sanitation.

For Malang City, moving up from shared latrine to communal sewerage would be economically unfavorable. Again, the total investment cost per household of private toilet connected to communal sewerage far outweighs the cost of shared latrines. The situation would probably be different if land were as scarce as it is in Banjarmasin.

Figure 73 shows the summary of BCR values of moving up sanitation ladders in the three urban study sites. A BCR values of less than 1 indicates that the generated economic

TABLE 55: URBAN AREA (MALANG) EFFICIENCY MEASURES FOR MAIN GROUPINGS OF SANITATION INTERVENTIONS, COMPARING DIFFERENT POINTS ON THE SANITATION LADDER

Efficiency measure	Scenario	Moving from shared latrine to:		Moving from private wet pit latrine to:
		Private septic tank	Communal sewerage	Private septic tank
COST-BENEFIT MEASURES				
Benefits per US$ input (US$)	Optimal	3	0.8	0.7
	Actual	2	0.7	0.6
Internal rate of return (%)	Optimal	90%	3%	0%
	Actual	62%	0%	-2%
Pay-back period	Optimal	2 years 1 month	15 years 3 months	>20 years
	Actual	2 years 7 months	>20 years	>20 years
Net present value (US$)	Optimal	855	(70)	(179)
	Actual	625	(154)	(263)
COST-EFFECTIVENESS MEASURES				
Cost per DALY averted (US$)	Optimal	3,373	3,642	4,521
	Actual	4,030	4,351	5,401
Cost per case averted (US$)	Optimal	24	26	32
	Actual	29	31	38
Cost per death averted (US$)	Optimal	98,870	106,744	132,514
	Actual	118,124	127,532	158,321

Note: Figures in parentheses are negative values

TABLE 56: URBAN AREA (PAYAKUMBUH) EFFICIENCY MEASURES FOR MAIN GROUPINGS OF SANITATION INTERVENTIONS, COMPARING DIFFERENT POINTS ON THE SANITATION LADDER

Efficiency measure	Scenario	Moving from shared latrine to:	Moving from private wet latrine to:
		Private septic tank	Private septic tank
COST-BENEFIT MEASURES			
Benefits per US$ input (US$)	Optimal	1.5	0.6
	Actual	1.0	0.5
Internal rate of return (%)	Optimal	20%	-2%
	Actual	9%	-9%
Pay-back period	Optimal	5 years 9 months	>20 years
	Actual	9 years 11 months	>20 years
Net present value (US$)	Optimal	198	(155)
	Actual	11	(217)
COST-EFFECTIVENESS MEASURES			
Cost per DALY averted (US$)	Optimal	3,572	4,061
	Actual	4,242	4,823
Cost per case averted (US$)	Optimal	18	20
	Actual	21	24
Cost per death averted (US$)	Optimal	84,816	96,433
	Actual	100,732	114,529

Note: Figures in parentheses are negative values

benefit would be less than the incremental cost of moving up the sanitation ladder. However, this does not mean that households should not move up the sanitation ladder, especially given the challenges associated with building some types of sanitation option, and the intangible benefits not quantified in the benefit-cost calculations. The results indicate how important it is that stakeholders, especially local governments, take measures to decrease the investment costs of sanitation options and promote more affordable ones.

At the same time, greater attention needs to be given to raising people's awareness of the importance of having technically sound and comfortable toilets. The aim is to establish awareness among households to voluntarily engage and actively participate in sanitation improvement programs. This in turn will shift the financing burden, from government bearing the whole cost to households contributing to the cost of sanitation.

8.3 SCALING UP RESULTS FOR NATIONAL POLICY MAKING

It has been pointed out in the previous section that the study results do not represent nationwide sanitation situations. Such results should be perceived as indicative outcomes for further exercises to promote evidence-based decision-making in sanitation development. However, the ultimate use of this study is not only the improvement of sanitation decisions in the field sites of the study, but in assessing national policies in the light of the field level results. How different are the selected sites in terms of the underlying characteristics, and how replicable are the sanitation interventions in the rest of the country? These issues are dealt with in turn.

In order to give a brief framework of thinking, Table 57 presents an assessment of some underlying characteristics include economic, social, demographic, cultural, geophysical with respect to the following aspects:

FIGURE 73: ECONOMIC PERFORMANCE OF MOVING UP THE URBAN SANITATION LADDER BENEFIT-CST RATIOS

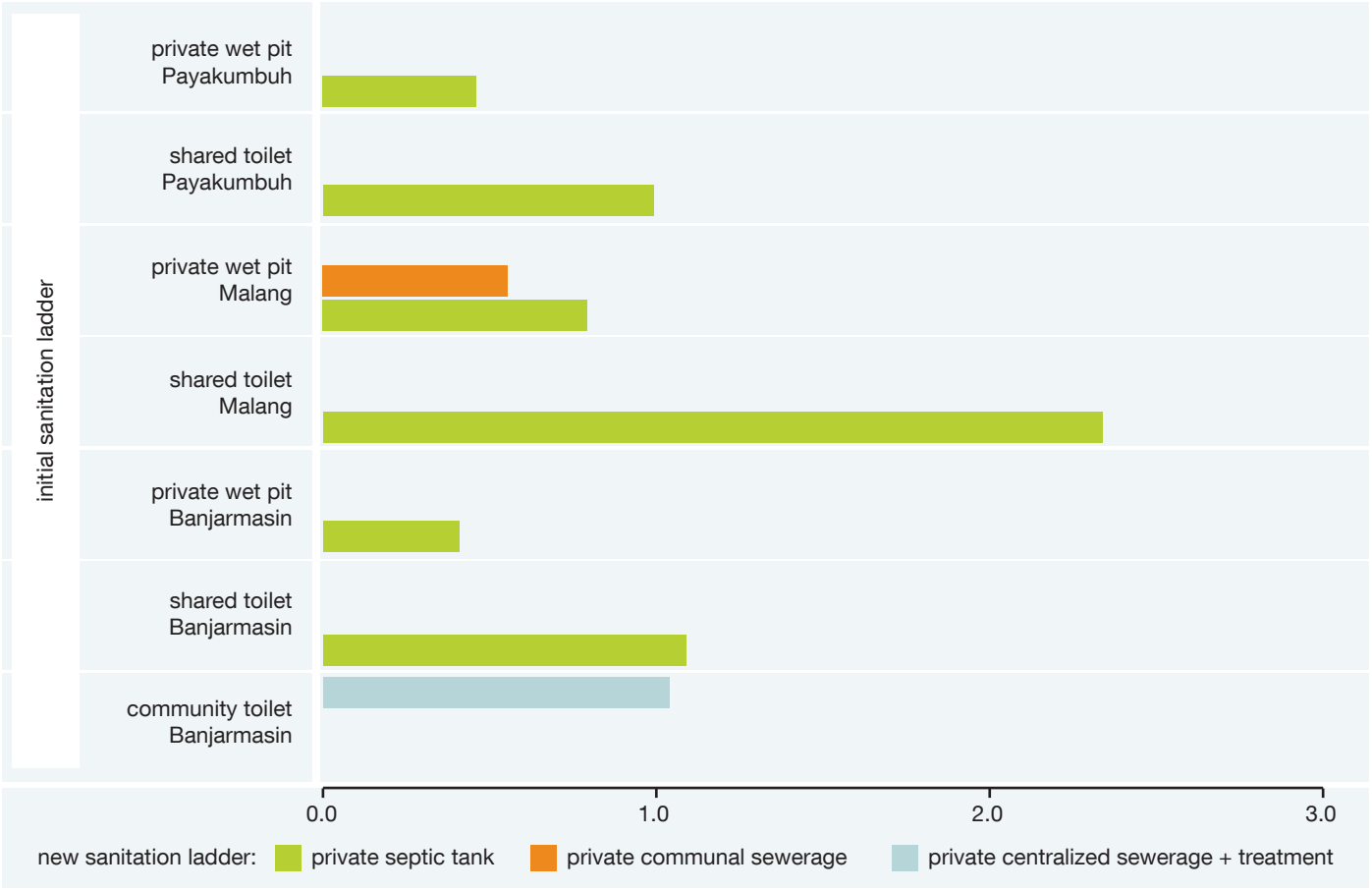

TABLE 57: TYPICAL NATIONWIDE SANITATION SUBGROUPS VERSUS FIELD SITE CHARACTERISTICS

Sites	Population size represented	Climate	Social group	Demographics	Economy	Sanitation coverage
Typical locations						
1. Coastal - lowland (rural)	Moderate to high	– Temp: 22 – 26 °C – Precipitation low to moderate*	Main occupation: - Farming - Fisheries	– Pop density: moderate to high	– Gross Regional Product (GRP): moderate	Moderate
2. Coastal - Lowland (urban)	High	– Temp : 22 – 26°C – Precipitation: moderate	Main occupation: - industry - trading	– Pop density: high	– GRP: high	High
3. Upland - hilly (urban)	Moderate to high	– Temp : 22 – 26°C – -Precipitation: high	Main occupation: - Trading - industry	– Pop density: moderate to high	– GRP: high	High
Field sites						
1. Lamongan (rural) / Coastal lowland rural	1,439,886 (2008)	– Temperature: 20 – 30°C – Precipitation: 2,670 mm/year	Ethnic: Javanese Main occupation: - Farming - Fisheries	– Pop Density: 794 people/ km² (2008) – No. of HH : 338,534 HH – Av. farm size: 4 persons/ HH – Av. children < 5: 1 person /HH	– GRP : IDR 5,336,440 per capita/year – Ability / willingness to pay for sanitation option: 0 – 500,000 IDR	46%
2. Tangerang (rural) / coastal lowland rural	3,585,256 (2008)	– Temperature: 23 – 33°C – Precipitation: 1.475 mm/year	Ethnic: Sundanese Main occupation: -Industrial labor	– Pop Density: 3,229 people/km² (2008) – No. of HH: 828,645 HH – Av. farm size : 4 persons/ HH – Av. children < 5: 1 person /HH	– GRP : IDR 8,190,000 per capita/year – Ability / willingness to pay for sanitation option: 0 – 500,000 IDR	58%
3. Banjarmasin (city) / Coastal lowland urban	602,725 (2006)	– Temperature: 25 – 38°C – Precipitation: 2.682 mm/year – Flooding occurred during high tide	Ethnic: Banjar Main occupation: - small trading - services	– Pop Density: 8,371 people/km² (2006) – No. of HH: 154,527 HH (2006) – Av. Farm size : 4 persons/HH – Av. children < 5: 1 person /HH	– GRP : IDR 8,043,860 per capita/year – Ability / willingness to pay for sanitation option: 0 – 500,000 IDR	44%
4. Malang (city) / upland hilly urban	816,444 (2007)	– Temperature: 23 – 24°C – Precipitation: 1.833 mm/year	Ethnic: Javanese - Madura Main occupation: - small trading - industry - services	– Pop Density: 7,418 people/km² (2007) – No. of HH: 250,085 HH – Av. Farm Size: 4 persons/HH – Av. children <5: 1 person /HH	– GRP : IDR 25,161,600 per capita/year – Ability / willingness to pay for sanitation option: 0 – 500,000 IDR	70%
5. Payakumbuh (city) / upland hilly urban	104,969 (2007)	– Temperature: 26°C – Precipitation: 2250 mm/year – Humidity: 45–50%	Ethnic: Minang Main occupation: - small trading - small farmer	– Pop Density: 1,305 people/km² (2007) – Number of HH: 24,725 HH – Av. Farm size : 4 persons/HH – Av. children <5: 1 person /HH	– GRP : IDR 12,900,000 per capita/year – Ability / willingness to pay for sanitation option: 0 – 500,000 IDR	49%

Notes: *) Definition by The Meteorology, Climatology and Geophysics Agency (BMKG) Indonesia: Low to moderate precipitation (rainfall): 20 - 50 mm per day, moderate to high precipitation 50-100 mm per day, above high precipitation: above 100 mm per day (http://id.wikipedia.org/wiki/)

- physical location – coastal, lowland/plain, upland, mountainous, etc,
- climatic features such as rainfall, water scarcity, and flooding,
- social groups, ethnicity and related cultural factors affecting acceptance of sanitation options,
- demographics – family size, number of children under five, etc.,
- economic level of living, and ability or willingness to pay for sanitation options; and
- sanitation coverage.

One of the criteria for selection of ESI study sites was to be representative of other parts of Indonesia in terms of geophysical, climatic, demographic and socio-economic characteristics. The sanitation options applied in the field sites of this study are basically common to most national contexts. For example, on-site septic tank and wet pit latrine are the most common sanitation options in any district or city in Indonesia. Urban sewerage and communal sewerage systems, meanwhile, are sanitation options that need further evaluation before they are promoted widely in Indonesia.

A national sanitation program, particularly a scaling up strategy, needs to take into account the appropriateness of sanitation option alternatives. In the past, massive top down delivery mechanisms have been used in programs of centralized government, with limited community participation, leading to low effectiveness and sustainability of the programs. Meanwhile, purely bottom up approaches – waiting for households to make their own choices with little outside intervention – are time consuming and have limited effectiveness. Therefore, there should be a menu of technologies and delivery approaches from which selections can be made and implemented in the most appropriate way for a particular field site. For example, for poor communities still practicing open defecation in Payakumbuh, the CLTS approach has been proven the most effective at the initial stage of sanitation development. At a later stage, the local government shifts the focus to delivering the so-called "One Thousand Toilet Movement" to accelerate toilet ownership among households. This is expected to encourage all households to stop open defecation as soon as possible.

In recent years, the Government of Indonesia, in collaboration with the World Bank's WSP and the Netherlands Government, has delivered the Indonesia Sanitation Sector Development Program (ISSDP). The program involved six cities in the first phase and eight cities in the second phase. The program adopted a new approach for sanitation development which combined top down and bottom up approaches. The top down element is providing facilitation to city governments to develop comprehensive city scale sanitation strategies (CSS), and the bottom up element is encouraging local initiatives by involving all local stakeholders (local government bodies, local parliament, local communities, local private sectors and local communication media) in assessing their own sanitation situation and developing a five-year strategy to improve their city scale sanitation. The approach also uses the existing sanitation condition as the baseline for further development. The ISSDP approach is considered successful and has been adopted as the approach for a nationwide program of sanitation development. A set of comprehensive methods has been developed that enables local governments to design and implement their sanitation development. Banjarmasin, Malang and Payakumbuh – three of the ESI Phase 2 field sites – are among the cities participating in the ISSDP.

In a previous chapter, it was reported that there is an imbalance in the distribution of responsibility in terms of sanitation financing. Households, many of which are poor, bear most of the cost of almost all on site sanitation options. Offsite urban sewerage systems, meanwhile, are largely financed by governments. To establish more of a balance in the distribution of the responsibility for financing among the stakeholders for all sanitation ladder options, requires adequate and appropriate campaigns to raise people's sanitation awareness and advocacy campaigns to get support from stakeholders. Well-planned and well-executed awareness and advocacy campaigns should address challenges in the sector such as financing and government stewardship capacity.

8.4 OVERALL COST-BENEFIT ASSESSMENT

The ESI Phase 1 reported that in 2006 Indonesia lost an estimated IDR56 trillion (US$6.3 billion) annually due to poor sanitation and hygiene. This is equivalent to approximately 2.3% of gross domestic product (GDP). In other words, the country would be able to benefit significantly if sanitation and hygiene were improved.

The ESI Phase 2 Study extends the previous study results by generating robust evidence on the costs and benefits of sanitation improvements in different programmatic and geographic contexts in Indonesia. The benefit analyses focus on household level at study sites as well as national level. The benefit of sanitation improvement at household level involves three main potential benefit value drivers i.e. health costs, time saving, and water access and treatment costs; all of which are presented quantitatively as well as qualitatively (Chapter 4).

Benefit analysis at national level covers the knock-on effects of sanitation improvement on tourism, business and the sanitation supply market, drawing on primary data as well as robust secondary data to make conclusions on the likely economic impacts of sanitation improvements (Chapter 5). Such an analysis enriches the comprehensiveness of the study and provides an increased awareness that sanitation sector may have a broader effect on other economic sectors.

The main output of the ESI Phase 2 study is a set of CBA results covering sanitation as well as hygiene improvement in selected rural and urban areas. It presents a thorough economic benefit analysis of sanitation improvement for all available sanitation ladder options at the study sites. Quantifiable benefits of having improved sanitation options were monetized and evaluated using several economic performance indicators. The analysis included two main types of intervention: (1) from no sanitation option (open defecation) or unimproved option (e.g. hanging toilet) to having any type of improved toilet, whether communal, shared or private; and (2) moving up the sanitation ladder from basic improved to more advanced improved toilets (Chapter 8). Hence, program implementers are provided with robust and detailed figures on which sanitation interventions may be economically viable in any given setting. Such quantitative information may also be used to support an advocacy campaign to get support from stakeholders.

Sanitation improvement options vary from basic level to advanced level options. Each of them delivers specific economic benefits but each also entails a cost. Therefore, this study provides detailed information on sanitation investment costs, which cover physical (capital) and nonphysical (program) costs, as well as operation and maintenance costs for each sanitation option. The figures are also presented on an annual basis in order to have fair and clear comparisons among the available sanitation ladder options at each study site, given that different options have a different expected life span (Chapter 6). Households of different socio-economic levels – from poor to wealthy – can therefore choose which point on the sanitation ladder is appropriate for them, based on their preferences and ability to pay.

