Economic Impacts of Sanitation in **The Philippines**

A five-country study conducted in
Cambodia, Indonesia, LAO PDR,
The Philippines and Vietnam
under the Economics of Sanitation Initiative (ESI)

USAID
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Water and Sanitation Program - East Asia and the Pacific (WSP-EAP)
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Contents

Acknowledgment

The Sanitation Impact Study was conducted in four countries: Cambodia, Indonesia, the Philippines, and Vietnam. A study is ongoing in Lao PDR. The study was led by the East Asia and Pacific Office of the World Bank's Water and Sanitation Program (WSP), with contribution of WSP teams in each of the participating countries. The study took 1 year to complete and has undergone two major peer review processes.

Guy Hutton (WSP-EAP senior water and sanitation economist) led the development of the concept and methodology for the Economics of Sanitation Initiative (ESI) and the management and coordination of the country teams. The study benefited from the continuous support of other WSP-EAP staff. Isabel Blackett was the task team leader; Jema Sy, Brian Smith, Almud Weitz, and Richard Pollard provided inputs to concept development and study execution. Bjorn Larsen (WSP consultant) contributed to the study methodology and provided the figures for malnutrition-related health effects of poor sanitation.

The country team in the Philippines consisted of U-Primo E. Rodriguez (USAID consultant and country lead) and Nelissa Jamora (USAID consultant). Edkarl Galing and Leila Elvas (WSP Philippines) contributed importantly to study conduct.

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This policy brief is an abbreviated version of the technical report. A more comprehensive discussion is available in the detailed research report: "Economic impacts of sanitation in the Philippines–summary." Rodriguez UE, Jamora N, Hutton G. World Bank, Water and Sanitation Program. 2008.

Reference for citation:

· Economic impacts of sanitation in **Southeast Asia**. Hutton G, Rodriguez UE, Napitupulu L, Thang P, Kov P. World Bank, Water and Sanitation Program. 2008.

· Economic impacts of sanitation in **Cambodia**. Kov P, Sok H, Roth S, Chhoeun K, Hutton G. World Bank, Water and Sanitation Program. 2008.

· Economic impacts of sanitation in **Indonesia**. Napitupulu L and Hutton G. World Bank, Water and Sanitation Program. 2008.

· Economic impacts of sanitation in **Vietnam**. Thang P, Tuan H, Hang N, Hutton G. World Bank, Water and Sanitation Program. 2008.

Basic country data–The Philippines, 2005

Variable	
Population	
Total population (millions)	84.2
Rural population (%)	65.4
Urban population (%)	34.6
Annual population growth	2.4
Under 5 population (% of total)	12.6
Under 5 mortality rate (per 1,000)	33
Female population (% of total)	49.6
Population below poverty line (million)	37
Currency name	Peso
Year of cost data presented	2005
Currency exchange with US$	55.10
GDP per capita (US$)	1,282
Sanitation	
Improved rural (%)	59
Improved urban (%)	80
Urban sewage connection treated (%)	3.3

Executive Summary

About 20 million Filipinos, or more than a quarter of the Philippine population, were exposed to poor sanitation in 2004. Moreover, with an average population growth of more than 2% per annum, an additional 2 million people will require adequate and clean sanitation facilities each year. These facts raise serious concerns because poor sanitation has a wide variety of negative impacts.

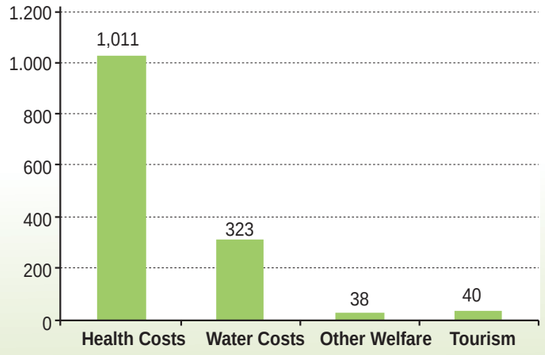
Sanitation is often a neglected aspect of development in developing countries. This in part explains the lack of reliable data and research to verify the significant burden imposed by poor sanitation on society. This study attempts to address these shortcomings by conducting a quantitative and qualitative assessment of the impacts of poor sanitation on health, water, other welfare indicators, and tourism.

The analysis interpreted sanitation as activities that are related to human excreta. However, there were instances in which sanitation as it relates to gray water and solid waste were also included. The study relied on evidence from secondary sources and was hence limited in the scope of impacts examined.

Overall, the study estimates that poor sanitation leads to economic costs in the order of US$1.4 billion or PhP 77.8 billion per year. This is equivalent to about 1.5% of GDP in 2005 and translates into per capita losses of US$16.8 or PhP 923.7 per year.

The health impacts represent the largest source of quantified economic costs. Estimated to be about US$1 billion, this item explains about 71% of the total. Poor sanitation also contributes to the pollution of water resources. The study found that this aspect accounted for about 23% of the total economic costs or US$323 million. Other welfare impacts and the impacts of poor sanitation on tourism were also estimated to exceed US$77 million per year.

Economic losses - (million US$)



Having estimated the impacts, the study also evaluated the benefits associated with improved sanitation and hygiene practices. The results showed that improved hygiene practices•'3fe.g., hand washing•'3fcan reduce health costs by approximately US$455 million. Improved physical access to sanitary toilets can reduce economic costs associated with user preferences by about US$38 million, whereas improved toilet systems can reduce health costs by US$324 million. Improvement in the treatment or disposal of waste has a large impact on water resources and can reduce costs by US$364 million.

The findings of this study indicate that poor sanitation has significant economic costs. It also showed that improvements in the sanitation sector will not only result in economic savings but will also lead to gains that go beyond the simple mitigation of the costs, such as the value of human excreta used for fertilizer.

This is the first regional study to compile economic evidence on a range of impacts of poor sanitation. The results are a wake-up call to the Philippine government and the development community. Poor sanitation affects everyone, especially the poor and vulnerable (children, women, disabled, and senior people). The considerable importance of sanitation shown in this study and the key links improved sanitation has with other development goals (poverty and hunger reduction, gender equality, child health, access to safe drinking water, and quality of life of slum dwellers) demonstrate that it should receive far greater attention from players whose interest is the equitable socioeconomic development of the Philippines. Decisionmakers should act now and in a concerted way to increase access to improved sanitation and hygiene practices.