In addition to the benefit analysis of sanitation improvement at household level and national level, the study presents a program approach analysis (PPA), which informs program implementers of the importance of implementing programs efficiently (Chapter 7). The PAA involved a structured assessment of selected sanitation programs, presenting results on program effectiveness and the appropriateness of a particular intervention approach with respect to specific geographical characteristics and cultural and socio-economic contexts.

IX. Discussion

9.1 STUDY MESSAGES AND INTERPRETATION

9.1.1 MAIN MESSAGES

The study results at rural sites reveal that all sanitation interventions are economically feasible. The actual benefit-cost ratio or BCR values range from 2.0 (private septic tank in Lamongan district) to 6.0 (community and private pour-flush toilets in Tangerang district). As payback periods are short, the internal rates of return are very high, exceeding 100% in many cases. Therefore, all investments at any level on the sanitation ladder, both at optimal and actual utilization, are economically feasible at rural sites.

At urban sites, all sanitation ladder options are economically feasible at their optimal utilization. The BCR values range from 1.1 for private toilet connected to the sewerage system in Banjarmasin to 4.0 for private wet pit in Malang city. Nevertheless, there are two sanitation ladder options – SANIMAS and private toilet connected to the sewerage system in Banjarmasin – which are not economically feasible at their actual capacity utilization, both with BCR of 0.2. Their actual levels of capacity utilization are 70% and 14%, respectively. These figures are a reminder to program implementers that sanitation interventions require careful planning and implementation.

Given that some people already have some form of sanitation, the decision they face is whether to move further up the sanitation ladder. At rural sites, further investments in sanitation are economically justified, with the following BCR figures:

- Lamongan district: the lowest actual BCR is 2.0 with an annual rate of return of 21% for moving up from private wet latrine to improved private septic tank.
- Tangerang district: the lowest actual BCR is 1.2 with an annual rate of return of 15% for moving up from private wet latrine to improved private septic tank.

At all urban sites, moving up the sanitation ladder from shared latrine to improved private septic tank is economically feasible at both optimal and actual capacity utilization. Other improvement options for moving up the sanitation ladder are not economically feasible, having a BCR of less than 1.

As well as the above quantitative benefits, there are also non-monetized benefits that should be taken into account to justify any sanitation investment. People may consider paying any price to acquire intangible benefits such as:

- The comfort of having a better environment as the result of possessing an improved private toilet.
- More privacy for doing other activities in a toilet room, especially for stay-at-home mothers, such as bathing, female hygiene, washing or cleaning home appliances.
- Economic gains from environmental improvements such as not contaminating groundwater used for drinking water, or improved quality of the neighborhood (e.g. closed rather than open drains transporting sewage).
- Connecting to off-site systems such as communal or urban sewerage systems due to limited space to build a septic tank.
- Larger scale economic benefits from having good sanitation, such as knock-on effects on tourism and business as well as the sanitation supply market.

The benefit value drivers in the quantitative analysis include the costs related to sickness, such as physician's fee, medicines and transport to health facilities, as well as saving time from not traveling to site of open defecation or queuing at public toilets. Marginal benefits have been valued related to

averted pollution of local water sources and reduced travel or treatment costs; however, the actual economic benefits are likely to be significantly greater than those valued in this study. Among the valued benefits, the health benefits will most likely lead to financial savings for households as well as health care providers. Therefore, decreased risks to health as a consequence of having better sanitation would lead to reduced household spending on health-seeking efforts, thus safeguarding cash resources for other uses.

For sanitation financing purposes, benefits can be classified into private and community benefits. Private benefits include direct health benefits (averted transmission between members within the same household), access time savings and intangible benefits of an improved and closer toilet. The community benefits include environmental benefits that are enjoyed by the community as a result of the joint effort of households to improve their sanitation facility as well as community-wide reductions of communicable disease (often termed 'health externalities'). Due to lack of empirical evidence on the distinction between private and community health benefits, disaggregated results were not presented in this study. However, there are clear and established public health arguments for public investment in sanitation to capture the health benefits, of which there are many precedents in countries of the developed world. Furthermore, investment in infrastructure is not enough: public funds also need to be utilized for raising community awareness and motivating households to take action.

Linking the benefits above with gender and their distributional assessment also requires understanding the different benefits for women, men, children and the elderly. In the previous chapter, it was mentioned that husbands are the decision makers when it comes to building and upgrading a sanitation facility, especially for higher cost facilities or facilities that involve disruption such as housing improvements. Therefore, husbands need to become one of the target groups for sensitization on the economic benefits of sanitation investment, to persuade them to invest. However, as housewives, children and the elderly tend to spend more time at home than the husbands, they would be the main beneficiaries of family toilet provision and would gain greater intangible benefits.

9.1.2 ROBUSTNESS OF RESULTS

To undertake the variety of economic calculations in the study, a range of assumptions had to be made as the basis for the analysis. The main assumptions of the quantitative analysis are as follows:

- The health risks posed by those who live in the study sites are assumed to be caused, among other things, by the level of sanitation. Open defecation practice is the most disease-prone option. Private toilet with septic tank and septage management, or toilets connected to sewerage systems with wastewater treatment, have the lowest health risks.
- Time savings from having better sanitation will have economic benefits, whether the time savings are used for wage earning, for non-income productive benefit, or for leisure time. A conservative value of time was used: 30% of the average wage for adults, and half of this value for children.
- Having better sanitation will lead to improved environment quality, which will avert pollution of local water sources and reduce water treatment costs.

The above assumptions may even be conservative under the following conditions:

1. When averted costs from avoided disease cases are greater than their assumed values.
2. Where there exists ample opportunities to earn additional income from the time saved and people are eager to spend their productive time in a productive manner.
3. People's behavior related to water treatment is heavily influenced by water source quality.

On the other hand, the assumptions are considered to be optimistic under the following conditions:

1. Sanitation is not the only factor that affects people's health risk. There may be other factors causing these same diseases, such as the way parents take care of their under-five children, food safety and the hygiene behavior of adults.
2. Not everybody perceives that being higher up the sanitation ladder is preferable, nor does it leads to regular toilet utilization. In sites such as Payakumbuh, some people who have private toilets still regu-

larly defecate in hanging toilets on ponds. Therefore there are some uncertainties in calculating benefits. In order to explore the impact of breakdown in this assumption, the efficiency calculations are presented under different scenarios: optimal versus actual capacity utilization.

3. In a country with relatively high unemployment like Indonesia, there are not many opportunities to profit from the saved time although people are eager to spend the time productively. The opportunities would be far fewer if people were reluctant to spend the time saved productively.
4. People are not aware that having better sanitation makes water treatment simpler and thus potentially reduces its cost.

In order to understand the sensitivity of the results to changes in these assumptions, a sensitivity analysis was conducted on three variables: the value of time, the value of premature death, and the diarrheal disease rate. The selected case study for the sensitivity analysis was the Banjarmasin urban site, presenting values for the sewerage system and the community toilet options. Banjarmasin was selected as the BCR of these sanitation options was the least favorable out of all the sites – hence one can observe whether less pessimistic assumptions would lead to a BCR of greater than unity. The assumptions used for the sensitivity analysis were as follows:

- Value of time: increase to 100% of the average wage for adults, and 50% for children.
- Value of time: using GDP per capita instead of the average wage.
- Value of premature death: substitute the alternative value of statistical life (VOSL) for the human capital approach. This involved adjusting a VOSL from developed countries of US$2 million to Indonesia, based on the difference in income levels.
- Diarrheal disease rate: a rate of twice the baseline estimate is used.

TABLE 58: SENSITIVITY ANALYSIS RESULTS FOR BANJARMASIN SEWERAGE SYSTEM

Efficiency measure	Scenario	Private toilet with off-site treatment at its actual capacity utilization					
			Sensitivity analysis version				
		Baseline analysis value	Increased value of time	Value of time = GDP per capita	Increased value of premature death	Increased baseline diarrheal disease rate	All parameters changed
COST-BENEFIT MEASURES							
Benefits per US$1 input (US$)	Optimal	1.1	2.5	1.7	1.6	1.4	6
	Actual	0.2	0.6	0.4	0.4	0.30	1.3
Internal rate of return (%)	Optimal	12%	70%	32%	28%	20%	>100%
	Actual	<0%	<0%	<0%	<0%	<0%	15%
Pay-back period	Optimal	8 years 2 months	2 years 5 months	4 years 1 month	4 years 6 months	5 years 11 months	11 months
	Actual	>20 years	>20 years	>20 years	>20 years	>20 years	7 years 1 month
Net present value ($)	Optimal	139	227	751	647	380	4,910
	Actual	(2,395)	(89)	(1,950)	(2,024)	(2,219)	1,081
COST-EFFECTIVENESS MEASURES							
Cost per DALY averted (US$)	Optimal	2,548	2,548	2,548	2,548	2,211	2,211
	Actual	10,818	10,818	10,818	10,818	9,389	9,389
Cost per case averted (US$)	Optimal	15	15	15	15	11	11
	Actual	66	66	66	66	47	47
Cost per death averted (US$)	Optimal	81,874	81,874	81,874	81,874	81,874	81,874
	Actual	347,621	347,621	347,621	347,621	347,621	347,621

TABLE 59: SENSITIVITY ANALYSIS RESULTS FOR BANJARMASIN COMMUNITY TOILETS

Efficiency measure	Optimistic scenario	Community toilet with treatment					
			Sensitivity analysis version				
		Baseline analysis value	Increased value of time	Value of time = GDP per capita	Increased value of premature death	Increased baseline diarrheal disease rate	All parameters changed
COST-BENEFIT MEASURES							
Benefits per US$1 input (US$)	Ideal	1.7	2	2	3	2	6
	Actual	1.1	1	2	2	1	4
Internal rate of return (%)	Ideal	21%	32%	34%	38%	31%	173%
	Actual	9%	17%	17%	20%	0	73%
Pay-back period	Optimal	5 years 8 months	4 years 1 month	4 years	3 years 8 months	4 years 3 months	1 year 7 months
	Actual	4 years 1 month	3 years 5 months	3 years 3 months	2 years 11 months	3 years 6 months	1 year 3 months
Net present value ($)	Ideal	272	500	529	599	475	1,805
	Actual	24	184	205	253	166	1,101
COST-EFFECTIVENESS MEASURES							
Cost per DALY averted (US$)	Ideal	1,502	1,502	1,502	1,502	1,302	1,302
	Actual	2,142	2,142	2,142	2,142	1,858	1,858
Cost per case averted (US$)	Ideal	9	9	9	9	7	7
	Actual	13	13	13	13	9	9
Cost per death averted (US$)	Ideal	47,948	47,948	47,948	47,948	47,948	47,948
	Actual	68,399	68,399	68,399	68,399	68,399	68,399

Table 58 and Table 59 show the results for the sewerage system and the community toilets, respectively. According to the sensitivity analysis, the most influencing variable is value of time by changing the average wage of adults to 100% and of children to 50%. However, the change in any single parameter alone does not make the system economically feasible (i.e. BCR > 1) at the actual capacity utilization of centralized system of 14%. The system becomes economically feasible only when all four parameters are changed at the same time. In the case of community toilets, changing the average wage of adults to 100% and of children to 50% produces an economically feasible result.

The results point to the finding that, in order to have efficient and economically feasible sanitation interventions – particularly for sewerage system and community toilets (SANIMAS) – the most important factors are increasing the utilization of the facilities towards the optimal level and increasing the capacity utilization of the treatment facility. The adjustment of assumptions also point to the uncertainty surrounding the benefits obtainable from improved sanitation, and hence their economic feasibility. The choice of conservative input values in the baseline assessment and the omission of several benefits from the quantitative analysis, suggests that the benefit-cost ratios will be higher – possibly significantly higher – than those reported in the baseline assessment.

9.1.3 GENERALIZABILITY OF RESULTS

It has been mentioned that the results of this study do not represent the country-wide sanitation situation. In terms of sanitation coverage, none of the five study sites, each with their own specific characteristics, would be representative of the general rural or urban sanitation situation in such a large country as Indonesia. There will be too many different 'typical' settings, each with their own unique characteristics and each delivering different economic benefits as the result of sanitation intervention. Therefore, the economic analysis results presented here for each site only truly represent the sanitation intervention benefits at that particular site.

However, areas with low improved sanitation coverage, with typical characteristics such as open defecation practices and unprotected ground water sources, are expected to have similar health status and water variables. Likewise, areas with a similar demographics, such as population density, age composition of family members and average wage, will have similar benefits once their sanitation facilities are improved. The fact that the major health benefits are attributed to the population aged five years and under, any settings with significantly lower fertility patterns (and hence fewer young children per household) are likely to have lower benefit-cost ratios. On the other hand, households with more adults will have greater access time savings. Larger households will generally have more favorable economic performance, as the costs are spread amongst more people.

The same observation applies for the tourism and business surveys. A sample of 254 holidaymakers and business visitors and ten companies interviewed cannot possibly represent the more than 6 million tourists visiting Indonesia each year[51] as well as the large numbers of companies located in Indonesia. There will be many different personal opinions about which are the most influential aspects of sanitation. However, in general, the impact of poor sanitation on the enjoyment of stay for tourists and the performance of employee in a business will have similar results. Therefore, the results of this study can provide indicative figures for the benefits of sanitation improvement as a whole.

9.2 UTILIZATION OF RESULTS IN DECISION MAKING

9.2.1 POTENTIAL USES OF RESULTS

Although conducted in only five sites, this study provides hard evidence on the costs and benefits of improved sanitation. These 'indicative results' provide strong advocacy materials to convince stakeholders to increase their spending on sanitation, and to focus greater attention on more efficient program implementation and further scaling up of improved sanitation facilities. Traditionally advocacy material is produced without specific targets and fed into the public domain. The results of this study, on the other hand, provide more specific information for different target groups and different sanitation stakeholders.

For instance, when presenting BCR figures, the household should be a greater focus of advocacy efforts, as is the case with community-led approaches such as CLTS and sanitation marketing approaches such as TSSM. The messages on the economic return of investing in improved sanitation will help convince households to pay more for sanitation to a level of effective demand that will lead to an investment decision.

At national and city/district level, the economic returns together with information from the program approach analysis, the costs of improved sanitation and their sources of financing will support the policy aspects of sanitation development, particularly for the PPSP, which is currently ongoing in Indonesia. For selection of interventions and appropriate technology through a better understanding of costs (investment, recurrent, annual equivalent) and economic returns (annual, short-term, long-term), this study provides in-depth yet practical case studies. The models of analysis have been developed in such way to cover the following issues:

- Enabling the inclusion of **efficiency criteria** in the selection of sanitation options when governments (at central and local level) and/or donors prepare sanitation strategic planning or specific sanitation projects and programs,
- Bringing greater focus on **appropriate technology** through increased understanding of the marginal costs and benefits of moving up the sanitation ladder in different contexts. The policy makers may develop 'stepping stone scenarios' when they prepare community-based sanitation program approaches, which also consider the process of raising awareness on better sanitation in the community.

In order to accelerate progress and meet the government target as well as MDG target on sanitation coverage, the PPSP has calculated that meeting both targets would require a total spend of US$5,356 million within the next five years. At the time of the launch of the program, the government committed to contributing about 30% of the total cost requirement and will seek to mobilize other sources of funding. This study also provides evidence-based

[51] Ministry of Culture and Tourism, 2009.

advocacy to convince all stakeholders that contributing to the total cost of the PPSP is economically feasible and will deliver valuable outcomes for the national economy. Therefore, it can be used to leverage grants to incentivize private investments in sanitation.

In the sanitation program preparation phase, the cost-benefit model in this study can contribute to the design of feasible financing options by identifying program beneficiaries as well as cost incidence of the sanitation program. The program planners can design 'matching' sanitation options and implementation approaches against the beneficiaries' ability to pay and their level of awareness. In the end, it will contribute to optimize program effectiveness.

The sensitivity analysis reveals that the determinants of efficiency are, on the benefit side, health variables, time savings and program performance. On the cost side, they are low investment costs per household reached, low operation and maintenance costs, and efficient program delivery. It is important that such information is well understood by program implementers. A good understanding of the determinants of program efficiency will also help program implementers boost the benefits of sanitation programs.

9.2.2 TRANSLATING EVIDENCE TO ACTIONS

The Sanitation Technical Team (TTPS), which is responsible for formulating policies as well as planning and implementing national sanitation sector development, will be the party that will find the detailed study results most useful. Table 60 presents the TTPS team members as well as other parties/ stakeholders whose areas of responsibility may lead them to use the results of the study.

9.2.3 INTEGRATING ECONOMIC CONSIDERATIONS INTO DECISION MAKING PROCESSES

The development of sanitation in Indonesia has become a national issue. The Government of Indonesia has placed the sanitation developments among the national priorities, declared at the 2nd National Sanitation Conference, December 2009. The Sanitation Technical Team has initiated a national "giant step" of sanitation development through the Acceleration of Settlement Sanitation Development Program (PPSP) 2010-2014. One of the targets is for Indonesia to be free of open defecation by the end of 2014, or earlier.

The first stage out of the six successive and comprehensive PPSP stages[52] is advocacy, which involves awareness-raising in order to create demand for sanitation among national, provincial and city/district governments as well as among end users (communities). Such advocacy requires robust and convincing data and information to convince the campaign targets of importance of sanitation improvement at household level. Therefore:

1. Decision makers at central, provincial and local levels can each utilize the study results as evidence of the economic importance of sanitation, thus leading to demand creation for sanitation.
2. The third stage of the PPSP – City Sanitation Strategy – can use the CBA model to enrich its Environmental Health Risks Assessment (EHRA) study. The outcomes of such a study demonstrate not only indicative health risks of particular areas, but also potential quantitative benefits that might be acquired should the sanitation condition in the areas be improved.
3. During the fourth stage of the PPSP – compilation of detailed technical proposals presenting sanitation programs or project profiles – the study results which can be utilized are the costs of improved sanitation and hygiene, the cost-benefit performance of sanitation investment, and the comparison of program performance, with the aim of securing financing commitments from stakeholders. Each stakeholder is offered the opportunity to take part in the proposed sanitation programs, hence, there ought to be a balance of responsibilities and an optimal blend of contribution among them according to their position and capacity. Local governments can make use of the program approach analysis to help them decide which of the implemented approaches is most appropriate to their local context.

[52] The Organization and Management of the USDP Project, 2010: The six PPSP stages are (1) advocacy, (2) institutional preparation, (3) City Sanitation Strategy, (4) detailed technical proposals, (5) implementation, and (6) monitoring and evaluation.

4. The sixth stage of the PPSP – monitoring and evaluation – can learn from the frameworks used in this study, such as the CBA and PAA models, which are tools to periodically measure performance of sanitation programs during and after implementation. Sanitation financiers and implementers will be able to assess to what extent the implemented sanitation programs have achieved their goals and targets, and the division of the total benefits amongst the different beneficiaries and stakeholders. Therefore, all contributing parties will have a fair assessment of and possess a sense of ownership in the sanitation programs. Hence, in the long run such assessments are expected to increase program sustainability.

TABLE 60: POSSIBLE USE OF STUDY RESULTS BY TTPS TEAM MEMBERS AND STAKEHOLDERS

No.	Party/Agency	Use of Study Results	Functional Activities
1	BAPPENAS	• CBA results • Program costs	Coordinating all national level government agencies in strategic planning and annual budgeting for sanitation sector.
2	Ministry of Public Works (MPW)	• CBA results • Program costs	• National level strategic planning, annual budgeting, technology option development and selection. • Design and implementation of appropriate sanitation options.
3	Ministry of Health (MoH)	• CEA results • Program approach analysis • Intangible benefits	• Coordinating with BAPPENAS and MPW: conducting health component of interventions at national level. • Program approach option development. • Design and implementation of appropriate sanitation approach. • Fostering program effectiveness to its optimal level.
4	Ministry of Home Affair (MoHA)	• Program approach analysis • Program costs	Facilitating all sanitation program implementation including capacity building at provincial and city/district level.
5	Ministry of Finance (MoF)	• CBA results • Program costs • Potential impacts of improved sanitation on tourism, businesses, foreign investment, and sanitation markets	• National level annual budgeting for sanitation sector. • Setting budget allocation for sanitation sector.
6	Decentralized governments	• CBA results • Program costs • Program approach analysis • Intangible benefits • Potential impacts of improved sanitation on tourism, businesses, foreign investment, and sanitation markets	• Strategic planning, annual budgeting, program approach selection at local level. • Implementation of appropriate technology option and sanitation approach. • Achieving optimal program effectiveness. • Sanitation supply assessment at local level. • Developing local potential to provide sanitation supply.
7	Sanitation Donor Group and NGOs	• CBA results • Program costs • Program approach analysis	• Setting budget allocation to support sanitation development.
8	Media	• CBA & CEA results • Program approach analysis • Potential impacts of improved sanitation on tourism, businesses, foreign investment, and sanitation markets • Intangible benefits	• Sensitization and advocacy to all stakeholders • Promoting and campaigning issues such as: - sanitation is no longer private issue, but it is a public shared issue, - there are knock on effects of improved sanitation on tourism, businesses and foreign investment, and sanitation markets
9	Households	• CBA results • Intangible benefits	• Messaging of cost-benefits through sanitation marketing to develop sanitation demand and improve willingness to pay for sanitation provision • Peer social marketing to increase awareness on gender sensitivity that women, children and elderly are the main beneficiary of family toilet provision

One of the challenges in program cost assessment is the difficulty of matching the hardware costs of an intervention with the software costs of the same intervention, given that different sector ministries manage different components of the same sanitation programs. For example, it is difficult to match particular sanitation program costs in the Ministry of Health (software component) with the corresponding programs implemented by the Ministry of Public Works (hardware component) as they were not designed as integrated sanitation programs. Consequently, it is difficult to calculate the total sanitation intervention costs, covering all related software and hardware costs of the sanitation programs. Therefore there is a need to synchronize and synergize all sanitation-related initiatives carried out separately by the various sector ministries.

5. In order to have comprehensive cost figures for any particular sanitation program, it is recommended that all participating parties record and keep information about related program costs and develop calculations for overall program cost. For this purpose, the costs calculation model in this study can be applied, with some adjustments according to program specific contexts.
6. Sanitation programs implemented by different ministries should be coordinated to ensure effective funds disbursement and program implementation. Inter-departmental cooperation in the WSLIC program (Water and Sanitation for Low Income Communities) and ISSDP are very good examples of this. WSLIC 3 (also known as PAMSIMAS), which was funded by the Ministry of Public Works, utilized the CLTS approach developed by the Ministry of Health. ISSDP, which implemented an institutional approach, fostered the creation of the TTPS in 2007. The purpose of the TTPS is to synchronize and coordinate sanitation developments throughout their planning, implementation, monitoring and evaluation processes. Since then, any sanitation related initiatives from sector departments are incorporated into an integrated sanitation development program, which is now called PPSP.

ISSDP facilitated 14 cities to develop their city sanitation strategies (CSS). PPSP started in 2010 and will be facilitating 330 cities/districts to develop and implement their CSS during the next five years. With such ambitious targets, and involving many parties and various stakeholders with different levels of awareness, building and maintaining a balanced awareness and understanding and involvement among the stakeholders will be a major challenge for the program.

7. Communication tools should be developed which are easy to understand, are interesting and motivating and hence lead to accelerated awareness and commitments to support sanitation development. The communication tools should include the monetary value of sanitation benefits or CBA figures. It is recommended that the TTPS facilitate local governments (PPSP participants) to conduct these activities in order to monetize the value of sanitation benefits.
8. The CBA figures in this study can be used to trigger initial awareness. The TTPS can then use the CBA model to calculate sanitation cost-benefit performance figures that can be used to develop the CSS in selected cities/districts. Simplified methods and tools are required in order to do this. Once the selected cities/districts have calculated their sanitation cost-benefit figures, they can then help other participating cities/districts to do the same. In doing so, there will be also a period of shared learning among the sector ministries and local governments to assess the economic benefits of sanitation development. The PAA study showed that sanitation program effectiveness is highly influenced by strong campaign, promotion and education for the community. For instance, FGD results in Banjarmasin revealed that some community members did not understand the need for a sewerage system, which has deterred them from connecting to the sewerage system. There may be other influencing factors for the households' willingness to connect, however, such as the government's failure to allocate sufficient funds for program promotion, instead spending the large portion of funds on construction of sanitation

facilities. On the other hand, the CLTS program in Payakumbuh allocated a large portion of funds on community campaign and education as part of the effort to put an end to open defecation, while the cost of sanitation facilities construction were borne by the community. The CLTS program has successfully reduced open defecation in the area.

9. It is very important for governments to allocate sufficient funds for software development to raise people's awareness of sanitation, and not just provide funds for hardware development. Financing the maintenance of the sanitation intervention should also be taken into account in order to ensure its sustainability.
10. Program performance indicators revealed that handwashing with soap after defecation is not common practice in local communities. As mentioned above, community campaigns and education initiatives are very important, especially those targeting health and hygiene behavior. Handwashing with soap as a component of health and hygiene behavior should always be part of a sanitation program. Paying more attention to promoting handwashing with soap will enhance the effectiveness of sanitation programs and enable full capture of the health benefits.

Distribution of the responsibility for financing construction of sanitation facilities is often not balanced. In general, poor people using on-site systems bear the cost of their construction, while urban households with toilets connected to a sewerage system rely on government to build their sanitation facilities. Lack of awareness among urban communities of the importance of improved sanitation at household level is one of the reason behind the imbalance in the distribution of financing responsibilities. An appropriate and easy-to-understand awareness campaign program for stakeholders, especially program beneficiaries, may help to redress the balance.

On the national level, the study also highlights the links between sanitation and productive sectors that are key contributors to sustainable economic growth, such as tourism, business and the sanitation supply market. These findings should be used to sensitize and convince other government departments, such as those responsible for tourism, industry and private sector development, to invest more in sanitation.

9.2.4 SUMMARY RECOMMENDATIONS

This study finds that all sanitation interventions have benefits that exceed costs, when compared with "no sanitation facility." The high net benefits from low-cost sanitation options, such as pit latrines, suggest these technologies should be centerpiece to increasing access for rural households. However, in densely populated areas, pit latrines have limited feasibility, and to improve quality of life in increasingly populous cities, decision makers need to take into account the economic benefits of improved conveyance and treatment options. If funding is available, populations prefer options that transport waste off site. Appropriate treatment and/or isolation of waste is key to the future sustainable development of Indonesia. Based on the findings of this study, three key recommendations for decision makers are proposed:

1. **Intensify efforts to improve access for the entire Indonesian population to improved basic sanitation.** Indonesia approved a sound community-based sanitation strategy in 2008 that needs to be implemented, and enough evidence is available to show that establishing a viable sanitation market – where demand by all income levels meets affordable and good quality supply – is feasible. For policy makers and local governments, this requires special attention to ensure demand is triggered, health benefits are captured, and coverage is sustained (i.e., avoiding a return to open defecation). Sanitation providers, from wholesalers to community-based masons, need to improve on affordable, upgradable latrine structures and design to ensure widespread uptake. Information on sanitation options and models for households everywhere in Indonesia is another key element for rapidly accelerating and sustaining coverage.
2. **Go beyond basic sanitation provision, where the population demands it and the funding is available.** In densely populated urban areas, only basic sanitation provision is no longer feasible due to the higher expectations of populations, space constraints

and risks of groundwater pollution. Decision makers should therefore be aware of the full range of conveyance and treatment options, and their related costs and benefits, in order to avoid investing in expensive technologies that are difficult and costly to sustain. In municipalities where funding is sufficient to permit more sustained and quality services, these will better capture the full environmental and health benefits and respond to the population's wish for a clean, livable environment.

3. **Promote evidence-based sanitation decision-making.** Variations in economic performance of options suggest that careful consideration of site conditions and local demand and preferences is needed to select the most appropriate sanitation option and delivery approach. Decisions should take into account not only the measurable economic costs and benefits, but also other key factors for a decision, including intangible impacts and socio-cultural issues that influence demand and behavior change, availability of suppliers and private financing, and actual household willingness and ability to pay for services.

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Annex Tables

ANNEX A. STUDY METHODS

TABLE A 1. SUB-NATIONAL SANITATION COVERAGE RATES, LATEST YEAR (2007)

No.	Province	Private Toilet	Shared Toilet	Community Toilet	No Toilet
1	Riau	79.8	8.5	1.7	9.9
2	Kepulauan Riau	77.8	14.4	1.8	6.0
3	Kalimantan Timur	76.4	9.5	5.2	8.9
4	DKI Jakarta	72.6	20.1	6.7	0.7
5	Sumatra Utara	71.8	6.8	4.0	17.4
6	Sumatra Selatan	65.8	11.1	4.0	19.1
7	DI Yogyakarta	65.4	25.8	0.7	8.2
8	Sulawesi Utara	64.1	16.2	3.4	16.4
9	Lampung	64.1	11.1	1.8	23.0
10	Jambi	63.3	9.6	4.0	23.1
11	Jawa Barat	61.8	12.7	8.7	16.9
12	Nusa Tenggara Timur	60.8	12.1	1.6	25.5
13	Bangka Belitung	60.7	5.0	2.0	32.3
14	Bali	59.5	20.0	0.3	20.2
15	Bengkulu	59.5	9.9	2.4	28.2
16	Kalimantan Selatan	59.3	13.3	9.0	18.4
17	Jawa Tengah	58.7	12.4	3.5	25.4
18	Sulawesi Selatan	58.4	12.6	1.6	27.4
19	Kalimantan Barat	57.9	6.6	3.3	32.2
20	Sulawesi Tenggara	57.7	8.2	2.8	31.2
21	Jawa Timur	57.1	15.3	1.8	25.8
22	Banten	53.3	12.0	2.0	32.8
23	NAD	51.2	8.2	8.4	32.2
24	Kalimantan Tengah	51.1	14.5	8.4	26.1
25	Sumatera Barat	49.1	12.5	7.1	31.2
26	Papua	47.9	11.6	4.2	36.3
27	Maluku	46.5	7.1	7.6	38.9
28	Sulawesi Tengah	45.4	8.1	3.7	42.8
29	Papua Barat	43.3	16.1	13.1	27.5
30	Sulawesi Barat	42.0	7.0	3.1	47.9
31	Maluku Utara	36.8	18.5	7.7	36.9
32	Nusa Tenggara Barat	35.6	13.0	2.3	49.1
33	Gorontalo	31.0	19.2	7.5	42.2
	Indonesia	58.9	12.1	4.2	24.8

Source : Susenas 2007

TABLE A 2. SELECTION OF FIELD SITES FOR THE ECONOMIC STUDY

Program name	Location(s) covered	Implementing agents	
Selected field sites			**Reason for inclusion**
Lamongan District (East Java Province) / WSLIC 2 Project	Sub-district : Turi Villages : Turi, Badurame, Geger, Keben	Ministry of Health	Kabupaten Lamongan has the largest number of households coverage among other location of WSLIC 2 project in Indonesia
Tangerang District (Banten Province) / SANIMAS	Sub-district : Sepatan Villages : Sarakan, Kayu Agung Sub-district : Rajeg Villages : Sukasari, Tanjakan	Ministry of Public Works	SANIMAS project has been implemented in various areas in Indonesia. It is better if the chosen site is located not far away from Jakarta to minimize the survey budget and manage / allocate the spare budget for other locations.
Banjarmasin City (South Kalimantan Province) / Sewerage System	Sub-district : Central Banjarmasin Villages : Pekapuran Laut, Kelayan Luar	Local Government	• The sewerage system in Banjarmasin is one of the few sewerage systems in Indonesia that has a good performance and management • Banjarmasin could be one of the 5 (five) sites locations for the ESI 2 study that is more or less represent typical sanitation conditions on Kalimantan Island. • Some data on the sanitation conditions in Banjarmasin are available already and access to related agencies or officials are easier, regarding the ongoing ISSDP project
Malang City (East Java Province) / CBSS (Sanimas)	Sub-district: Kedung kandang, Lowokwaru Villages : Mergosono, Tlogomas, Aryowinangun, Dinoyo	Local Government Ministry of Public Works	Malang City has a SANIMAS program that is initiated, funded, and managed by the community, and proven successful. The program has been replicated at other locations in the surrounding areas.
Payakumbuh City (West Sumatera Province) / CLTS	Sub-district: North Payakumbuh Villages : Talawi, Kotopanjang, Panyolinyam, Kubu Gadang	Ministry of Health Directorate General of Disease Control and Environmental Health National Planning Agency Ministry of Home Affairs Ministry of General Affairs National Pokja AMPL (National Working Groups)	• Availability of primary data as well as secondary data regarding the pre-intervention conditions such as environmental health survey report and the CLTS Proceeding/ Report • Availability of commitment for a full support from the local government (the Mayor and the Sanitation Working Group) which is indicated by a strong intention and providing required and available relevant data • There is a preliminary indication that having a more attention and commitment from the Local Government for sanitation improvement lead to a significant decrease of health subsidy budget during the last 3 consecutive years • A strong intention from BAPPENAS/ Sanitation Technical Team to include Payakumbuh in the ESI – 2 Study • Kodya Payakumbuh could be one of the 5 (five) site locations for the ESI 2 study that is more or less represent the sanitation condition at Sumatera Island.