Introduction

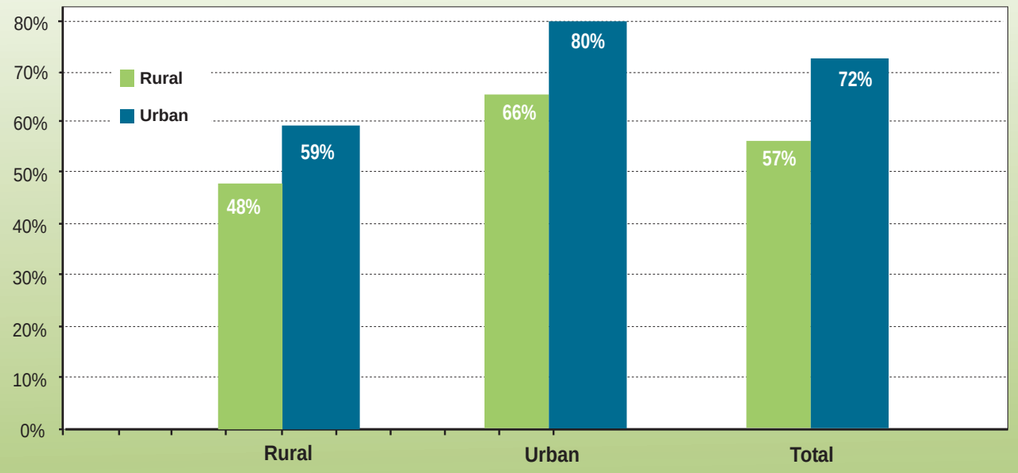
Sanitation is a global concern. One of the targets of the United Nation's Millennium Development Goals (MDG) is to halve–from 1990 to 2015–the proportion of people without access to sanitation . In the Philippines, Chapter 3 of the Philippine Medium-term Development Plan 2004-10 states the following: "Ensure that all barangays/municipalities that will be provided with water supply services have corresponding sanitation facilities for proper disposal of wastewater and septage…" . Achieving both objectives can be a formidable task.

Figure 1 shows official sanitation coverage data for the Philippines. Taken from the WHO/UNICEF Joint Monitoring Programme, the data indicate that about 72% of the Philippine population had access to improved sanitation in 2004. While the figure is a considerable improvement from the 57% in 1990, it nonetheless suggests that at least 20 million people have no access to improved sanitation facilities. Based on current population trends, an additional 2 million Filipinos will also require adequate and clean sanitation facilities each year. Further, the rural-urban disparity is evident as only 59% of the rural population in 2004 had access to improved sanitation compared with 80% of the urban population. Hygiene practice in the Philippines is another concern. A nationwide survey in 2000 found that less than half of the respondents wash their hands after using the toilet .

In spite of the importance of water and sanitation in the development process, there are limited data and research to document the impact of poor sanitation. The majority of published studies focus on the health impacts of poor sanitation. This is clearly incomplete because arguments for improved sanitation need to be evaluated and presented together with other negative impacts. One previous study conducted by the World Bank considered the health, fish losses, and tourism costs of poor sanitation. As well as the negative impacts of poor sanitation, policymakers and sanitation advocates require evidence on how these impacts can be mitigated with different sanitation options, along with comparative costs of these options.

The major goal of the study is to provide decisionmakers at the country and regional levels with better evidence on the negative economic impacts of poor sanitation. It also seeks to generate tentative estimates of the impacts that can be mitigated by investing in improved sanitation. This study is conducted under the Water and Sanitation Program-East Asia and the Pacific (WSP-EAP) Economics of Sanitation Initiative (ESI), applying a comprehensive sanitation impact evaluation methodology developed by the World Bank WSP . It draws largely on existing data sources available from governments, donors, nongovernment agencies, and the scientific literature.

Figure 1. Sanitation coverage in the Philippines (%)



Methods

2.1 Study approach

This sanitation impact study employs a standardized peer-reviewed methodology . It follows the methodology also adopted in four other countries (Cambodia, Indonesia, Lao PDR, and Vietnam) with a view to generating comparable outputs for Southeast Asia. While the primary aim is to provide national estimates of the economic impact of poor sanitation, results are also presented by regional level in the Philippines, as well as by rural/urban, gender, and age breakdown where feasible.

The study uses a modeling approach and draws almost exclusively on secondary sources of data. It presents the impacts in physical units and converts these into monetary equivalents using conventional economic valuation techniques. Results on economic impact are presented for a single year–2005. Results are also presented in US dollars (US$) to enable cross-country comparisons. For those impacts where quantification in economic terms is not feasible using secondary data sources, the impacts are examined and reported descriptively. A complete listing of the equations used in calculating costs is provided in the full-length research report.

2.2 Scope of sanitation

Sanitation is used to describe many different aspects of hygiene and the disposal or recycling of waste. In the international arena, the sanitation target adopted in the MDG focuses on the disposal of human excreta. Hence, for human excreta, there are significantly better national data available on population numbers with access to improved coverage.

Despite the focus of the Millennium Development Goal (MDG) target on human excreta, this study recognizes other aspects of sanitation. The management of animal excreta, solid waste, agricultural waste, toxic waste, wastewater, food safety, and associated hygiene practices are also included in the broader definition of sanitation. However, not all of these could be included in the present study. Table 1 provides an overview of which aspects of sanitation were included.