TABLE A 2. SELECTION OF FIELD SITES FOR THE ECONOMIC STUDY (CONTINUED)

Program name	Location(s) covered	Implementing agents	
Selected field sites			**Reason for inclusion**
WSLIC 2 : • Sumenep District (East Java Province) • Sampang District (East Java Province) • Mojokerto District (East Java Province)			Although all of the location mentioned have a large number of revolving fund, but the number is still far below Kab. Lamongan. Another thing is the locations mentioned here are all located in East Java province, the same as Kab. Lamongan
SANIMAS : • Denpasar City (Bali Province) • Surakarta City (Central Java Province)			Denpasar and Surakarta City located further from Jakarta compared to Tangerang which could influence the project budget
Sewerage System : • Surakarta City (Central Java Province)			The Surakarta Sewerage System doesn't perform well enough compared to the one in Banjarmasin.
CLTS : • Bogor District (West Java Province) • Muara Enim District (South Sumatera) • Cirebon District (West Java) • Ciamis District (West Java)			• The study meant to represent the condition of Indonesia. Since location from Sumatera Island hasn't been represented, so Kab Bogor, Kab. Cirebon, and Kab. Ciamis (located at Java Island) should be excluded • Kab. Muara Enim could be choosen as study location for CLTS program but Payakumbuh is much more prepared in availability of data, support from local government, and is the chosen location of SanTT

TABLE A 3. ASSESSMENT OF ADVANTAGES AND LIMITATIONS OF DIFFERENT DESIGN OPTIONS

No.	Design	Advantages	Limitations
DESIGNS INVOLVING FIELD DATA COLLECTION			
1	Economic study designed entirely for research purposes, including matching and randomization of comparison groups	• Addresses the specific questions of the research • Highly scientific design	• Expensive and long time period • May not capture health impact • Limited generalisability
2	Economic research attached to other research studies (e.g. randomized clinical trial)	• Captures health impact with degree of precision • Can conduct additional research on other impacts • Add-on research cost is small • Statistical analysis possible	• Expensive and long time period • Few ongoing clinic trials • Requires collaboration from start • Trials may not reflect real conditions • Limited comparison options
3	Economic research attached to pilot study, with or without randomization	• Add-on research cost is small • Options are policy relevant • Matched case-control possible • Can start research in mid-pilot	• Few pilot programs available • Pilots often not designed with scientific evaluation in mind (e.g. before vs. after surveys) • Pilot conditions not real life • Limited comparison options
4	Economic research attached to routine government or NGO/donor programs, without randomization	• Reflects real life conditions (e.g. uptake and practices) • Research addresses key policy questions • Matched case-control possible	• No research infrastructure • No scientific design • Limited comparison options
DESIGNS INVOLVING SECONDARY DATA COLLECTION			
5	Collection of data from a variety of local sources to conduct a modeling study	• Relatively low cost • Short time frame feasible • Can compare several options and settings in research model • Can mix locally available and non-local data	• Results imprecise and uncertain • Actual real-life implementation issues not addressed
6	Extraction of results from previous economic studies	• Low cost • Results available rapidly • Gives overview from various interventions and settings	• Limited relevance and results not trusted by policy makers • Published results themselves may not be precise

TABLE A 4. AGGREGATING EQUATIONS FOR COST-BENEFIT AND COST-EFFECTIVENESS ANALYSIS

Cost-Benefit Analysis:

1) **Benefit-cost ratios (BCR)**
   - o BCR (benefit cost ratio = PVB / PVC) where PVB = Present Value of Benefit and PVC = Present Value of Cost
   - o It has to present an answer to the question: "Are the benefits greater than the costs

2) **Net present value (NPV)**
   - o NPV is the sum of all terms of discounted cash inflow/outflow (present value or PV)

$$PV = NCF_t /(1+i)_t$$

where

- o t - the time of the cash flow
- o i - the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk.)
- o NCFt is the net cash flow (the amount of cash, inflow minus outflow) at time t.
- o It provides an answer to the question: "What the investment worth is in today's money? "

3) **Internal rate of return (IRR):** Given the (period, cash flow) pairs (n, Cn) where n is a positive integer, the total number of periods N, and the net present value NPV, the internal rate of return is given by r in:

$$NPV = \sum_{n=0}^{N} \frac{C_n}{(1+r)^n} = 0$$

TABLE A 5. METHODOLOGY FOR BENEFIT ESTIMATION (CALCULATIONS, DATA SOURCES, EXPLANATIONS)

Impacts included	Variable	Data sources	Specific value/comment
1. HEALTH *(All calculations are made using disaggregated data inputs on disease and age grouping: 0-4 years, 5-14 years, 15+ years)*			
1.1 Health care savings *Calculation: [Prevalence or incidence X Attribution to poor sanitation X ((% seeking outpatient care X visits per case X unit cost per visit (medical and patient)) + (Inpatient admission rate X days per case X unit cost per day (medical and patient))] X Proportion of disease cases averted*	Diarrheal disease incidence (0-4 years)	DHS	
	Diarrheal disease incidence (over 5 years)	WHO stats	
	Helminthes prevalence	Global review	
	Hepatitis A and E incidence	National health statistics	
	Indirect diseases incidence (malaria, ALRI)	WHO statistics	
	Malnutrition prevalence	UNICEF/WHO statistics	
	Scabies and trachoma Incidence	National health statistics	
	Attribution of fecal-oral diseases to poor sanitation	WHO (Prüss et al. 2002)	Value = 88%
	Attribution of helminthes to poor sanitation	Global review	Value = 100%
	% disease cases seeking health care	DHS, SES, ESI household survey, health statistics	
	Outpatient visits per patient	Health facility statistics, ESI household survey	
	Inpatient admission rate		
	Inpatient days per admission		
	Health service unit costs		
	Other patient costs (transport, food)	ESI household survey	
	% disease cases averted	International literature review	See Annex B for review
1.2 Health morbidity-related productivity gains *Calculation: [Prevalence X Attribution to poor sanitation X Days off productive activities X Value of time] X Proportion of disease cases averted*	Days off productive activities	ESI household survey	
	Basis of time value: GDP per capita	National economic data World Bank data	Average product per capita (at sub-national level, where available) – 30% for adults, 15% for children
1.3 Premature mortality savings *Calculation: [Mortality rate X Attribution to poor sanitation X Value of life] X Proportion of disease cases averted*	Mortality rate (all diseases)	WHO statistics	(cross-checked with local stats)
	Basis of time value: GDP per capita	National economic data World Bank data	Annual value of lost production of working adults (human capital approach) , from the time of death until the end of (what would have been) their productive life
	Discount rate for future earnings	National governments	Cost of capital estimate (8%)
	Long-term economic growth	Assumption	
	Value-of-statistical-life	Developed country studies	Adjusted to local purchasing power by multiplying by GDP per capita differential

TABLE A 5. METHODOLOGY FOR BENEFIT ESTIMATION (CALCULATIONS, DATA SOURCES, EXPLANATIONS) (CONTINUED)

Impacts included	Variable	Data sources	Specific value/comment
1.4 Disability-adjusted life-years (DALY) averted *Calculation:* *DALY = YLD+YLL* *YLD: discounted disability based on weight and years equivalent time* *YLL: discounted future years of healthy life lost*	Duration of disability	ESI household survey	based on average length of each disease
	Disability weighting	WHO burden of disease project	
	Healthy life expectancy	WHO statistics	
	Discount rate for future disease burdens	National governments	Cost of capital estimate (8%)
	Morbidity and mortality rates	Various: see 1.1 and 1.3 (above)	
2. WATER (for household use) *(weighted average costs were estimated for each water source and for each household water treatment method)*			
2.1 Household water access savings *Calculation:* *Annual costs X % costs reduced, per water source*	Drinking water sources (%) in wet and dry seasons	ESI household survey	
	Annual financial cost per household, per water source	ESI household survey; ESI market survey	
	Annual non-financial cost per household, per water source	ESI household survey	
	Proportion of access cost reduction under scenario of 100% improved sanitation, per water source	ESI household survey; assumption	
2.2 Household water treatment savings *Calculation:* *(% households treating water per method X annual cost) X % households who stop treating*	Proportion of households treating their water, by method	ESI household survey	Validated by other national statistics (DHS, SES)
	Full annual cost per water treatment method	ESI household survey; ESI market survey	
	Proportion of households currently treating who stop treating under scenario of 100% improved sanitation	ESI household survey; assumption	As well as stopping to treat, households may switch to an alternative – cheaper – treatment method if the cleaner water sources enable different water purification methods
3. ACCESS TIME SAVINGS *(weighted average costs estimated for each age category and gender – young children, children and male and female adults)*			
Calculation: *% household members using OD X Time saved per trip due to private toilet X average trips per day X value of time*	Household composition (demographics)	ESI household survey	
	Sanitation practice, by age group	ESI household survey	
	Average round trip time to access site of open defecation	ESI household survey	For households moving from shared to private toilet, access time to shared toilets is used instead of OD
	Average number of round trips to defecation site per day	ESI household survey	
	Basis of time value: GDP per capita	National economic data World Bank data	Average product per capita (at sub-national level, where available) – 30% for adults, 15% for children

TABLE A 5. METHODOLOGY FOR BENEFIT ESTIMATION (CALCULATIONS, DATA SOURCES, EXPLANATIONS) (CONTINUED)

Impacts included	Variable	Data sources	Specific value/comment
4. EXCRETA REUSE GAINS *(reuse of excreta as fertilizer from either UDDT or double-vault pit latrine; and reuse of energy value from biogas digester)*			
Calculation: (% households using product themselves X value in own use) + (% households selling product X selling price)	% households using reuse methods	ESI household survey	
	% households using product themselves	ESI household survey	
	% households selling product to others	ESI household survey	
	Selling price	ESI household & market survey	
	Value in own use	ESI market survey; assumption	

TABLE A 6. DISEASES LINKED TO POOR SANITATION AND HYGIENE, AND PRIMARY TRANSMISSION ROUTES AND VEHICLES

Disease	Pathogen	Primary transmission route	Vehicle
DIARRHEAL DISEASES (GASTROINTESTINAL TRACT INFECTIONS)			
Rotavirus diarrhea	Virus	Fecal-oral	Water, person-to-person
Typhoid/ paratyphoid	Bacterium	Fecal-oral and urine-oral	Food, water + person-person
Vibrio cholera	Bacterium	Fecal-oral	Water, food
Escherichia Coli	Bacterium	Fecal-oral	Food, water + person-person
Amebiasis (amebic dysentery)	Protozoa [1]	Fecal-oral	Person-person, food, water, animal feces
Giardiasis	Protozoa [1]	Fecal-oral	Person-person, water (animals)
Salmonellosis	Bacterium	Fecal-oral	Food
Shigellosis	Bacterium	Fecal-oral	Person-person +food, water
Campylobacter Enteritis	Bacterium	Fecal-oral	Food, animal feces
Helicobacter pylori	Bacterium	Fecal-oral	Person-person + food, water
Protozoa			
Other viruses [2]	Virus	Fecal-oral	Person-person, food, water
Malnutrition	Caused by diarrheal disease and helminthes		
HELMINTHES (WORMS)			
Intestinal nematodes [3]	Roundworm	Fecal-oral	Person-person + soil, raw fish
Digenetic trematodes (e.g. Schistosomiasis Japonicum)	Flukes (parasite)	Fecal/urine-oral; fecal-skin	Water and soil (snails)
Cestodes	Tapeworm	Fecal-oral	Person-person + raw fish
EYE DISEASES			
Trachoma	Bacterium	Fecal-eye	Person-person, via flies, fomites, coughing
Adenoviruses (conjunctivitis)	Protozoa [1]	Fecal-eye	Person-person
SKIN DISEASES			
Ringworm (Tinea)	Fungus (Ectoparasite)	Touch	Person-person
Scabies	Fungus (Ectoparasite)	Touch	Person-person, sharing bed and clothing
OTHER DISEASES			
Hepatitis A	Virus	Fecal-oral	Person-person, food (especially shellfish), water
Hepatitis E	Virus	Fecal-oral	Water
Poliomyelitis	Virus	Fecal-oral, oral-oral	Person-person
Leptospirosis	Bacterium	Animal urine-oral	Water and soil-swamps, rice fields, mud

Sources: WHO http://www.who.int/water_sanitation_health/en/ and [75, 76]

[1] There are several other protozoa-based causes of GIT, including
- Balantidium coli – dysentery, intestinal ulcers
- Cryptosporidium parvum - gastrointestinal infections
- Cyclospora cayetanensis - gastrointestinal infections
- Dientamoeba fragilis – mild diarrhea
- Isospora belli / hominus – intestinal parasites, gastrointestinal infections

[2] Other viruses include:
- Adenovirus – respiratory and gastrointestinal infections
- Astrovirus – gastrointestinal infections
- Calicivirus – gastrointestinal infections
- Norwalk viruses – gastrointestinal infections
- Reovirus – respiratory and gastrointestinal infections

[3] Intestinal nematodes include:
- Ascariasis (roundworm - soil)
- Trichuriasis trichiura (whipworm)
- Ancylostoma duodenale / Necator americanus (hookworm)
- Intestinal Capillariasis (raw freshwater fish in Philippines)

TABLE A 7. WATER QUALITY MEASUREMENT PARAMETERS

Parameter	Test
E-coli (cfu/100 ml)	Coliscan
Biological Oxygen Demand (BOD_5) (mg/L)	5 day incubation
Chemical Oxygen Demand (COD) (mg/L)	5 day incubation
Dissolved Oxygen (DO) (mg/L)	Hach DO Probe
Nitrate (NO^{3-}) (mg/L)	Hach Photometer
Ammonia (NH^4)	Hach Photometer
Conductivity (µS/cm)	YSI Conductivity Meter
Turbidity (NTU)	TurbidiMeter
pH	pH Probe
Water temperature (°C)	Hach ThermoProbe
Residual chlorine (Cl) (in places provided with centralized chlorinated water supply) (mg/L)	Field Kit

TABLE A 8. HOUSEHOLDS SAMPLED VERSUS TOTAL HOUSEHOLDS PER VILLAGE/COMMUNITY

Site	Sampling of households	Sewerage/STF		Septic tank	Wet pit latrine	Dry pit latrine	Shared	Public	OD	Total
		With treatment	Without treatment							
Lamongan	Sample			140	26	34	72		28	300
	Total			300	300	300	300		300	
	% sampled		%	47%	9%	11%	24%	%	9%	%
Tangerang	Sample			85	28	7	26	23	131	300
	Total			300	300	300	300	300	300	
	% sampled	%	%	28%	9%	2%	9%	8%	44%	%
Banjarmasin	Sample	46		165	1	19	33	16	20	300
	Total	300		300	300	300	300	300	300	
	% sampled	15%	%	55%	0%	6%	11%	5%	7%	%
Malang	Sample	137		36	21	61	32		13	300
	Total	300		300	300	300	300		300	
	% sampled	46%	%	12%	7%	20%	11%	%	4%	%
Payakumbuh	Sample			117	3	11	27	15	127	300
	Total			300	300	300	300	300	300	
	% sampled	%	%	39%	1%	4%	9%	5%	42%	%
Total	Sample	**183**		**543**	**79**	**132**	**190**	**54**	**319**	**1500**
	Total	**1500**		**1500**	**1500**	**1500**	**1500**	**1500**	**1500**	
	% sampled	**12%**	%	**36%**	**5%**	**9%**	**13%**	**4%**	**21%**	%

TABLE A 9. SAMPLE SIZES OF OTHER SURVEYS IN STUDY SITES

Site	Group	Focus Group Discussion			Physical location surveys	Health facilities	
		Women[1]	Men[2]	Other groups[3]		Hospital	Clinic
Lamongan	Unimproved	4 x 3	4 x 3	7 x 3	Subdistrict Turi	• Local Public Hospital • Puskesmas Turi	
	Improved	4 x 3	4 x 3				
	Sub-total	24 persons	24 persons	21			
Tangerang	Unimproved	4 x 3	4 x 3	7 x 3	• Subdistrict Sepatan • Subdistrict Rajeg	• Local Public Hospital • Puskesmas Sepatan • Puskesmas Rajeg	• Polyclinic Sepatan Sarana Medika • Dr. Ashari's Clinic at Rajeg • 6 physician practices
	Improved	4 x 3	4 x 3				
	Sub-total	24 persons	24 persons	21			
Banjarmasin	Unimproved	4 x 3	4 x 3	7 x 3	• Subdistrict Central Banjarmasin	• Puskesmas Gadang Hanyar • Puskesmas Cempaka	
	Improved	4 x 3	4 x 3				
	Sub-total	24 persons	24 persons	21			
Malang	Unimproved	4 x 3	4 x 3	7 x 3	• Subdistrict Kedung kandang • Subdistrict Lowokwaru	• Local Public Hospital Saiful Anwar • Puskesmas Arjowinangun • Puskesmas Dinoyo	• 4 physician practices
	Improved	4 x 3	4 x 3				
	Sub-total	24	24	21			
Payakumbuh	Unimproved	4 x 3	4 x 3	7 x 3	Subdistrict North Payakumbuh	• 2 community health centres in North Payakumbuh Subdistrict (Puskesmas Tarok and Puskesmas Lampasi)	
	Improved	4 x 3	4 x 3				
	Sub-total	24	24	21			
Total	Unimproved	60	60				
	Improved	60	60				
	Total	120	120	105			

[1] 4 x 3 means 4 persons x 3 sessions
[2] idem
[3] 7 x 3 means 7 persons x 3 sessions
[4] public health centre

TABLE A 10. SELECTION OF PROGRAMS FOR PROGRAM APPROACH ANALYSIS

Program name	Location(s) covered	Implementing agents	
Selected programs			**Reason for inclusion**
WSLIC 2	South Sumatera, West Sumatera, NTB, East Java, West Java, Babel, South Sulawesi, West Sulawesi	Ministry of Health	• One Community Based Sanitation Program that used revolving fund scheme • Program has finished and thus program data are more complete
SANIMAS	South Sumatera, West Sumatera, NTB, East Java, West Java, Babel, South Sulawesi, West Sulawesi	Ministry of Public Works	One of Community Based Sanitation Program in Indonesia that has been implemented in almost all provinces in Indonesia.
Sewerage System	Bandung (West Java),Banjarmasin (South Kalimantan), Balikpapan (East Kalimantan), Jakarta (Jakarta), Medan (North Sumatera), Solo (Central Java), Tangerang (Banten), Yogyakarta (Yogyakarta)	Local water supply utilities/local health authority/PD PAL	Represents city scale off- site sanitation system
CBSS / Sanimas Malang	Malang City :	Local government/ Ministry of Public Works	• Example of program that is initiated, funded, and managed by the community • The initiator, Pak Agus Gunarto has received a presidential award for his effort in creating a sanitation model/system in his village. He also encourages other communities in the near village to establish their own system.
CLTS	West Sumatera, South Sumatera, Jambi, West Java, Banten, East Java, West Kalimantan, Nusa Tenggara Barat,	Ministry of Health	A promising community based sanitation program, which is different from other programs because no subsidy is given for the physical development
Non-selected programs			**Reason for exclusion**
Community Water Services and Health (CWSH)			Project is still on going (has just started). The Project has been delayed because of regulation changes on loan mechanism and foreign loan from Department of Finance (KMK 35)
Rural Water Supply and Sanitation in NTT Province (ProAir)			Focus more on clean water supply

ANNEX B. HEALTH IMPACT

TABLE B 1. RATES PER POPULATION FOR CASES OF DISEASE

	Average rural sites	Average urban sites	Lamongan	Tangerang	Banjarmasin	Malang	Payakumbuh
Direct diseases							
Mild diarrhea	8.43	3.16	10.81	6.05	3.37	2.66	3.45
Severe diarrhea	5.30	2.38	7.62	2.99	0.95	1.66	4.54
Helminthes	1.83	1.84	1.81	1.84	1.85	1.82	1.86
Scabies		3.70				7.57	3.52
Indirect diseases							
ALRI	2.41	2.09	1.65	3.17	4.18	1.81	0.27
Total	**17.96**	**13.17**	**21.89**	**14.04**	**10.35**	**15.50**	**13.64**

TABLE B 2. RATES PER 1000 POPULATION FOR DEATHS

	Average rural sites	Average urban sites	Lamongan	Tangerang	Banjarmasin	Malang	Payakumbuh
Direct diseases							
Diarrhea	1.5	1.7	1.4	1.6	1.6	1.7	1.8
Helminthes	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Indirect diseases							
Malnutrition	0.00	0.02	0.00	0.01	0.06	0.01	0.01
ALRI	0.38	0.42	0.36	0.40	0.42	0.38	0.48
Measles	0.17	0.19	0.16	0.18	0.18	0.17	0.21
Other indirect	0.01	0.05	0.01	0.01	0.12	0.01	0.01
Total	**2.06**	**2.41**	**1.97**	**2.16**	**2.42**	**2.26**	**2.54**

TABLE B 3. RATES PER 1000 POPULATION FOR DALYS

	Average rural sites	Average urban sites	Lamongan	Tangerang	Banjarmasin	Malang	Payakumbuh
Direct diseases							
Mild diarrhea	0.06	0.02	0.09	0.03	0.02	0.02	0.00
Severe diarrhea	0.03	0.01	0.04	0.02	0.01	0.01	0.03
Helminthes	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Scabies	0.00	0.00	0.00	0.00	-	0.01	0.00
Indirect diseases							
Malnutrition	0.000	0.000	0.000	0.000	0.001	0.000	0.000
ALRI	0.014	0.013	0.011	0.017	0.021	0.012	0.007
Measles	0.002	0.002	0.002	0.002	0.002	0.002	0.003
Other indirect	0.000	0.001	0.000	0.000	0.002	0.000	0.000
Total	**0.12**	**0.06**	**0.16**	**0.08**	**0.07**	**0.07**	**0.05**

TABLE B 4. COMPARISON OF DATA SOURCES FOR SELECTED DISEASES

Disease	Age	Data source	Type of data	Data value
				Lamongan
Diarrhea (mild)	Under 5	ESI Survey		
		INA-DR +COT[1]	Unit cost of Inpatient Health Care/day	• Public facility: 350 • Private facility: 480
		Local Public Hospital – Lamongan District	Rate of inpatient admission	16.9%
		OTC Medicines[2]	Pharmacy	10
	Age 5-14	ESI Survey		
		Local Public Hospital – Lamongan District	Rate of inpatient admission	10.3%
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 381 • Private facility: 511
		OTC Medicines	Pharmacy	10
	Age 15+	ESI Survey		
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 381 • Private facility: 511
		Local Public Hospital – Lamongan District	Rate of inpatient admission	8.7%
		OTC Medicines	Pharmacy	10
Diarrhea (severe)	Under 5	ESI Survey		
		INA-DR +COT[1]	Unit cost of Inpatient Health Care/day	• Public facility: 349 • Private facility: 479
		Local Public Hospital Lamongan District	Rate of inpatient admission	2.27%
	Age 5-14	ESI Survey		
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 346 • Private facility: 476
		Local Public Hospital Lamongan District	Rate of inpatient admission	2.03%
		OTC Medicines	Pharmacy	13
	Age 15+	ESI Survey		
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 346 • Private facility: 476
		Local Public Hospital Lamongan District	Rate of inpatient admission	1.8%
Scabies	Under 5	Local Public Hospital Lamongan District	Rate of inpatient admission	1.8%
	Age 5-14	Local Public Hospital Lamongan District	Rate of inpatient admission	1.4%
	Age 15+	Local Public Hospital Lamongan District	Rate of inpatient admission	0.7%
Malnutrition	Under 5	ESI Survey		
	Age 5-14	ESI Survey		
	Age 15+	ESI Survey		
Malaria	Under 5	ESI Survey		
	Age 5-14	ESI Survey		
	Age 15+	ESI Survey		
ALRI	Under 5	ESI Survey		
		Local Public Hospital Lamongan District	Rate of inpatient admission	11.74%
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 277 • Private facility: 407

TABLE B 4. COMPARISON OF DATA SOURCES FOR SELECTED DISEASES (CONTINUED)

Disease	Age	Data source	Type of data	Data value
				Lamongan
		OTC Medicines	Pharmacy	27
	Age 5-14	ESI Survey		
		Local Public Hospital Lamongan District	Rate of inpatient admission	11.09%
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 277 • Private facility: 407
		OTC Medicines	Pharmacy	27
	Age 15+	ESI Survey		
		Local Public Hospital Lamongan District	Rate of inpatient admission	8.22%
		INA-DR +COT	Unit cost of Inpatient Health Care/day	• Public facility: 254 • Private facility: 384
		OTC Medicines	Pharmacy	25
Hepatitis A,E	Under 5	ESI Survey		
	Age 5-14	ESI Survey		
	Age 15+	ESI Survey		

Remarks:
[1] INA –DRG - COT = Indonesia - Diagnosis Related Group – Cost of Treatment
[2] OTC Medicines = Over the Counter Medicines

TABLE B 5. DIARRHEAL INCIDENCE IN THE PAST YEAR (OR 2 WEEKS) IN ALL FIELD SITES, BY OPTION

Sanitation coverage	Households in sample	Age group			Total	Significant difference with OD
		<5	5-14	15+		
Open defecation	1570	20.9	23.2	20.2	20.8	0.072
Shared/public	304	4.5	3.4	4.0	4.0	0.362
Dry pit	784	11.5	11.2	9.8	10.4	0.083
Wet pit	517	6.9	6.6	6.9	6.9	0.940
Septic tank	2984	39.8	39.4	39.6	39.8	0.980
Sewerage	720	9.8	8.6	9.7	9.6	0.500

TABLE B 6. EVIDENCE ON TREATMENT SEEKING BEHAVIOR FOR OTHER DISEASES

Data source by disease. rural/ urban and year	Observations	% seeking treatment from					other provider	Total
		Public provider	Private formal clinic	Private informal care	Pharmacy	Self-treatment		
DIARRHEA DISEASE MILD								
ESI Survey 0-4 years old Rural 2009		11%	24.1%	2.7%	0%	0.6%	0.0%	38%
ESI Survey 4-15 years old Rural 2009		8%	16%	3%	2%	3%	0.7%	32%
ESI Survey 15+ years Rural 2009		3%	6%	1%	0%	12%	1.0%	23%
DIARRHEA DISEASE SEVERE								
ESI Survey 0-4 years old Rural 2009		31.9%	9%	0%	0%	0.0%		40.7%
ESI Survey 4-15 years old Rural 2009		15.5%	17.3%	3.0%	0%	1.7%		37.5%
ESI Survey 15+ years Rural 2009		5.9%	22.3%	5%	0%	4.9%		37.7%
INDIRECT : ALRI								
ESI Survey 0-4 years old Rural 2009		19.2%	16.0%	0.0%	0%	0.0%		35.2%
ESI Survey 4-15 years old Rural Year of data		12.3%	5.9%	0%	0%	0%		18.2%
ESI Survey 15+ years Rural 2009		9.8%	8.4%	4.1%	0%	4.9%		27.2%

TABLE B 6. EVIDENCE ON TREATMENT SEEKING BEHAVIOR FOR OTHER DISEASES (CONTINUED)

Data source by disease. rural/ urban and year	Observations	% seeking treatment from					other provider	Total
		Public provider	Private formal clinic	Private informal care	Pharmacy	Self-treatment		
DIARRHEA DISEASE MILD								
ESI Survey 0-4 years old Urban 2009		21.2%	21.4%	0.7%	0%	2.5%		45.7%
ESI Survey 4-15 years old Urban Year of data		11.2%	13.4%	0%	1%	3%		29.1%
ESI Survey 15+ years Urban 2009		10.1%	8.5%	2.7%	1%	3.4%		25.6%
DIARRHEA DISEASE SEVERE								
ESI Survey 0-4 years old Urban 2009		20.4%	15.2%	0.2%	0%	0.0%		35.8%
ESI Survey 4-15 years old Urban Year of data		9.2%	13.7%	2%	0%	0%		24.5%
ESI Survey 15+ years Urban 2009		12.5%	12.8%	4.6%	0%	1.7%		31.7%
INDIRECT : ALRI								
ESI Survey 0-4 years old Urban 2009		27.6%	9.7%	3.5%	0%	13.3%		54.2%
ESI Survey 4-15 years old Urban Year of data		13.8%	8.5%	0%	0%	4%		26.4%
ESI Survey 15+ years Urban 2009		11.4%	8.2%	5.7%	0.0%	6.7%		32.0%

TABLE B 7. UNIT COSTS ASSOCIATED WITH TREATMENT OF *SEVERE DIARRHEA* DISEASE (USD 2009)

Health provider	Outpatient cost (US$)		Inpatient cost (US$)		
	Health care	Incidentals[1]	ALOS[2]	Health care[3]	Incidentals[1]
Public/NGO					
Rural (ref)	9.63	1.85	0.39	33.41	0.48
Urban (ref)	9.63	1.94	0.42	33.41	0.48
Private formal					
Rural (ref)	19.25	1.85	0.39	45.92	0.48
Urban (ref)	19.25	1.94	0.42	45.92	0.48
Informal					
Rural (ref)	4.81	-	-	-	-
Urban (ref)	4.81	-	-	-	-

[1] Incidentals: non-health patient costs such as transport, food, and incidental expenses, per outpatient visit and per inpatient stay.
[2] ALOS: average length of stay.
[3] Inpatient health care costs are presented per stay

TABLE B 8. UNIT COSTS ASSOCIATED WITH TREATMENT OF *ALRI* (US$, 2009)

Health provider	Outpatient cost (US$)		Inpatient cost (US$)		
	Health care	Incidentals[1]	ALOS[2]	Health care[3]	Incidentals[1]
Public/NGO					
Rural (ref)	6.42	1.96	0.29	25.93	0.70
Urban (ref)	6.42	1.80	0.35	25.93	0.70
Private formal					
Rural (ref)	19.25	1.96	0.29	38.45	0.70
Urban (ref)	19.25	1.80	0.35	38.45	0.70
Informal					
Rural (ref)	0.0	-	-	-	-
Urban (ref)	0.0	-	-	-	-

[1] Incidentals: non-health patient costs such as transport, food, and incidental expenses, per outpatient visit and per inpatient stay.
[2] ALOS: average length of stay.
[3] Inpatient health care costs are presented per stay

TABLE B 9. UNIT COSTS ASSOCIATED WITH TREATMENT OF *MILD DIARRHEA* DISEASE (US$, 2009)

Health provider	Outpatient cost (US$)		Inpatient cost (US$)		
	Health care	Incidentals[1]	ALOS[2]	Health care[3]	Incidentals[1]
Public/NGO					
Rural (ref)	6.42	1.96	0.26	35.69	0.64
Urban (ref)	6.42	1.80	0.33	35.69	0.64
Private formal					
Rural (ref)	14.44	2.31	0.26	48.20	0.64
Urban (ref)	14.44	1.80	0.33	48.20	0.64
Informal					
Rural (ref)	2.89	-	-	-	-
Urban (ref)	2.89	-	-	-	-

[1] Incidentals: non-health patient costs such as transport, food, and incidental expenses, per outpatient visit and per inpatient stay.
[2] ALOS: average length of stay.
[3] Inpatient health care costs are presented per stay

ANNEX C. WATER QUALITY IMPACT

TABLE C 1. WATER QUALITY MEASUREMENT RESULTS

Sample No.	Turbidity (NTU)	Nitrate (mg/ liter)	Ammonia (as NH3)	Ammonia Max. Limit (Gov.Reg.)	pH	Sample Location	Source
1				0.5		Banjarmasin	Piped Water
2				0.5			Piped Water
3				0.5			Piped Water
4	18.9	7.9	0.92	0.5	6.69		Surface
5				0.5			Piped Water
6				0.5			Piped Water
7	0	0.44	0.23	0.5	6.85	Payakumbuh	Surface
8	0	0.77	0.23	0.5	6.16		Surface
9	0	0.32	0.25	0.5	7.76		Surface
10	0	0.33	34	0.5	7.11		Surface
11	11.2	2.3	0.12	0.5	5.22		Surface
12				0.5			Piped Water
13				0.5			Dug well
14				0.5			Dug well
15				0.5		Malang City	Piped Water
16				0.5			Piped Water
17				0.5			Piped Water
18			0.017	0.5			Borehole
19			0.09	0.5			Borehole
20	0	60.9	0.06	0.5	7		Surface
21	0	17.7	0.05	0.5	6.16		Surface
22	0		0.11	0.5			Dug well
23				0.5			Piped Water
24				0.5			Piped Water
25	0	28.7	0.11	0.5	6.98		Surface
26				0.5			Piped Water
27				0.5			Piped Water
28				0.5			Piped Water
29				0.5			Piped Water
30	0	29.8	0.09	0.5	5.29		Surface
31	0	19.4	0.09	0.5	6.65		Surface
32	>200		0.2	0.5	7.61		Surface (urban)
33	0		0.27	0.5			Dug well
34	6		0.15	0.5	7.44		Surface (urban)
35			0.1	0.5			Borehole
36			0.85	0.5			Borehole
37	0		1.1	0.5			Dug well
38	11		0.18	0.5	7.32		Surface (urban)
39	0		0.24	0.5		Tangerang	Dug well
40	0		<0.02	0.5			Dug well

TABLE C 1. WATER QUALITY MEASUREMENT RESULTS (CONTINUED)

Sample No.	Turbidity (NTU)	Nitrate (mg/liter)	Ammonia (as NH3)	Ammonia Max. Limit (Gov.Reg.)	pH	Sample Location	Source
40	0		<0.02	0.5			Dug well
41	0		0.1	0.5			Dug well
42	1		0.06	0.5			Dug well
43	0		0.24	0.5			Dug well
44	6		0.21	0.5			Dug well

TABLE C 2. POLLUTION FROM POOR SANITATION AND WASTEWATER MANAGEMENT (% OF HOUSEHOLDS)

Field site	Human excreta management (%)					Household wastewater (%)		
	Not isolated		Partial isolation		Full isolation	Drain to ground	Drain to water sources	to wastewater treatment facilities
	OD	Flush to water	Dry pit	Wet pit				
Lamongan	25.00%	1.80%	0.70%	5.10%	68%	87.00%	9.33%	1.33%
Tangerang	39.16%	2.50%	11.80%	11.50%	37%	84.33%	7.00%	0.67%
Banjarmasin	18.90%	8.40%	2.90%	3.90%	65%	83.33%	12.67%	1.33%
Malang	2.40%	17.60%	0	14.60%	65%	40.00%	10.33%	44.00%
Payakumbuh	42.30%	7.80%	0.30%	2.60%	47%	71.67%	1.33%	18.00%
Average rural	32.08%	2.15%	6.25%	8.30%	52.55%	85.67%	8.17%	1.00%
Average urban	21.20%	11.27%	1.07%	7.03%	59.10%	65.00%	8.11%	21.11%