Table 1. Aspects of sanitation included in the present sanitation impact study

Included	Excluded
· Practices related to human excreta	· Drainage and general flood control measures
· Quality, safety, and proximity of latrine system	· Industrial effluents, toxic waste, and medical waste
· Disposal or treatment of excreta and impact on the (inhabited) outdoor environment	· Agricultural waste
	· Broader environmental sanitation
· Hygiene practices	· Vector control
	· Broader food safety
	· Practices related to use or disposal of animal excreta
	· Practices related to disposal or treatment of gray water
	· Practices related to disposal or treatment of household solid waste

2.3 Impacts evaluated

Poor sanitation has many actual and potential negative effects. Based on an initial assessment of a long list of potential impacts, a shortened list was selected for evaluation in this present study. These are

- **Health impacts**
- **Water resource impacts**
- **Other welfare impacts**
- **Tourism impacts**

The estimated economic losses of these impacts include additional expenditures, income or productivity losses, and the value of premature death associated with poor sanitation. Nonpecuniary welfare impacts were assessed but not quantified in monetary units. When other factors impacted an evaluated sector, economic losses were estimated on the basis of the narrower definition of poor sanitation (see Table 1).

2.4 Impact mitigation

From a policy viewpoint, it is important to know how much of the estimated losses resulting from poor sanitation can be reduced by implementing improved sanitation options. For some impacts such as health, improved sanitation and hygiene do not totally solve the problem, so the overall estimated losses cannot be fully mitigated.

This study estimates the potential benefits of certain features of sanitation improvements. It provides an initial estimate of the likely gains from improving these features (see Table 2). ESI's second study aims to estimate the costs and benefits of specific technical and management approaches to sanitation.

Table 2. Features of sanitation interventions for assessing economic gains

Intervention	Detail	Gains evaluated
Making toilets cleaner and safer	Improved: position or type of toilet seat or pan; structure; collection system; ventilation; waste evacuation	Avert health impacts (32% reduction)
Hygiene	Availability of water for anal cleansing; safe disposal of materials for anal cleansing; hand washing with soap; toilet cleaning	Avert health impacts (45% reduction)
Latrine access	Toilets closer and more accessible (private rather than shared or public)	Save latrine access time
Isolation of human waste from water resources	Improved: septic tank functioning and emptying; flood-proof; treatment; drainage system	Avert costs of accessing clean water for drinking and other household uses; avert losses to fish production
Sanitary conditions for tourists	Culturally appropriate improved tourist toilet facilities (hotel, restaurants, tourist attractions)	Avert tourist losses
Reuse of human waste	and general sanitary conditions Composting of feces for fertilizer; biogas production	Value of replaced fertilizer and fuel

Results

3.1 Summary of economic impacts of poor sanitation

Table 3 summarizes the quantified economic impacts of poor sanitation. It shows that the estimated overall economic losses from poor sanitation amount to about US$1.4 billion or PhP 77.8 billion per year. Equivalent to about 1.5 % of GDP for 2005, this translates to approximately US$16.80 or PhP 923.70 per person per year. It was also slightly more than six times larger than the programmed health budget of the national government (PhP 12.9 billion) for the same period .

About US$1 billion or more than two-thirds (72%) of the total economic costs were accounted for by the health impacts (Figure 2). This was followed by water impacts, which explained close to a quarter (23%) of the total. The remainder was attributed to tourism and other welfare impacts.

Figure 2. Financial and economic losses due to poor sanitation, by impact type (million US$)

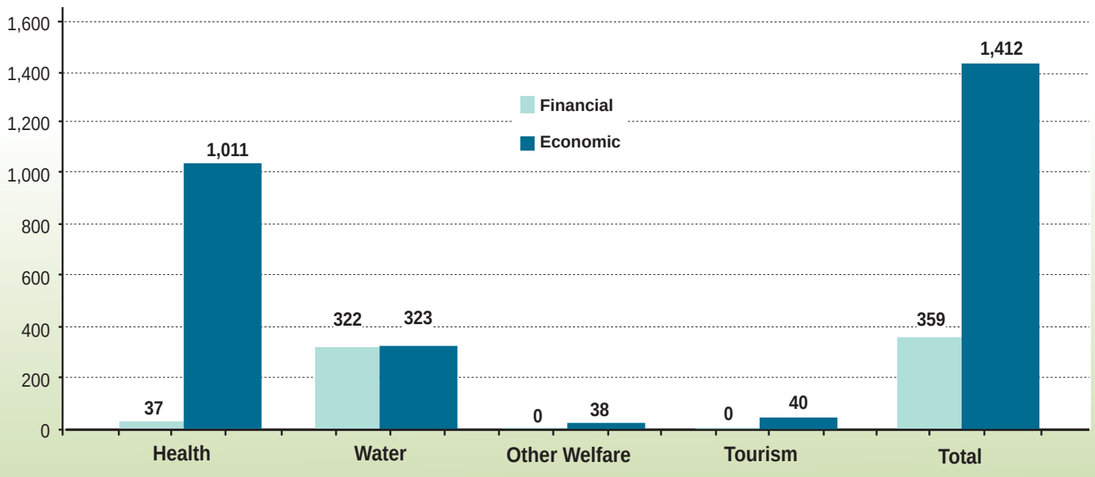


Table 3. Financial and economic losses due to poor sanitation, by impact type

Impact	Financial losses				Economic losses			
	Value (million)		Per capita (US$)	%	Value (million)		Per capita (US$)	%
	US$	PhP			US$	PhP		
Health costs	**37.0**	**2,036.5**	**0.5**	**10.3**	**1,011.1**	**55,705.3**	**12.1**	**71.5**
Health care	6.2	342.2	0.1	1.7	33.1	1,826.0	0.4	2.3
Productivity	29.7	1,636.3	0.4	8.3	55.3	3,045.6	0.7	3.9
Premature death	1.1	58.0	0.0	0.3	922.7	50,833.7	11.0	65.3
Water costs	**322.0**	**17,741.8**	**3.8**	**89.7**	**323.3**	**17,813.9**	**3.8**	**22.9**
Drinking water	116.5	6,417.0	1.4	32.4	117.0	6,445.9	1.4	8.3
Fish production	9.6	531.6	0.1	2.7	9.6	531.6	0.1	0.7
Domestic water uses	195.9	10,793.2	2.3	54.6	196.7	10,836.4	2.3	13.9
Other welfare	-	-	-	-	**37.6**	**2,066.4**	**0.5**	**2.6**
Time use	-	-	-	-	24.6	1,352.7	0.3	1.7
Life choices	-	-	-	-	13.0	713.7	0.2	0.9
Tourism	-	-	-	-	**40.1**	**2,208.7**	**0.5**	**3.3**
Tourist loss	-	-	-	-	40.1	2,208.7	0.5	3.3
Total	**359.0**	**19,778.28**	**4.3**	**100.0**	**1,412.1**	**77,794.3**	**16.8**	**100.0**