Source: ESI 2 Field Surveys

TABLE C 3. WATER ACCESS AND COSTS

Field site	Location	Piped water (treated)		Non-piped protected source (including untreated piped)		Non-piped unprotected source	
		% access	Average monthly cost	% access	Average monthly cost	% access	Average monthly cost
Lamongan	Improved	0.00	1.64	23.01	2.38	0.00	0.00
	Unimproved	0.00	0.00	9.73	1.73	0.00	0.00
	OD	0.00	0.00	6.19	1.93	6.25	0.00
Tangerang	Improved	1.56	3.85	10.62	0.00	15.63	0.00
	Unimproved	0.00	0.00	0.88	0.00	12.50	0.00
	OD	0.00	0.00	34.51	0.00	43.75	0.00
Banjarmasin	Improved	37.50	4.81	2.65	6.74	0.00	0.00
	Unimproved	25.00	4.81	0.00	10.40	0.00	0.00
	OD	21.88	1.30	0.00	12.80	0.00	0.00
Malang	Improved	1.56	4.38	4.42	1.44	0.00	0.00
	Unimproved	0.00	4.81	0.00	0.00	0.00	0.00
	OD	0.00	0.00	0.88	1.16	0.00	0.00
Payakumbuh	Improved	4.69	1.93	1.77	0.00	0.00	0.00
	Unimproved	1.56	0.96	0.00	0.00	0.00	0.00
	OD	6.25	8	5.31	0	21.88	0.00
Average rural		0.26	0.91	14.16	1.01	13.02	0.00
Average urban		10.94	3.45	1.67	3.62	2.43	0.00

TABLE C 4. HOUSEHOLDS CITING POOR WATER QUALITY FROM THEIR PRINCIPAL DRINKING WATER SOURCE

Field site	Piped water (treated)						Non-piped protected source (including untreated piped)						Non-piped unprotected source					
	N	Bad appearance[1] (%)	Bad smell (%)	Bad taste (%)	Contain solids (%)	Any (%)	N	Bad appearance1 (%)	Bad smell (%)	Bad taste (%)	Contain solids (%)	Any (%)	N	Bad appearance1 (%)	Bad smell (%)	Bad taste (%)	Contain solids (%)	Any (%)
Banjarmasin	159	91.67	60.87	95.83	85.86	75.00	3	0.00	0.00	0.00	2.88	0.00	162	0.00	0.00	0.00	0.00	0.0
Malang	22	8.33	30.43	2.08	12.12	25.00	15	29.41	14.29	0.00	7.69	25.00	0	0.00	0.00	0.00	0.00	0.0
Payakumbuh	5	0.00	8.70	2.08	2.02	0.00	19	23.53	28.57	23.08	8.65	25.00	23	66.67	75.00	50.00	20.83	0.0
Lamongan	0	0.00	0.00	0.00	0.00	0.00	21	0.00	14.29	23.08	14.42	50.00	2	0.00	0.00	0.00	4.17	0.0
Tangerang	0	0.00	0.00	0.00	0.00	0.00	87	47.06	42.86	53.85	66.35	0.00	43	33.33	25.00	50.00	75.00	0.0
Average rural		0.00	0.00	0.00	0.00	0.00		23.53	28.57	38.46	40.38	25.00		16.67	12.50	25.00	39.58	0.0
Average urban		33.33	33.33	33.33	33.33	33.33		17.65	14.29	7.69	6.41	16.67		22.22	25.00	16.67	6.94	0.0

TABLE C 5. HOUSEHOLD RESPONSES TO POLLUTED WATER – REASONS FOR USING WATER SOURCES

Field site	Location	Piped water (treated)			Non-piped protected source (including untreated piped)			Non-piped unprotected source		
		Quality (%)	Quantity (%)	Cost (%)	Quality (%)	Quantity (%)	Cost (%)	Quality (%)	Quantity (%)	Cost (%)
Lamongan	Improved	0.00	0.00	0.00	4.44	5.82	4.67	0.00	0.00	0.00
	Unimproved	0.62	0.65	0.63	15.00	21.82	19.57	1.02	0.00	0.00
	OD	0.00	0.00	0.00	1.48	2.18	3.23	2.04	2.17	2.02
Tangerang	Improved	0.00	0.00	0.00	1.48	1.45	1.44	5.10	4.35	4.04
	Unimproved	0.21	0.22	0.21	13.89	10.18	11.49	17.35	15.22	19.19
	OD	0.00	0.00	0.00	15.19	14.36	14.36	32.65	33.70	31.31
Banjarmasin	Improved	13.07	13.17	13.63	0.19	0.18	0.18	0.00	0.00	0.00
	Unimproved	34.85	35.85	35.85	2.41	2.36	2.33	0.00	0.00	0.00
	OD	3.73	3.46	3.77	0.19	0.18	0.18	0.00	0.00	0.00
Malang	Improved	0.41	0.43	0.63	1.30	0.55	0.90	0.00	0.00	0.00
	Unimproved	18.26	16.20	16.14	20.93	18.18	18.85	2.04	2.17	4.04
	OD	0.00	0.00	0.00	0.93	0.55	0.90	0.00	0.00	0.00
Payakumbuh	Improved	3.53	3.67	3.56	1.67	1.64	1.62	1.02	1.09	1.01
	Unimproved	17.84	18.57	18.03	9.44	9.27	9.16	6.12	6.52	6.06
	OD	7.47	7.78	7.55	11.48	11.27	11.13	32.65	34.78	32.32
Average rural		0.14	0.14	0.14	8.58	9.30	9.13	9.69	9.24	9.43
Average urban		11.02	11.02	11.02	5.39	4.91	5.03	4.65	4.95	4.83

TABLE C 6. TREATMENT PRACTICES

Field site	Boiling	Chlorine	Filtering device	Filtering cloth	Settle-removal solid	Use mineral water	Nothing
Lamongan	86.8	0	0.7	0.3	13.7	9.7	7.7
Tangerang	90.7	0.7	3	10	63.7	10.7	2
Banjarmasin	88	0	0.7	0	22.3	5	6.4
Malang	91.7	0	1	0	3	10.7	0.3
Payakumbuh	91.7	0	0	2.7	0.3	9	1.2
Average rural	88.8	0.4	1.9	5.2	38.7	10.2	4.9
Average urban	90.5	0.0	0.6	0.9	8.5	8.2	2.6

TABLE C 7. ANNUAL TREATMENT COSTS (US$)

Field site	Boil	Filter	Chemical (Chlorine)	Solar	Homemade device	Stand and settle	Other
Lamongan	27	0	0	0	5	3	3
Tangerang	32	2	0	0	2	3	2
Banjarmasin	79	0	0	0	0	7	5
Malang	39	0	0	0	1	1	1
Payakumbuh	40	0	0	0	4	4	3

TABLE C 8. WATER ACCESS AND HOUSEHOLD TREATMENT COSTS INCURRED AND AVERTED

Variable	Annual average costs per household		Annual average costs saved per household following 100% sanitation coverage	
	Water source access	Water treatment	Water source access	Water treatment
Lamongan	5.68	14.98	0.95	0.83
Tangerang	7.70	14.72	0.73	0.83
Banjarmasin	11.55	33.93	1.97	10.84
Malang	8.28	20.92	1.10	3.16
Payakumbuh	10.49	23.02	1.36	2.04
Average rural	6.69	14.85	0.84	0.83
Average urban	10.11	25.95	1.48	5.35

ANNEX D. ACCESS TIME

TABLE D 1. PLACE OF DEFECATION OF HOUSEHOLDS WITH NO 'OWN' TOILET

	Women				Men				Children			
E1.3 + OD with answer on outside plot (4.5)	N	Neighbor (3)	Own plot (1.2)	Outside plot (4.5)	N	Neighbor	Own plot	Outside plot	N	Neighbor	Own plot	Outside plot
Lamongan	214	14.7	23.7	1.6	214	14.9	23.8	1.6	216	16.3	25.3	1.6
Tangerang	150	36.8	13.6	1.6	147	36.2	13.4	1.6	115	32.6	10.7	3.2
Banjarmasin	127	42.1	23.2	29.0	228	3.2	22.8	54.8	220	3.5	23.2	53.2
Malang	253	3.2	22.9	54.8	254	42.6	23.4	29.0	254	46.5	24.7	29.0
Payakumbuh	150	3.2	16.6	12.9	150	3.2	16.6	12.9	136	1.2	16.0	12.9
Average rural	171	18.2	18.0	5.4	170	18.1	17.9	5.4	156	16.7	17.4	5.9
Average urban	190	22.6	23.1	41.9	241	22.9	23.1	41.9	237	25.0	24.0	41.1

TABLE D 2. DAILY TIME SPENT ACCESSING TOILET FOR THOSE WITH NO TOILET

	Women		Men		Children	
	Time per trip and waiting	No. of times per day	Time per trip and waiting	No. of times per day	Time per trip and waiting	No. of times per day
Lamongan	2.5	1.0	2.6	1.0	2.23	1.0
Tangerang	5.1	1.4	4.2	1.4	4.34	1.3
Banjarmasin	10.3	2.5	12.4	2.3	11.96	2.3
Malang	5.0	1.0	5.0	1.0	5.00	1.0
Payakumbuh	6.0	1.6	6.0	1.6	6.44	1.6
Average rural	5	1	4	1	4	1
Average urban	8	2	9	2	8	2

TABLE D 3. PRACTICES RELATED TO YOUNG CHILDREN

	Parents accompanying young children	Of which:	
		% outside plot	No. of times per day
Lamongan	101	88.9	1.7
Tangerang	105	81.8	1.5
Banjarmasin	156	67.5	2.0
Malang	285	90.0	1.0
Payakumbuh	143	76.7	1.0
Average rural	116	85.4	1.6
Average urban	221	78.1	1.3

TABLE D 4. PREFERENCES RELATED TO TOILET CONVENIENCE, FROM HOUSEHOLD QUESTIONNAIRE

Site	Perceived benefits of sanitation (B6.1): proximity cited as satisfied or very satisfied		Those without toilet: reasons to get a toilet	
	Those with toilet	Those without toilet	Saves time (B7.16)	Proximity is an important characteristic (B7.17)
Lamongan	3.3	1.4	1.2	3.7
Tangerang	3.7	2.7	0.0	37.0
Banjarmasin	3.6	2.9	0.0	5.9
Malang	3.9	2.6	1.9	37.9
Payakumbuh	3.7	2.7	1.6	15.4
Average rural	3.5	2.1	0.6	20.4
Average urban	3.7	2.7	1.2	19.7

TABLE D 5. OPPORTUNITY COST OF TIME – WHAT RESPONDENTS WOULD SPEND AN EXTRA 30 MINS A DAY DOING (%)

Use time as Opportunity cost	Lamongan	Tangerang	Banjarmasin	Malang	Payakumbuh
Bathing	88%	92%	81%	94%	86%
Taking a rest	75%	80%	85%	86%	79%
Washing	72%	13%	48%	31%	39%
Cooking/Help cooking	72%	21%	51%	28%	36%
Shopping	32%	22%	39%	43%	6%
Business	18%	4%	10%	12%	4%
	Average Rural			**Average Urban**	
Bathing	90%			87%	
Taking a rest	78%			83%	
Washing	42%			39%	
Cooking/Help cooking	47%			38%	
Shopping	27%			29%	
Business	11%			9%	

TABLE D 6. AVERAGE TIME SAVINGS PER YEAR, BY HOUSEHOLD MEMBER (HOURS)

Site	Young Children (0-4 years old)	Children (5-14 years old)	Adult	Total
Lamongan	33.9	42.7	41.0	117.6
Tangerang	142.0	138.3	140.0	420.3
Banjarmasin	59.3	54.2	54.5	168.1
Malang	80.6	96.3	97.3	274.1
Payakumbuh	37.2	57.4	50.8	145.3
Average rural	87.9	90.5	90.5	269.0
Average urban	59.0	69.3	67.5	195.8

TABLE D 7. AVERAGE ANNUAL VALUE OF TIME SAVINGS (US$)

Site	Young Children (0-4 years old)	Children (5-14 years old)	Adult
Lamongan	27.0	23.3	234.0
Tangerang	125.3	98.7	729.2
Banjarmasin	54.8	41.0	274.9
Malang	77.8	52.6	523.0
Payakumbuh	39.0	48.2	234.5
Average rural	76.1	61.0	481.6
Average urban	57.2	47.2	344.1

ANNEX E. INTANGIBLE USER PREFERENCES FOR SANITATION

TABLE E 1. LEVEL OF SATISFACTION WITH CURRENT TOILET OPTION, BY OPTION TYPE (0% = NOT SATISFIED, 100% = VERY SATISFIED)

Characteristic	Those with improved sanitation					Those with unimproved sanitation			
	Sewer/septic tank	Wet pit latrine	Dry pit latrine	Compost toilet	Average	Unimproved pit or bucket	Shared toilet	No toilet	Average
Toilet position					70%				54%
Cleanliness					69%				53%
Status					73%				58%
Visitors					72%				55%
Maintaining					70%				54%
Health					72%				53%
Conflict avoidance					74%				60%
Convenience for children					72%				52%
Convenience for elderly					74%				54%
Night use of toilet					74%				53%
Avoid rain					73%				52%
Showering					71%				57%
Dangerous animals					74%				53%

Source: Household survey

TABLE E 2. IMPORTANT CHARACTERISTICS OF A TOILET FOR THOSE CURRENTLY WITHOUT (0% = NOT IMPORTANT, 100% = VERY IMPORTANT)

Characteristic	Average score
Comfortable toilet position	80%
Cleanliness and freedom from unpleasant odours and insects	83%
Having a toilet not needing to share with other households	82%
Having privacy when at the toilet	82%
Proximity of toilet to house	83%
Pour-flush compared to dry pit latrine	83%
Having a toilet disposal system that does not require emptying (piped sewer vs septic tank)	76%
Having a toilet disposal system that does not pollute yours, neighbors', or your community's environment	81%

ANNEX F. EXTERNAL ENVIRONMENT

TABLE F 1. SCORING OF DIFFERENT TYPES OF LIVING AREA (1 = CLEAN, 2 = MINOR SOILING, 3 = MODERATE SOILING, 4 = MAJOR SOILING, 5 = EXTREME SOILING)

Site	Private plots		Community living areas (market. roadside. etc)		Other land (e.g. on edge of villages)	
	Human excreta	Solid waste	Human excreta	Solid waste	Human excreta	Solid waste
Lamongan	2.9	2.2	2.8	2.7	2.2	2.9
Tangerang	3.1	1.9	2.3	2.0	2.1	2.2
Banjarmasin	3.4	2.3	2.6	2.6	2.0	2.9
Malang	3.6	2.6	3.4	3.0	2.9	3.5
Payakumbuh	3.0	2.2	2.7	2.5	2.4	2.9
Av. Rural	3.0	2.1	2.5	2.4	2.1	2.6
Av. urban	3.3	2.4	2.9	2.7	2.4	3.1

Source: private plots: ESI household observation instrument; community: physical location survey

TABLE F 2. PROPORTION OF HOUSEHOLDS WITH AND WITHOUT TOILET WITH UNIMPROVED SANITATION PRACTICE

Site	Households with toilet		Households with no toilet		Other land (e.g. on edge of villages)	
	Open defecation (sometimes, often)	Open urination (sometimes, often)	Disposal child stool in environment[1]	Disposal from hanging latrine in environment[1]	Disposal child stool in environment[1]	See children defecating in yard[2]
Lamongan	2%	1%	2%	10%	1%	1%
Tangerang	5%	30%	11%	37%	1%	1%
Banjarmasin	0%	7%	0%	7%	0%	1%
Malang	0%	1%	0%	2%	0%	0%
Payakumbuh	0%	30%	5%	50%	0%	1%
Av. Rural	4%	15%	7%	24%	1%	1%
Av. urban	0%	13%	2%	20%	0%	1%

[1] Answering 'put in drain or ditch', 'thrown in garbage', 'buried in ground' and 'left in open')
[2] Answering 'sometimes' or 'often'

TABLE F 3. IMPLICATION OF CURRENT TOILET OPTION FOR EXTERNAL ENVIRONMENT (1 = NOT SATISFIED, 5 = VERY SATISFIED)

Characteristic	Improved sanitation				Unimproved
	Sewerage	Septic tank	Wet pit latrine	Dry pit latrine	OD
POLLUTION OF YOUR OR NEIGHBORS' ENVIRONMENT					
Lamongan	na	69%	64%	40%	28%
Tangerang	na	74%	79%	na	40%
Banjarmasin	75%	72%	56%	60%	58%
Malang	73%	75%	73%	na	49%
Payakumbuh	na	71%	44%	na	40%
Av. Rural	na	71%	71%	40%	34%
Av. urban	74%	73%	58%	60%	49%
SMELL AROUND HOUSE					
Lamongan	na	69%	63%	38%	29%
Tangerang	na	74%	79%	na	46%
Banjarmasin	75%	72%	58%	68%	61%
Malang	67%	71%	78%	na	62%
Payakumbuh	na	73%	58%	na	50%
Av. Rural	na	72%	71%	38%	37%
Av. urban	71%	72%	65%	68%	58%

remark: 0% - 100% range of not satisfied to very satisfied
Source: Household survey

TABLE F 4. PERCEPTIONS OF ENVIRONMENTAL SANITATION STATE, BY OPTION TYPE (1 = VERY BAD, 5 = VERY GOOD)

Site	Interv/ control	Perception of environmental sanitation state								
		Rubbish	Sewage	Standing water	Smoke	Smell	Dirt outside	Direct inside	Rodents	Insects
Lamongan	improved	54%	56%	56%	59%	43%	60%	60%	54%	56%
	unimproved	54%	55%	56%	57%	47%	59%	58%	57%	59%
Tangerang	improved	43%	52%	45%	46%	43%	46%	53%	34%	35%
	unimproved	37%	40%	39%	43%	40%	41%	52%	34%	34%
Banjarmasin	improved	52%	52%	52%	59%	39%	52%	53%	44%	49%
	unimproved	52%	52%	53%	59%	38%	50%	52%	44%	46%
Malang	improved	52%	68%	66%	69%	57%	61%	62%	52%	51%
	unimproved	23%	65%	67%	71%	55%	62%	64%	50%	48%
Payakumbuh	improved	53%	55%	58%	57%	48%	57%	60%	55%	53%
	unimproved	50%	51%	54%	57%	47%	57%	60%	54%	54%
Av. Rural improved		49%	54%	50%	52%	43%	53%	57%	44%	45%
Av. Rural unimproved		46%	48%	47%	50%	44%	50%	55%	45%	46%
Av. Urban improved		52%	58%	58%	62%	48%	57%	58%	50%	51%
Av. Urban unimproved		42%	56%	58%	62%	47%	57%	59%	49%	49%

remark: 0% - 100% range of not satisfied to very satisfied

TABLE F 5. RANKING IMPORTANCE OF ENVIRONMENTAL SANITATION, BY OPTION TYPE (1 = NOT IMPORTANT, 5 = VERY IMPORTANT)

Site	Interv /control	Perceived importance of environmental sanitation management								
		Rubbish	Sewage	Water	Smoke	Smell	Dirt outside	Direct inside	Rodents	Insects
Lamongan	improved	70%	70%	66%	63%	67%	63%	62%	67%	66%
	unimproved	78%	77%	69%	64%	70%	65%	65%	69%	67%
Tangerang	improved	84%	81%	80%	78%	81%	77%	77%	88%	86%
	unimproved	79%	81%	79%	77%	78%	79%	79%	84%	85%
Banjarmasin	improved	83%	81%	79%	78%	80%	79%	79%	82%	79%
	unimproved	80%	79%	78%	77%	79%	78%	79%	80%	79%
Malang	improved	83%	77%	75%	72%	78%	78%	79%	85%	85%
	unimproved	84%	82%	79%	78%	81%	82%	87%	86%	87%
Payakumbuh	improved	69%	68%	59%	58%	66%	58%	60%	65%	64%
	unimproved	71%	71%	62%	59%	69%	58%	57%	58%	64%
Av. Rural improved		77%	75%	73%	71%	74%	70%	70%	78%	76%
Av. Rural unimproved		78%	79%	74%	70%	74%	72%	72%	76%	76%
Av. Urban improved		78%	75%	71%	69%	75%	71%	72%	77%	76%
Av. Urban unimproved		79%	78%	73%	71%	76%	72%	74%	75%	77%

remark: range 0% - 100% describes the range of very bad condition to very good condition

ANNEX G. TOURISM

TABLE G 1. PLACES VISITED (% RESPONDENTS) AND ENJOYMENT OF STAY

Hotel tariff	No of visitors	Place 1 (Jakarta)			Place 2 (historical/ temple sites)			Place 3 (beaches)			Place 4 (natural or forest)			Place 5 (within Indonesia)		
		no of visitors to this place	%	Score*	no of visitors to this place	%	Score*	no of visitors to this place	%	Score*	no of visitors to this place	%	Score*	no of visitors to this place	%	Score*
TOURIST																
1-29	18	18	13.3%	3.06	13	14.0%	3.08	13	17.8%	3.31	15	18.5%	3.47	17	14.5%	3.18
30-59	37	34	25.2%	3.21	28	30.1%	3.21	20	27.4%	2.85	24	29.6%	3.50	32	27.4%	3.22
60-89	43	40	29.6%	3.33	26	28.0%	3.62	17	23.3%	3.00	17	21.0%	3.82	29	24.8%	3.35
90-119	25	24	17.8%	3.63	16	17.2%	3.31	11	15.1%	2.64	15	18.5%	3.20	21	17.9%	3.05
120-149	11	11	8.1%	3.36	6	6.5%	3.17	6	8.2%	3.17	6	7.4%	3.83	10	8.5%	3.20
150+	10	8	5.9%	3.50	4	4.3%	2.75	6	8.2%	2.67	4	4.9%	2.75	8	6.8%	2.38
TOTAL	144	135	100%		93	100%		73	100%		81	100%		117	100%	
BUSINESS																
1-29	1	1	0.9%	4.00	0	0.0%	0.00	0	0.0%	0.00	0	0.0%	0.00	1	1.5%	3.00
30-59	19	16	14.5%	3.56	9	23.7%	3.44	6	18.8%	3.50	8	25.8%	4.13	13	20.0%	3.54
60-89	34	29	26.4%	3.79	12	31.6%	2.33	12	37.5%	2.58	13	41.9%	3.08	26	40.0%	3.42
90-119	23	20	18.2%	3.40	6	15.8%	2.83	6	18.8%	1.50	2	6.5%	2.50	9	13.8%	2.56
120-149	21	19	17.3%	3.53	7	18.4%	2.14	4	12.5%	2.00	4	12.9%	2.00	9	13.8%	2.44
150+	12	10	9.1%	3.80	4	10.5%	3.25	4	12.5%	4.25	4	12.9%	3.75	7	10.8%	3.43
TOTAL	110	95	86%		38	100%		32	100%		31	100%		65	100%	

Source: ESI Tourism Survey.
Key: * Visitors surveyed were asked to rank from a maximum score of 5 ("very much") to a minimum of 1 ("not at all").

TABLE G 2. GENERAL SANITARY EXPERIENCE (SCORE: 5 = VERY GOOD, 1 = VERY POOR)

Category	Hotel tariff	No of visitors	General sanitary condition	Hotel	Swimming pool	Open water	Restaurant	Capital city	Other cities
Tourist	<30	18	1.83	2.94	3.44	2.72	3.11	2.55	2.57
	30-59	37	2.49	3.49	3.50	2.46	3.19	2.71	2.59
	60-89	43	2.24	3.68	3.74	2.21	3.56	2.44	3.16
	90-119	25	2.71	3.96	3.90	2.42	3.76	2.96	3.08
	120-149	11	2.18	3.80	3.25	2.29	3.60	2.90	2.83
	150+	10	1.80	3.20	3.22	1.71	3.50	2.00	2.20
Business	<30	1	3.00	3.00	2.00	-	3.00	0.00	0.00
	30-59	19	3.00	3.74	3.67	2.78	3.58	3.27	3.00
	60-89	34	2.68	3.94	3.50	2.20	3.67	2.88	3.31
	90-119	23	2.61	3.96	3.56	2.29	3.68	2.77	2.50
	120-149	21	2.33	4.00	4.07	1.75	4.00	2.65	2.80
	150+	12	2.25	4.27	3.82	2.60	3.67	2.80	3.67

Source: ESI Tourism Survey.

TABLE G 3. SANITARY EXPERIENCE IN RELATION TO TOILETS AND HAND WASHING (SCORE: 5 = VERY GOOD, 1 = VERY POOR)

Category	Quality of toilets in the place					Toilet availability		Water and soap for hand washing (5 = always)		
	Hotel	Restaurant	Airport	Bus station	City	% could not find when needed	impact on stay (5 = significant)	Restaurant	Bus station	City
Tourist	3.52	3.13	2.90	1.93	1.97	0.70	2.82	3.27	1.90	2.33
Business	3.53	3.25	3.10	2.14	1.94	0.48	3.00	3.33	2.12	2.18

Source: ESI Tourism Survey.

TABLE G 4. WHAT FACTORS WERE MOST CONCERNING? (% RESPONDENTS CITING THE REASON, MAXIMUM 3 RESPONSES PER RESPONDENT)

Category	Drinking water	Tap water	Swimming pool water	Food	Currency notes	Shaking hand	Unsanitary toilet	Public toilets
Tourist	19	17	2	23	3	1	19	11
Business	19	18	1	19	12	2	17	10

Source: ESI Tourism Survey.

TABLE G 5. HEALTH ISSUES

Category	Average no of days of symptoms	Average no of days of incapacitation	No Medical Care (%)	Outpatient (%)	Inpatient (%)	Shop (%)	Av. Cost (USD)
Tourist	3.08	1.91	64.88	26.93	0.0	27.80	24.75
Business	3.21	2.00	47.50	42.50	0.0	25.00	67.50

TABLE G 6. INTENTION TO RETURN TO INDONESIA

Category	Return to Indonesia? (%)				Advise friends to come? (%)			
	Yes	No	Maybe	Do not know	Yes	No	Maybe	Do not know
Tourist	76.38%	2.85%	16.60%	4.17%	71.75%	10.95%	14.18%	3.13%
Business	93.30%	2.27%	4.43%	0.00%	76.47%	6.22%	18.54%	3.46%

TABLE G 7. REASONS NOT TO RETURN TO INDONESIA

Category	Sanitation	Not safe	Cost	No need
Tourist	44.83%	33.63%	17.97%	16.25%
Business	47.00%	35.63%	23.33%	17.50%

ANNEX H. BUSINESS

TABLE H 1. RATING OF ENVIRONMENTAL SANITATION CONDITIONS IN THE LOCATION OF THE BUSINESS SURVEY INTERVIEW (SCORE: 1 = BEST; 5 = WORST)

Variable	Restaurants	Hotels	Garment factories	Food processing
Water quality in rivers	3.5	4.0	2.0	NA
State of canals and rainwater drainage	2.5	2.0	3.0	NA
Management of sewage	2.3	2.0	2.0	NA
Management of industrial wastewater	2.3	2.0	2.0	2.0
Household coverage with private toilets	2.0	2.0	2.0	2.0
Toilets in public places	2.2	2.0	3.0	3.0
Household/office solid waste	1.8	2.0	2.0	4.0
Management of industrial solid waste	2.0	3.0	2.0	4.0
Air quality from vehicles	2.0	-	3.0	3.0
Air quality from solid waste	2.0	1.0	3.0	4.0
Air quality from excreta	1.8	2.0	2.0	3.0

Source: ESI Business Survey.

TABLE H 2. IMPORTANCE OF ENVIRONMENTAL SANITATION CONDITIONS FOR LOCATING THE COMPANY (SCORE: 1 = UNIMPORTANT; 5 = IMPORTANT)

Variable	Restaurants	Hotels	Garment factories	Food processing
Workers' health	4.8	4.5	5	5
Water quality directly available from nature (rivers, lakes, ground)	4.8	4.5	5	5
Pleasant environment for your staff (clean, good air quality, proper sewerage and sanitation)	5	4.5	5	5
Availability of cheap and good land	4.4	4.5	5	5

Source: ESI Business Survey.

ANNEX I. COST TABLES

TABLE I 1. LAMONGAN AVERAGE COST PER HOUSEHOLD FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009) DISCOUNT RATE 8%

Cost Item	Hygiene[1]	Shared	Dry pit	Wet pit	Septic tank
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING					
1. Capital	2	99	43	56	564
Average Annual	0.9	15	11	14	57
2. Program	na	0.1	0.0	0.0	0.2
Average Annual	na	0.0	0.0	0.0	0.0
SUB-TOTAL	2	99	43	56	564
RECURRENT COSTS: AVERAGE ANNUAL SPENDING					
3. Operation	7	4	7	7	13
4. Maintenance	0	7	13	13	21
5. Program	-	-	-	-	-
SUB-TOTAL	7	11	20	20	34
AVERAGE ANNUAL COST CALCULATIONS					
Duration[2]	3	10	5	5	8
Cost/household	10	26	30	33	91
Cost/capita[3]	2	5	6	7	18
OF WHICH:					
% capital	9%	57%	35%	42%	63%
% program	23%	0%	0%	0%	0%
% recurrent	68%	43%	65%	58%	37%
Observations[4]		72	34	26	140

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 2. TANGERANG AVERAGE COST PER HOUSEHOLD FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009) DISCOUNT RATE 8%

Cost Item	Hygiene[1]	Community	Shared	Dry pit	Wet pit	Septic tank
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING						
1. Capital	2	151	160	62	85	550
Average Annual	1	15	24	16	21	56
2. Program	-	28	0.2	0.2	0.2	0.1
Average Annual	-	3	0	0	0	0
SUB-TOTAL	2	179	161	62	85	550
RECURRENT COSTS: AVERAGE ANNUAL SPENDING						
3. Operation	11	0	4	7	7	13
4. Maintenance	0	0.8	2.0	1.9	1.9	3.3
5. Program	-	-	-	-	-	-
SUB-TOTAL	11	0	4	7	7	13
AVERAGE ANNUAL COST CALCULATIONS						
Duration[2]	3	20	10	5	5	20
Cost/household	12	18	28	22	28	69
Cost/capita[3]	2	4	6	4	6	14
OF WHICH:						
% capital	8%	84%	85%	69%	76%	81%
% program	0%	16%	0%	0%	0%	0%
% recurrent	92%	1%	15%	30%	24%	19%
Observations[4]		23	26	7	28	85

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 3. BANJARMASIN AVERAGE COST PER HOUSEHOLD FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009)

Cost Item	Hygiene[1]	Community	Shared	Dry pit	Wet pit	Septic tank	Sewerage
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING							
1. Capital	2	316	88	45	48	221	473
Average Annual	1	32	13	11	12	22	48
2. Program	0	0	0.2	0.2	0.2	0.4	0.4
Average Annual	-	-	0	0	0	0	0
SUB-TOTAL	2	316	89	45	48	221	473
RECURRENT COSTS: AVERAGE ANNUAL SPENDING							
3. Operation	8	4	2	na	7	7	13
4. Maintenance	-	3	5	10	na	13	39
5. Program	-	-	-	-	-	-	-
SUB-TOTAL	8	7	7	10	7	20	52
AVERAGE ANNUAL COST CALCULATIONS							
Duration[2]	3	20	10	5	5	20	20
Cost/household	9	39	20	21	19	43	100
Cost/capita[3]	2	8	4	4	4	9	20
OF WHICH:							
% capital	10%	83%	65%	54%	63%	52%	48%
% program	0%	0%	0%	0%	0%	0%	0%
% recurrent	90%	17%	35%	46%	37%	48%	52%
Observations[4]		16	33	19	1	165	46

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 4. MALANG AVERAGE COST PER HOUSEHOLD FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009)

Cost Item	Hygiene[1]	Shared	Dry pit	Wet pit	Septic tank	Sewerage
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING						
1. Capital	2	106	56	71	319	479
Average Annual	1	11	8	18	80	49
2. Program	-	-	-	-	-	-
Average Annual	-	-	-	-	-	-
SUB-TOTAL	2	106	56	71	319	479
RECURRENT COSTS: AVERAGE ANNUAL SPENDING						
3. Operation	12	7	7	7	7	7
4. Maintenance	-	na	10	13	27	32
5. Program	-	-	-	-	-	-
SUB-TOTAL	12	7	17	20	34	39
AVERAGE ANNUAL COST CALCULATIONS						
Duration[2]	3	10	5	5	20	20
Cost/household	12	18	25	38	114	87
Cost/capita[3]	2	4	5	8	23	17
OF WHICH:						
% capital	7%	61%	33%	46%	70%	56%
% program	0%	0%	0%	0%	0%	0%
% recurrent	93%	39%	67%	54%	30%	44%
Observations[4]		32	61	21	36	137

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 5. PAYAKUMBUH AVERAGE COST PER HOUSEHOLD FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009)

Cost Item	Hygiene[1]	Shared	Dry pit	Wet pit	Septic tank
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING					
1. Capital	2	118	22	61	567
Average Annual	1	18	6	15	58
2. Program	-	26	25.6	25.6	0.1
Average Annual	0.0	3.8	3.9	3.10	3.11
SUB-TOTAL	2	143.7	47.7	86.8	354.4
RECURRENT COSTS: AVERAGE ANNUAL SPENDING					
3. Operation	7	4	na	7	11
4. Maintenance	-	6	na	11	16
5. Program	-	-	-	-	-
SUB-TOTAL	7	9	-	18	26
AVERAGE ANNUAL COST CALCULATIONS					
Duration[2]	3	10	5	5	20
Cost/household	8	31	12	40	87
Cost/capita[3]	2	6	2	8	17
OF WHICH:					
% capital	12%	57%	46%	38%	67%
% program	0%	12%	54%	16%	3%
% recurrent	88%	30%	0%	46%	30%
Observations[4]		27	11	3	117

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 6. SUMMARY OF AVERAGE COST PER HOUSEHOLD IN RURAL AREAS FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009)

Cost Item	Hygiene[1]	Community	Shared	Dry pit	Wet pit	Septic tank
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING						
1. Capital	2	151	130	53	70	557
2. Program	-	28	0.1	0.2	0.2	0.2
SUB-TOTAL	2	179	130	53	70	557
RECURRENT COSTS: AVERAGE ANNUAL SPENDING						
3. Operation	9	0	4	7	7	9
4. Maintenance	-	0.8	4.5	7.4	7.3	-
5. Program	na	na	na	na	na	na
SUB-TOTAL	9	1	9	14	14	9
AVERAGE ANNUAL COST CALCULATIONS						
Duration[2]	3	20	10	5	5	20
Cost/household	10	19	28	27	32	82
Cost/capita[3]	2	4	6	5	6	16
OF WHICH:						
% capital	9%	80%	69%	48%	55%	69%
% program	0%	15%	0%	0%	0%	0%
% recurrent	90%	5%	31%	52%	44%	31%
Observations[4]	208	23	98	41	54	224