3.2 Health impacts

Poor sanitation causes illness and premature death in the Philippines. Given the large number of diseases and health effects due to poor sanitation, this study selected key health impacts based on their epidemiological and economic importance. The availability of data from national statistics, local research studies, and international sources also played an important role in determining which diseases to include. Table 4 shows the estimated number of episodes and deaths attributed to poor sanitation for selected diseases. More than 38 million cases of diarrhea were attributable to poor sanitation and hygiene annually. A large number of diarrhea cases are unreported; these are estimated to represent roughly 37 million annually. diarrheal diseases explicitly included in this study, acute watery diarrhea was dominant with nearly 1.2 million cases.

Table 4 . Estimated number of cases and deaths attributed to poor sanitation

Disease	Reported cases (no.)	Estimated actual cases (no.)	Estimated deaths (no.)
Diarrheal diseases	534,556	38,018,043	13,428
Acute watery diarrhea	516,928	1,181,183	11,338
Acute bloody diarrhea	6,552	16,905	135
Cholera	136	289	46
Typhoid	10,939	26,128	1,909
Other	na	36,793,536	na
Malnutrition- related: ALRI, measles, malaria	20,926	608,234	6,917
Total	**555,482**	**38,626,277**	**20,345**

The financial and economic impacts assessed in this study included spending on (1) health care, (2) loss of income or production associated with disease, and (3) the value associated with premature loss of life.

To estimate health care costs, the study compiled information on disease rates, treatment-seeking rates, treatment practices, and unit costs. Health costs are both financial and economic in nature.

Financial health cost includes the marginal cost to treat patients at public facilities (mainly drugs), patient transport costs, as well as the full costs of treatment in private clinics or self-treatment. Economic cost includes the financial costs plus the short-term fixed costs of public health facilities such as staff, capital items, and overhead.

Health-related productivity costs were also estimated to place value on the time lost from work or school as a result of the illness. Disease takes people away from their occupations and daily activities, and regular sickness-related absences from school affect the ability of children to keep up with the curriculum and complete their education. This study distinguished between financial and economic costs. Financial cost was estimated as immediate income loss for those not paid their wage or earning an income from time lost due to sickness. For those not directly losing income, there would also be a welfare loss, which may include longer term income-earning potential. In the estimation of economic cost, this study recognized the value of time lost from daily activities, whether productive working time, school time, or leisure time.

Premature death affects society in a number of ways. The most tangible economic impact is the loss of a member of the workforce, with implications for the economic outputs generated. This approach, which has been termed the 'human capital approach,' approximates welfare loss to society by estimating the future-discounted income stream from a productive person, from the time of death until the end of (what would have been) his or her productive life.

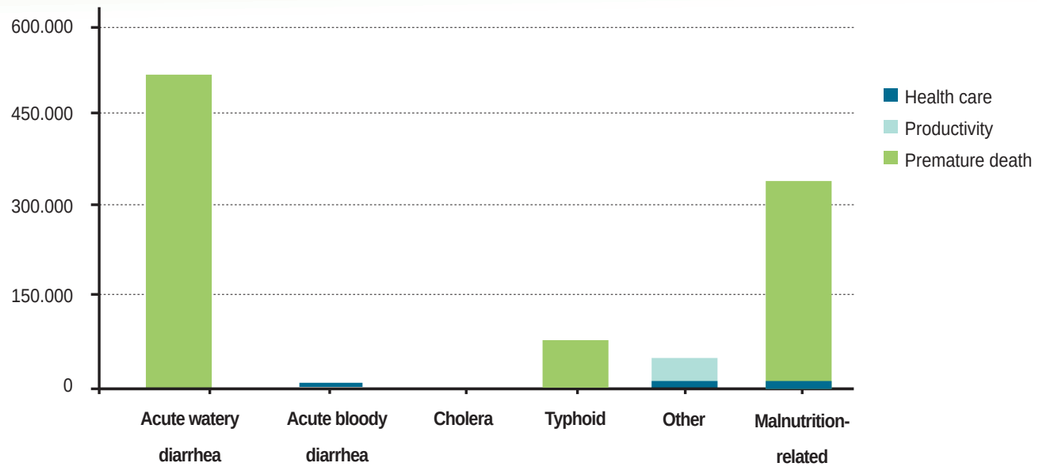
Table 5 summarizes the estimated economic cost of negative health impacts of poor sanitation and hygiene in the Philippines. These figures include health care cost, health-related productivity cost, and the value of premature deaths. It shows that economic cost associated with health was about US$1.0 billion per year. With an estimated economic cost of US$517 million, acute watery diarrhea disease accounted for about 51% of the total health-related cost. Among the different impacts, losses due to premature death explained 91% of the cost.

Figure 3 shows the contribution of different impacts to overall cost, by disease. It indicates that health care cost accounted for a small fraction of the total cost for each disease. For almost all diseases, premature death was the largest source of economic cost. The only exception was for "other diarrhea," which was treated in the study as a collection of nonfatal diarrheal diseases.

Table 5. Total health-related costs (000 US$)

Disease	Total economic costs			
	Health care	Productivity	Premature death	Total
Diarrheal diseases	12,071	53,700	606,034	671,804
Acute watery diarrhea	2,897	1,231	512,684	516,812
Acute bloody diarrhea	69	75	6,110	6,253
Cholera	2	2	1,951	1,954
Typhoid	141	141	85,289	85,571
Other	8,962	52,251	-	61,214
Malnutrition- related: ALRI, measles, malaria	21,075	1,585	316,705	339,364
Total	**33,145**	**55,284**	**922,739**	**1,011,168**

Figure 3. Contribution of different costs to total cost, by disease (000 US$)



3.3 Water resource impacts

The Philippines is well-endowed with water resources. According to the Bureau of Fisheries and Aquatic Resources (BFAR), the country has 200,000 hectares of lakes, 31,000 hectares of rivers, 19,000 hectares of reservoirs, and 246,063 hectares of swamplands [7]. It also has an extensive coastline that stretches over a distance of 32,289 kilometers.

3.3.1 Water pollution

Water pollution from domestic sources can be estimated from the annual release or eventual seepage of untreated feces, urine, and gray water into inland water bodies. It is estimated by accounting for the population and their access to different types of sanitation facilities, the proportion of sewage released to water bodies, and average human waste production per year.

Table 6 shows the estimated release of polluting substances attributable to sanitary waste. The estimates account for toilet facilities and their assumed efficiency in treating human waste. It indicates that Filipinos annually released 4.2 billion kilograms of untreated feces and 33.9 million cubic meters of equivalent black water (feces and urine) into the environment. The largest contributor to such wastes was the National Capital Region (NCR), accounting for about 12% of the national release of feces and urine. This was slightly lower than the share of the region in the national population (13%) because of the existence of sewers and septic tanks, thereby reducing the release of human waste into the environment.

Table 6 also indicates that the total wastewater from households (gray and black water) was 1.96 billion cubic meters. About 763 million cubic meters or about 38% of household wastewater was attributed to sanitation. In other words, 33.9 million cubic meters of black water mixed with flushed water to give 763 million cubic meters of brown water. In both cases, the NCR, Region 3, and Region 4a had the largest contributions. Accounting for about 42% of the total, this was due to the relatively high population and/or per capita consumption of water in these regions. For similar reasons, these regions also had the largest contribution of biological oxygen demand (BOD) and bacteria (coliform).

Table 6. Total release of polluting substances from sanitation

Region	Total release (volume)				Polluting substances	
	Feces (million kg)	Urine (million m3)	Wastewater from households (million m3)	Wastewater attributable to sanitation (million m3)	BOD (million kg)	Coliform (trillion count)
NCR	516.9	4.1	323.0	124.1	120.6	10,424,904
CAR	80.0	0.6	38.1	14.6	13.0	1,368,509
1	224.9	1.8	110.0	42.3	36.6	3,865,696
2	155.4	1.2	65.3	25.1	25.3	2,306,206
3	431.1	3.4	236.9	91.0	70.2	8,311,771
4a	514.0	4.1	261.1	100.3	119.9	9,244,964
4b	125.2	1.0	63.6	24.4	20.4	2,251,085
5	265.1	2.1	108.0	41.5	43.2	3,893,228
6	356.3	2.9	134.5	51.7	58.0	4,877,434
7	311.5	2.5	124.5	47.8	50.7	4,478,041
8	212.5	1.7	83.4	32.1	34.6	3,007,025
9	168.5	1.3	62.5	24.0	27.5	2,269,323
10	202.4	1.6	88.6	34.0	32.9	3,176,005
11	207.8	1.7	89.7	34.5	33.8	3,196,337
12	193.2	1.5	78.3	30.1	31.5	2,829,926
13	124.3	1.0	50.7	19.5	20.2	1,808,025
ARMM	148.3	1.2	43.3	16.6	24.1	1,622,930
Total	**4,237.2**	**33.9**	**1,961.5**	**753.7**	**762.6**	**68,931,410**

3.3.2 Drinking water

Water consumers and providers treat water because water sources are not clean. Some households, especially the wealthier ones, even purchase bottled water, which is either chemically treated or obtained from a protected (mineral) source. The more polluted the water source, the more likely the household will take some form of precautionary measure, and the higher the unit cost of treatment. In some cases, households will haul water from more distant but less polluted water sources, having implications on access time. Table 7 presents the access costs of drinking water attributed to poor sanitation.

The findings indicate that the total economic costs were US$117 million. About 56% of this total was explained by household treatment of drinking water and 40% by purchase of non-piped water (Figure 4). There was also substantial variation in drinking water access costs across regions. NCR accounted for US$35 million (about 30%) of the total economic costs.

Figure 4. Drinking water access costs (million US$)

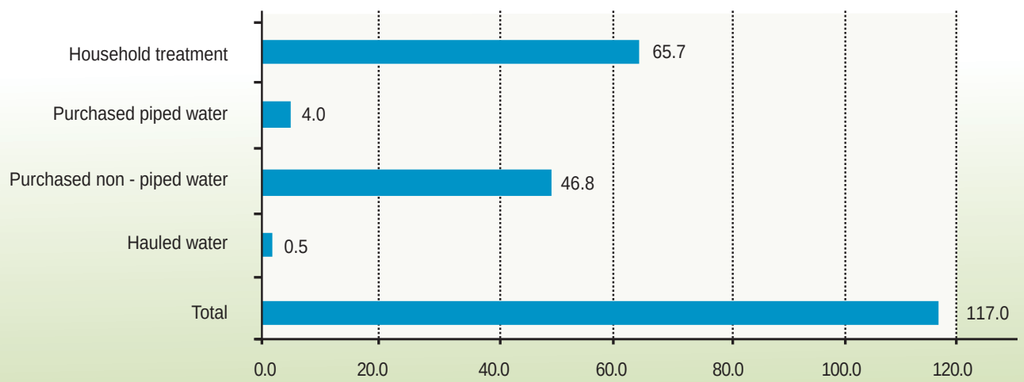


Table 7. Drinking water access costs, by region (US$)