[1] Mainly annual soap cost
[2] Refers to length of life of hardware before full replacement
[3] Based on 5 persons per HH
[4] Number of households (respondents)

TABLE I 7. SUMMARY OF AVERAGE COST PER HOUSEHOLD IN URBAN AREAS FOR DIFFERENT SANITATION AND HYGIENE OPTIONS, USING FULL (ECONOMIC) COST (US$, 2009)

Cost Item	Hygiene[1a]	Community		Shared	Private dry pit	Urban wet pit	Urban septic tank	Urban Communal sewerage[1b]	Urban sewerage + treatment	
		Optimal	Actual						Optimal	Actual
INVESTMENT COSTS: INITIAL ONE-OFF SPENDING										
1. Capital	2	316	503	104	41	60	369	479	473	2,198
2. Program	-	-	-	13	13	13	13.0	-	0.4	3.0
SUB-TOTAL	2	316	503	117	54	73	382	479	473	2,201
RECURRENT COSTS: AVERAGE ANNUAL SPENDING										
3. Operation	9	4	6	3	7	8	7	13	13	36
4. Maintenance	-	3	5	8	10	13	23	32	39	54
5. Program	na	na	na	na	na	na	na	na	na	na
SUB-TOTAL	9	7	11	11	17	21	30	45	52	90
AVERAGE ANNUAL COST CALCULATIONS										
Duration[2]	3	20	20	10	5	5	20	20	20	20
Cost/household	10	39	62	28	31	37	70	87	100	317
Cost/capita	2	8	12	6	6	7	14	17	20	63
OF WHICH:										
% Capital	9%	83%	83%	55%	34%	40%	53%	56%	48%	71%
%Program	0%	0%	0%	7%	11%	8%	2%	0%	0%	0%
% Recurrent	91%	17%	17%	38%	55%	53%	45%	44%	52%	29%
Observations[3]		29	92	92	116	318	137	46	46	46

[1a] Mainly annual soap cost
[1b] Malang city
[1c] Banjarmasin city
[2] Refers to length of life (years) of hardware before full replacement
[3] Number of households (respondents)

ANNEX J. FINANCIAL COSTS

TABLE J 1. LAMONGAN FINANCIAL VERSUS NON-FINANCIAL COSTS, IN US$

Cost category		Hygiene	Shared	Dry pit	Wet pit	Septic tank	
						Optimal	Actual
Investment	Financial	-	80	30	41	550	241
	Non-financial	2	19	13	14	14	57
	Sub-total	2	99	43	56	564	298
Recurrent	Financial	7	11	20	19	34	34
	Non-financial	-	-	-	-	-	-
	Sub-total	7	11	20	19	34	34
Annual equivalent	Financial	23	19	20	23	77	63
	Non-financial	10	7	10	10	14	23
	Sub-total	33	26	30	33	91	86

TABLE J 2. TANGERANG FINANCIAL VERSUS NON-FINANCIAL COSTS, IN US$

Cost category		Hygiene	Community	Shared	Dry pit	Wet pit	Septic tank	
							Dry pit	Wet pit
Investment	Financial	0	179	161	43	44	550	481
	Non-financial	2	0	-	20	41	-	-
	Sub-total	2	179	161	62	85	550	481
Recurrent	Financial	11	1	6	9	9	16	16
	Non-financial	-	0	-	-	-	-	-
	Sub-total	11	1	6	9	9	16	16
Annual equivalent	Financial	0	19	26	13	13	59	52
	Non-financial	12	0	4	12	17	13	13
	Sub-total	12	19	30	24	30	72	65

TABLE J 3. BANJARMASIN FINANCIAL VERSUS NON-FINANCIAL COSTS, IN US$

Cost category		Hygiene	Community		Shared	Dry pit	Wet pit	Septic tank	Sewerage	
			Optimal	Actual					Optimal	Actual
Investment	Financial	0	287	474	65	22	24	195	415	2,141
	Non-financial	2	28	28	23	23	23	26	58	58
	Sub-total	2	316	503	88	45	48	221	473	2,198
Recurrent	Financial	8	7	11	12	10	20	34	52	93
	Non-financial	-		0	-	-	-	-	-	-
	Sub-total	8	7	11	12	10	20	34	52	93
Annual equivalent	Financial	8	36	59	22	16	27	34	72	136
	Non-financial	1	3	3	3	6	6	-	3	6
	Sub-total	9	39	62	25	21	32	34	75	141

TABLE J 4. MALANG FINANCIAL VERSUS NON-FINANCIAL COSTS, IN US$

Cost category		Hygiene	Shared	Dry pit	Wet pit	Septic tank	Communal sewerage
Investment	Financial	-	94	35	38	281	420
	Non-financial	2	13	22	32	38	59
	Sub-total	2	106	56	71	319	479
Recurrent	Financial	12	12	17	20	34	39
	Non-financial	-	-	-	-	-	-
	Sub-total	12	12	17	20	34	39
Annual equivalent	Financial	-	24	19	23	56	74
	Non-financial	12	4	12	15	11	13
	Sub-total	12	28	31	38	67	87

TABLE J 5. PAYAKUMBUH FINANCIAL VERSUS NON-FINANCIAL COSTS, IN US$

Cost category		Hygiene	Unimproved private latrine	Shared	Dry pit	Wet pit	Septic tank	
							Ideal	Actual
Investment	Financial	0	241	138	36	76	550	337
	Non-financial	2	-	6	12	11	17	17
	Sub-total	2	241	144	48	87	567	354
Recurrent	Financial	7	7	9	11	18	26	26
	Non-financial	-	-	-	-	-	-	-
	Sub-total	7	7	9	11	18	26	26
Annual equivalent	Financial	0	25	26	20	30	72	50
	Non-financial	8	7	4	3	10	12	12
	Sub-total	8	31	31	23	40	84	62

ANNEX K. SANITATION OPTIONS BY ASSET QUINTILE

TABLE K 1. PROPORTION OF RURAL HOUSEHOLDS SELECTING DIFFERENT SANITATION OPTIONS, BY ASSET QUINTILE

Asset quintile	Community toilets	Shared	Dry pit	Wet pit	Septic tank
Very poor 20%	6%	2%	2%	0%	5%
Poor 20%	5%	7%	3%	3%	9%
Non poor 20%	1%	1%	2%	3%	13%
Upper non poor 20%	1%	2%	0%	3%	14%
Wealthiest 20%	1%	1%	2%	2%	10%

TABLE K 2. PROPORTION OF URBAN HOUSEHOLDS SELECTING DIFFERENT SANITATION OPTIONS, BY ASSET QUINTILE

	Community toilets	Shared	Dry pit	Wet pit	Septic tank	Communal sewerage	Sewerage with treatment
Very poor 20%	2%	4%	3%	0%	4%	1%	2%
Poor 20%	2%	2%	3%	1%	5%	4%	1%
Non poor 20%	1%	2%	2%	1%	9%	5%	1%
Upper non poor 20%	0%	2%	2%	0%	11%	5%	1%
Wealthiest 20%	0%	1%	2%	1%	14%	4%	1%

ANNEX L. INCREMENTAL COSTS OF MOVING UP THE SANITATION LADDER

TABLE L 1. INCREMENTAL COSTS OF MOVING UP THE SANITATION LADDER (US$, 2009)

Cost item	Community toilet	Shared toilet	Private dry pit	Private wet pit	Private septic tank	Communal sewerage	Private sewerage
Lamongan							
Shared toilet			-56	-44	465		
Private dry pit	-	-		13	521		
Private wet pit	-	-	-		508		
Tangerang							
Community toilet		-19	-117	-94	371		
Shared toilet	-		-98	-76	390		
Private dry pit	-	-		23	488		
Private wet pit	-	-	-		465		
Banjarmasin							
Community toilet		-227	-271	-268	-95		158
Shared toilet			-44	-41	133		385
Private dry pit	-			3	176		428
Private wet pit	-	-			173		425
Private septic tank							252
Malang							
Shared toilet			-50	-36	212	373	
Private dry pit				14	262	423	
Private wet pit					248	408	
Private septic tank						160	
Communal sewerage	-						
Payakumbuh							
Shared toilet			-96	-57	210		
Private dry pit	-	-	-	39	306		
Private wet pit					267		
Private septic tank							

ANNEX M. PROGRAM APPROACH ANALYSIS

TABLE M 1. HOUSEHOLD CHOICES AND OTHER INTERVENTIONS

Site	Rural/ urban	Number of households interviewed	Was household given a choice to participate? (%)		Was household given a choice of options (%)		Hygiene awareness (%)		Water intervention offered (%)	
			Yes, voluntary	No, not voluntary	Yes, choice available	No, choice not available	Yes	No	Yes	No
1	Rural	300	-	-	-	-	-	-	-	-
2	Rural	300	100	-	96.4	3.6	85.7	14.3	64.3	35.7
3	Urban	300	93.8	6.3	87.5	12.5	66.7	33.7	12.5	87.5
4	Urban	300	98.6	1.4	94.6	5.4	60.5	39.5	10.9	89.1
5	Urban	300	100	-	71.4	28.6	100	-	71.4	28.6
…	…									

TABLE M 2. FINANCING FROM HOUSEHOLD AND PROJECT SOURCES

Site	Rural/ urban	Number of households interviewed	Household pays for facility		Non cash household contribution			Project value input
			Yes	No	No	Labor	Materials	
1	Rural	300	100	-	-	-	-	
2	Rural	300	30.4	69.6	44.4	52.8	2.8	
3	Urban	300	24.2	75.8	95.6	2.2	2.2	
4	Urban	300	74.8	25.2	97.2	2.8	-	
5	Urban	300	-	100	85.7	14.3	-	
…	…							

TABLE M 3. APPROPRIATE TECHNOLOGY

Site	Rural/ urban	Number of households interviewed	% households with insufficient water for flushing		% households with pit flooding		% households with pit overflow	
			Sometimes	Often	Sometimes	Often	Sometimes	Often
1	Rural	300	0	0	3.7	6.3	3	2
2	Rural	300	0	0.3	0	0	0	0
3	Urban	300	0.3	0	0	1.3	0	1.3
4	Urban	300	0.3	0.3	0	0	0	0
5	Urban	300	0	0	0	0	0	0
…	…							

TABLE M 4. ACTUAL PROGRAM PERFORMANCE IN RELATION TO KEY SELECTED INDICATORS FOR PROGRAM EFFECTIVENESS

Impact	Indicator	Lamongan	Tangerang	Banjarmasin	Malang	Payakumbuh
Health (sanitation intervention)	% household members using improved toilet regularly	81%	82%	70%	84%	84%
Health (hygiene intervention)	% households (always) washing hands after defecation	45%	11%	6%	11%	23%
	% latrines with signs of feces around toilet	7.67%	8.67%	18.73%	5%	9.33%
Water source	Rural: % of tubewells and dug wells tested which have zero E Coli	100%	100%	-	-	-
	Urban: main water source - tested samples which have zero E Coli	-	-	100%	100%	100%
Water treatment	% households using non-boiling household water treatment methods	85%	70%	23%	70%	57%
Access time	% household members using own toilet instead of off-plot options Men Women Children 5-14 Children 0-4	87% 89% 88% 89%	74% 64% 76% 72%	72% 73% 72% 73%	82% 83% 81% 82%	59% 60% 56% 58%
Re-use	Own use: % households applying human excreta in own land or using human excreta for biogas	-	-	-	-	-
	Sales: % households selling human excreta or biogas	-	-	-	-	-
Intangibles	Average score (as % of maximum score of 5) of satisfaction questions	3%	3%	9%	9%	4.7%
External environment	Average score (as % of maximum score of 5) of external environment questions relating to sewage	4%	4%	8%	8%	4.8%

TABLE M 5. SELECTED KEY INDICATORS FOR PROGRAM EFFECTIVENESS

Impact	Indicator area	Actual proposed indicator
FOR QUANTITATIVE CBA		
Health (sanitation intervention)	• Extent of use of improved toilet	• Proportion of household members using improved toilet instead of previous unimproved option
Health (hygiene intervention)	• Decreased incidence of disease(s) caused by poor sanitation.	• Rate of patient admission to health care facilities.
Health (hygiene intervention)	• Extent of hand washing with soap after defecation, or • Hygienic state of improved toilet.	• Proportion of households, who answered 'yes' to washing hands after defecation, • Proportion of improved latrines in which there are signs of feces around toilet (observational questionnaire).
Water source	• Water quality is adequate from nearest low-cost source (rural area) and from piped supply (urban area).	• Rural area: % of tube wells and dug wells tested to contain zero E. coli, • Urban area (areas with piped water): % tested samples in which chlorine is at adequate level.
Water treatment	• Households feel safe to use cheaper and simpler household treatment methods	• Proportion of households using non-boiling household water treatment methods
Access time	• Extent of use of own toilet compared to off-plot sanitation facilities or OD	• Proportion of household members using own toilet instead of off-plot options (can split by men, women, children 5-14, children <5)
Reuse	• Extent of actual reuse of human excreta out of all households with reuse options	• Own use: proportion of households applying human excreta in own land or using human excreta for biogas • Sales: proportion of households selling human excreta or biogas
FOR QUALITATIVE ANALYSIS		
Intangibles	• Degree of satisfaction with key aspects of toilet facility	• Average score (as % of maximum score of 5) of all relevant satisfaction questions
External environment	• Degree of continued soiling of external environment with human excreta	• Average score (as % of maximum score of 5) of two external environment questions relating to sewage (visibility and smell questions)

ANNEX N: STEPS OF THE FIELD SURVEY IMPLEMENTATION

Briefing for field coordinators

Field coordinators were recruited in Jakarta. Before leaving for the field, they were briefed and received training on their responsibilities in the field study. They were also involved in a pilot test of the household questionnaire and observational component, and the health facility study.

Each coordinator was responsible for all data collection processes in the field where she/he was assigned, including FGD implementation and all required arrangements with local stakeholders to get their support and inputs. In each site, the Field Coordinator was assisted by one local counterpart. The local counterpart assisted the Field Coordinator to recruit interviewers/enumerators, obtain survey permit from the local authorities, help with enumerators training, and support all data collection processes. The criteria of enumerator recruitment were:

- Experienced with activities related to local communities and local government,
- Good verbal communication skills,
- Understand sanitation issues,
- Fully committed to get the data collection done.

There were 8 interviewers in each survey site. Most of them were graduated from public health faculty or health workers/cadres. Most interviewers were women.

Training for interviewers

The selected candidates for interviewers/enumerators in each site were given an intensive 3 day training on conducting the field survey. The training was facilitated by the ESI Team from PT. MLD who was also assisted by each field coordinator and local counterparts. The training aimed at giving the interviewers/enumerators an adequate level of comprehension to conduct the HH survey. There were classroom sessions as well as field testing in a village near the training location. The interview tests were evaluated in the classroom to assess whether the questionnaires were practical enough.

Field preparation and household interviews

The field preparation encompassed determining a base camp, preparing interviewers training, and contacting all related parties to ensure successful survey, such as getting research permit at village level. The samples or respondents were gathered from the field sites by creating a list of targeted households, with special focus on families with children under-five. The process involved field personnel, such as enumerators and local health cadres and involved the following steps:

- Visiting the selected villages to identify and record the number and names of under-five children in those villages,
- Visiting local midwifery clinics or midwife practitioners to get additional data of families with under-five children,
- Once the respondent candidates list was completed, the field personnel selected them randomly to be interviewed.

The household survey team collected data by visiting the respondents' houses. With household questionnaires in hand, the enumerators interviewed the housewives for 40-60 minutes, including a direct observation of their toilet facilities. The household survey did not encounter significant problems, except for revisiting the house when the selected respondents were not at home because they were working.

To ensure the quality of data collection in the field, the interviewers and the field coordinator conducted data reconciliation every end of the day after the interviews. There were three stages to verify the questionnaire responses:

1. The first stage: peer review among interviewers. The result of an interviewer was verified by another interviewer until all questionnaire responses of that day were all cross-checked. The purpose of this stage was to make sure that all questions in the questionnaires were properly filled out,

2. The second stage: the field coordinator thoroughly reviewed all questionnaire responses. The purpose of this stage was to ensure no mistakes in filling in of the questionnaire,

3. The third stage: the field coordinator randomly revisited some respondents to verify that the respondents were really interviewed by the interviewers.

These verification stages were conducted during the field surveys to ensure prompt actions were taken following identification of problems related to the questionnaires. For instance, should there be a questionnaire that has not been properly filled out, the field coordinator would ask the interviewer to visit the respondent of that particular questionnaire again and would make sure that all questions are answered. If the interviewer failed to meet a certain respondent until the second visit, then the respondent would be replaced with the following person in the respondent list. Employing such verification method in this study resulted in zero non-response or error response rate and credible confidential data to be processed. At the same time, there were parallel data collection activities in each site survey (see below).


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