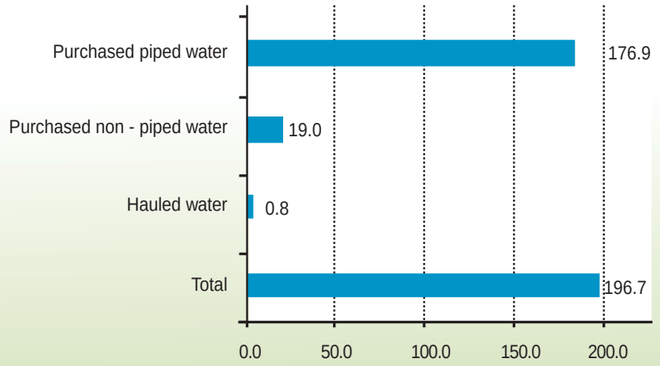
Region	Household treatment	Purchased piped water	Purchased non-piped water	Hauled water	Total
NCR	10,779,144	697,838	23,331,738	42,514	34,851,234
CAR	1,274,389	76,638	947,526	14,455	2,313,007
1	3,685,950	252,247	675,667	10,385	4,624,247
2	2,188,725	151,653	190,797	12,464	2,543,639
3	7,936,145	497,675	3,305,821	11,140	11,750,780
4a	8,738,524	497,119	6,339,770	51,675	15,627,088
4b	2,127,804	121,047	1,543,715	9,207	3,801,773
5	3,618,206	230,772	1,003,618	23,353	4,875,950
6	4,503,930	294,809	3,064,063	72,807	7,935,610
7	4,167,310	215,348	3,292,694	67,764	7,743,116
8	2,796,786	189,111	305,616	20,262	3,311,774
9	2,093,105	116,980	422,983	31,390	2,664,458
10	2,968,039	169,395	559,379	44,324	3,741,136
11	3,007,050	185,201	697,581	40,903	3,930,736
12	2,623,141	160,181	538,901	34,926	3,357,149
13	1,698,740	116,529	179,639	5,992	2,000,900
ARMM	1,451,473	57,084	394,112	31,928	1,934,596
Total	**65,658,461**	**4,029,625**	**46,793,620**	**525,488**	**117,007,193**

3.3.3 Other domestic uses of water

In addition to the uses of surface and groundwater sources for drinking, water is a resource to many other human and nonhuman activities [8]. While it is not possible to conduct an exhaustive analysis of all the different uses of water, this study assessed the relevance of noncommercial household (domestic) activities, such as the use of water for cooking, washing, and bathing.

Figure 5 shows the costs attributed to poor sanitation as a result of accessing water from improved water sources. The estimated economic impact amounted to US$196.7 million. Nearly 90% of these costs were accounted for by households with purchased piped water.

Figure 5. Water access costs for other domestic uses (million US$)



It is important to note that domestic costs might be lower in reality. The reason is, compared with demand for drinking water, demand for high-quality water is less important for tasks such as bathing and washing. However, people pay for the water, perhaps, because they can afford it or it is more convenient to have piped water.

3.3.4 Fish production

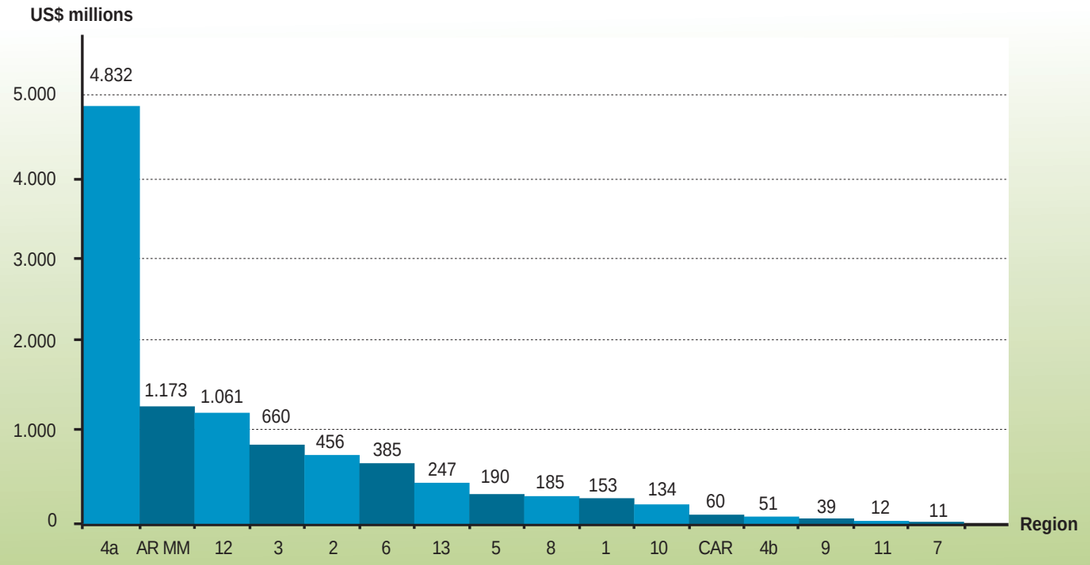
The fisheries sector plays a vital role in the Philippine economy. In 2005, it accounted for about 7% of total employment and 1% of GDP. For the same year, net exports were valued at US$376 million. Fishery products are the only food source of which the country is a net exporter.

Given the lack of empirical evidence linking water quality and fish production in Southeast Asia, this study used innovative methods to examine the likely effect of sewage on fish production. While the following three links between sanitation and fish production are potentially important, owing to lack of empirical evidence, only the first link was explored quantitatively in this study:

1. Sewage, due to its BOD, results in lower dissolved oxygen levels, which affect fish reproduction, growth, and survival.
2. Sewage contains bacteria, which have a direct impact on fish health and fish survival.
3. Sewage contains bacteria, which become lodged in fish scales and skin. Due to inadequate decontamination of fish prior to consumption, the bacteria are transmitted to humans, causing food poisoning and diseases.

With the methodology employed in the study, it was estimated that the existing sanitation conditions caused a loss to fish production equivalent to about 11% of current production. With an estimated total production value of US$85 million in 2005, an 11% loss translated into about US$9.7 million (Figure 6). The results also indicate that the largest losses were likely to be for Region 4a.

Figure 6. Losses to fish production value, by region (million US$)



3.4 Other welfare impacts

Apart from difficulties in quantification, no studies at the national level provide information on what is classified in the present study as "other welfare" impacts of poor sanitation. These include time access for sanitation, intangible aspects related to user preferences, and life choices associated with sanitation. However, there are some site-specific surveys that can give clues on the importance of these aspects to Filipinos.

3.4.1 Access time

Welfare loss from increased access time due to unimproved sanitation can be due to journey time for open defecation or waiting time for shared latrines. The economic losses were computed on the basis of forgone income. In the case of adults, this was assumed to be 30% of the average daily compensation of employees. The time value of children was assumed to be half the value of adult time.

Figure 7 shows the impacts on time use of suboptimal toilet access. It indicates that, as a whole, people who practiced open defecation in the Philippines spent a total of 11.47 million days a year in accessing a "suitable" location.

People who shared toilets spent about 19.1 million days a year in accessing facilities. This essentially represents the amount of time spent waiting for a facility to be available and/or traveling to the toilet. All these were estimated to cost about US$24.6 million a year

Figure 7. Total time (000 days) and value of time (million US$) spent in accessing latrines

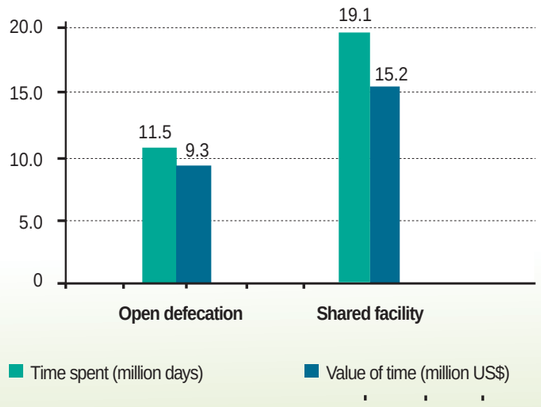


Table 8. Time used accessing latrines

Region	Population size (000)		Total time spent accessing (000 days)		Value (000 US$)		
	Open defecation	Shared facility	Open defecation	Shared facility	Open defecation	Shared facility	Total
NCR	246	2,404	312	3,047	946	6,702	7,648
CAR	66	329	83	417	106	363	469
1	92	924	117	1,171	65	457	522
2	80	704	102	892	52	312	364
3	429	1,545	543	1,959	415	1,046	1,461
4a	995	1,569	1,261	1,988	1,255	1,364	2,618
4b	242	382	307	484	224	243	467
5	938	806	1,189	1,021	534	303	837
6	1,110	910	1,406	1,153	1,222	693	1,915
7	1,384	1,032	1,754	1,308	1,744	896	2,640
8	1,080	520	1,368	659	728	232	961
9	536	549	679	696	444	302	746
10	288	684	365	867	388	623	1,010
11	272	904	345	1,146	349	788	1,137
12	362	814	459	1,031	373	560	932
13	278	350	352	444	91	76	167
ARMM	651	657	825	833	397	265	662
Total	**9,047**	**15,084**	**11,466**	**19,116**	**9,330**	**15,224**	**24,554**

3.4.2 Intangible aspects

The absence of national level studies makes the intangible aspects of poor sanitation difficult to analyze and quantify. However, there are site specific studies which provide clues on the importance of clean facilities to Filipinos.

A 2006 survey with 312 respondents in San Fernando, La Union, reported that almost all households disinfected their toilet bowls once a week [9]. The same study also showed that 71% of households did not desludge their septic tanks in the last 5 years prior to the survey.

Public toilets are important for many Filipinos as a largely daytime necessity, but these were shown to be of inadequate quality and insufficient number. Many public toilets in the Philippines are not clean and do not have the basic necessities such as running water, toilet paper, soap, and hand towels. As a result, people are forced to make adjustments to cope with the situation. For example, one study reported that the absence of water for flushing and hand washing in public restrooms in the Philippines had made it habitual for women to bring their own toilet paper [10].

The importance of these intangible benefits can also be gleaned from consultations with rural households in the Philippines that have received latrines. Cairncross [11] showed that the number one reason for satisfaction with latrines was the "lack of smell." This was followed by "cleaner surroundings," "privacy," "less embarrassment when friends visit," and "low incidence of gastrointestinal diseases.

3.4.3 Impact on life decisions and behavior

Running water supply and sanitary latrines in schools are a luxury in most of the developing world. In many workplaces, latrines are unhygienic, poorly maintained, and do not cater to the special needs of women. In the Philippines, a good indication are the findings in the previous section which state public toilets in the Philippines are not clean and do not have the basic necessities.

The presence of hygienic and private sanitation facilities in schools has been shown to affect enrollment and attendance, especially for girls [12, 13]. On the other hand, good latrine access at the workplace has implications for female participation in traditionally male-dominated employment areas. Furthermore, sanitary and adequate latrines in schools and at workplaces not only affect participation rates but improve the welfare of all pupils and employees as well.

Table 9 presents the estimated impacts of poor sanitation on school and work attendance of females. It indicates estimated economic impacts of about US$13 million. Almost all of the losses (97%) were explained by the absenteeism of working women.

Table 9. Impacts of poor sanitation on school attendance of girls and work attendance of women

Establishment	Absences (000 days per year)	Economic cost	
		Value (000 US$)	%
Secondary school	996	449	3.5
Workplace	13,890	12,507	96.5
Total	**14,886**	**12,956**	**100**

3.5 Tourism impacts

The total number of tourists choosing a country for their holiday is partially related to the general sanitary conditions of the country, as well as to whether the country has had specific health events such as a cholera epidemic. Better sanitary conditions can also attract 'high-value' tourists? ,i.e., those who are willing to pay more for their holiday. The attractiveness of a country to tourists is related to several aspects of sanitation. Examples include of water resources; quality of outdoor environment (smell, sightlines); food safety (hygiene in food preparation); general availability of toilets offering comfort and privacy in hotels, restaurants, and bus stations; and the related health risks of the abovementioned aspects.

Tourism is a booming industry and it continues to experience double-digit growth in many developing countries around the world [14]. Measured against such a standard, however, the performance of the Philippines over the past 10 years has been rather sluggish. Between 1994 and 2004, foreign visitor arrivals in the country only grew at an average annual rate of about 5%. Over the same period of analysis, tourist receipts only grew by an average rate of 0.3% per year. Measured against the rate of growth in visitor arrivals, this reflects declining expenditures per tourist over time.

Economic losses are reflected by the gap between current tourist revenues and the tourist revenues that would be possible at significantly higher tourist visit numbers such as those experienced by neighboring countries with higher visit rates. Assuming that 5% of the lost earnings are attributable to poor sanitation, economic losses to tourism was estimated to be about US$40 million (Table 10).

Table 10. Economic losses to tourism as a result of poor sanitation

Item	Value
Current number of tourists (million)	4.2
Government target, number of tourists (million)[a]	5.0
Potential tourism revenues per year (million US$)	2,589
Potential revenues less actual revenues (million US$)	802
Attribution to sanitation (%)	5
Losses due to poor sanitation (million US$)	40.1

[a]Target is for the year 2010 [2].

3.6 Economic gains from improved sanitation and hygiene

The economic gains from improved sanitation and hygiene are a proportion of the total losses estimated for diseases associated with poor sanitation and hygiene. The proportion of costs that can be averted will depend on the expected effectiveness of the interventions employed to prevent the disease. No health intervention, as implemented in practice, will be 100% effective in reducing overall loss. However, sanitation and hygiene interventions have been proven to be effective in a number of field trials [15, 16]. The estimates of intervention effectiveness used in this study were based on international literature, which included the most up-to-date reviews on effectiveness [15-18].

Table 11 shows the predicted economic gains from improved sanitation. The results indicate that improvements in hygiene practices alone, particularly hand washing, can reduce health costs by up to US$455 million a year. This result is very important from a policy perspective because, unlike improvements in toilet facilities, such improvements do not have to rely heavily on investments in physical infrastructure. Nonetheless, there is also a large one-time benefit arising from the construction of toilets for people who currently practice open defecation. Improved physical access to sanitary toilets can reduce other welfare impacts by about US$38 million, while improved toilet systems can reduce health costs by US$324 million. Improvement in the treatment or disposal of waste has a large impact on water resources and can reduce costs by US$364 million. Finally, the gains to sanitation markets were estimated to be about US$1.5 billion. Note that the health impacts associated with improved hygiene practices, when implemented in conjunction with the improved toilet system, are not additive.

Table 11. Estimated economic gains from improved sanitation (million US$)

	Hygiene practices	Latrine physical access	Improved toilet system	Treatment or disposal	Reuse
Health	455.0	-	323.6	-	-
Water	-	-	-	323.4	-
Other welfare	-	37.5	-	-	-
Tourism	-	-	-	40.1	-
Sanitation markets	-	-	-	-	1,500.2
Total	**455.0**	**37.5**	**323.6**	**363.5**	**1,500.2**

3.7 Omitted impacts

For several reasons, the current study omitted many other impacts of poor sanitation. For example, health impacts were limited to diarrhea and diseases related to malnutrition where there were reasonably reliable nationwide data. Hence, helminthes and skin diseases, among others, were not included. Also, the impact of sanitation on the business climate, including foreign investment, was omitted from this study as there is no proof linking sanitation, investment, and economic outcomes. Therefore, in order to keep the work manageable within the project's time frame and in the absence of data and validated methodologies for estimating some impacts, several impacts were not considered in this study.

Recommendations

Recommendation 1.

Give greater priority to investments in sanitation

With more than a quarter of the Philippine population exposed to unimproved sanitation, it is clear that more investments are needed in this sector.

While specific types of investment projects were not explored in the study, these may include the provision of simple pit latrines and moderately sophisticated latrines in rural and urban areas, respectively. This may also include increasing the coverage of piped sewers in urban areas. In areas where space is a major constraint and financial resources are limited, projects may involve the construction of easy-to-maintain communal facilities.

Recommendation 2.

Target investments to rural regions as well as to urban slums

The priority accorded the rural regions arises from the finding that access to improved sanitation is lower in these areas. This means that relatively simple and inexpensive facilities can go a long way in mitigating the problem.

Moreover, the emphasis should be on regions with high concentrations of children. This arises from the finding that children, especially those under the age of five, are very vulnerable to health impacts of unimproved sanitation.

Another priority would be the slum areas in urban regions. These areas have high population densities, which are more likely to be exposed to poor sanitation. Moreover, in such a confined space, human excreta that are not properly disposed or treated pollute water resources and increase health risks among the population.

Recommendation 3.

Strengthen education and information campaigns to promote personal hygiene

The study showed that hand washing can lead to substantial benefits in the form of lower health costs, particularly with reduced diarrheal incidence.

This means that intensifying existing campaigns to encourage hand washing and other hygiene practices can be an effective and cheaper means to reduce disease incidence directly and the impacts of poor sanitation indirectly. Notwithstanding current campaigns, there is still room for further improvement in hygiene practices.

Recommendation 4.

Collect further information on key variables related to sanitation

The present analysis relied on secondary data and existing literature to analyze the economic impacts of sanitation. In many instances, it did not find information that is directly relevant to the analysis. Also, the absence of well-defined and established relationships between sanitation and the evaluated impacts also constrained the quantitative analysis, in particular, fish losses and tourism.

This not only limited the scope of the study but also introduced uncertainties about the impacts presented.

Recommendation 5.

Evaluate available options/technologies for improving sanitation in the country

Having estimated the economic benefits from improving sanitation, the next step is to evaluate potential measures to address the problem. This involves analyzing the options that are available to concerned agencies/institutions. Such studies should carefully weigh the costs of each option relative to the benefits.

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Abbreviations

ARMM	Autonomous Region of Muslim Mindanao
ALRI	Acute Lower Respiratory Infection
BAS	Bureau of Agricultural Statistics
BFAR	Bureau of Fisheries and Aquatic Resources
BOD	Biological Oxygen Demand
CAR	Cordillera Administrative Region
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
EAP	East Asia and the Pacific
ESI	Economics of Sanitation Initiative
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
JMP	Joint Monitoring Programme
kg	kilogram(s)
L	Liter(s)
MDG	Millennium Development Goal
MT	Metric ton(s)
NEDA	National Economic and Development Authority
NSCB	National Statistics Coordination Board
NCR	National Capital Region
PhP	Philippine Peso
UNICEF	United Nations Children's Fund
US$	US dollar
WB	World Bank
WHO	World Health Organization
WSP	Water and Sanitation Program