

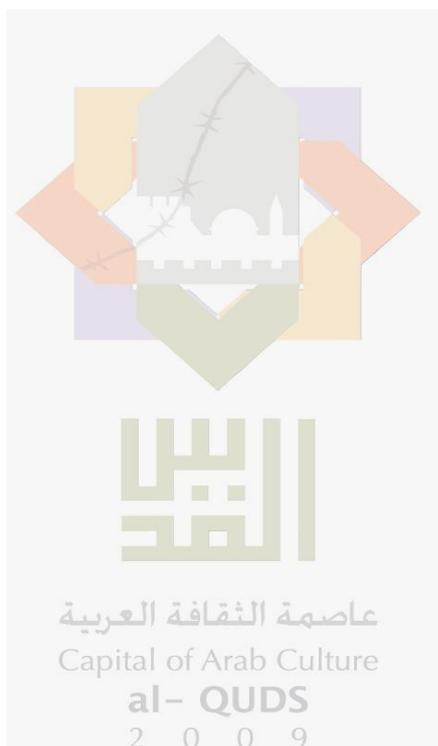


**Palestinian National Authority  
Palestinian Central Bureau of Statistics**

**Environmental Economic Survey, 2009  
Main Findings**

**September, 2009**

PAGE NUMBERS OF ENGLISH TEXT ARE PRINTED IN SQUARE BRACKETS.  
TABLES ARE PRINTED IN THE ARABIC ORDER (FROM RIGHT TO LEFT)



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## **Preface**

The world attention has increased to provide environmental statistics in the economic sector. Providing such data participates in policy making and legislation that reduces the pressure on the environment. As in the rest of the world, the attention has greatly been increased in the Palestinian Territory to provide such data after many years of environment negligence and the absence of standards and rules during the period of the Israeli occupation.

We are pleased to publish this specialized statistical report about environment situation in the economic establishments in the Palestinian Territory. This report presents the main findings of the Environmental Economic Survey 2009. This survey is part of our official effort for creating and establishing the National Statistical System, and providing the necessary statistics to Palestinian policy-planners and decision-makers in environment and natural resources sector.

PCBS conducted the Environmental Economic Survey during the period 22/03/2009 to 28/05/2009, the main objective of the survey is to provide reliable data of environmental reality in the economic establishments in the Palestinian Territory, including the methods used to handle the solid waste and wastewater. It includes also the role of the local authority in providing the suitable environment that will reduce the negative effect of the different types of pollution in the economic sector.

This report presents the main findings of the Environmental Economic Survey. It is one of a series of expected reports to be published by PCBS on the environment and natural resources in Palestine according to the plan for the Environment Statistical Department, as a tool for describing the status of environment in the Palestinian Territory.

This report presents statistical data of water consumption in the economic establishments by water source, the methods of solid waste disposal and their main components, and the disposal of wastewater.

PCBS hopes that the main findings of this survey will contribute in improving the environmental status and minimizing the random depletion of natural resources, in addition to providing reliable and useful statistics for Palestinian planners and decision-makers.

**September, 2009**

**Ola Awad  
Acting President**



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## **Executive Summary**

The Palestinian Central Bureau of Statistics implemented the Environmental Economic Survey during the period 22/03/2009 to 28/05/2009. The survey aimed at covering the whole economic sectors. It provides data on the main indicators of environment in the economic establishments, including water, management of solid waste and wastewater.

Survey results showed that the average quantity of water consumed by economic establishments in the Palestinian Territory in 2009 was 3,071 thousand cubic meters per month. Geographically, the average quantity of water consumed by the economic establishments in the West Bank was 1,664 thousand cubic meters per month, and 1,407 thousand cubic meters per month in Gaza Strip.

Results showed that the main source for obtaining water in the economic establishments in the Palestinian Territory in 2009 was the public water network; 92.0% used this source compared with 87.5% in 2008. Geographically, the percentage of economic establishments that obtain water from the public water network in the West Bank was 92.7% of economic establishments, compared with 90.6% in Gaza Strip.

Data indicated that the percentage of economic establishments in the Palestinian Territory in 2009 that used wastewater network to dispose wastewater was 59.9%, compared with 29.9% using porous cesspits.

The results indicated that the economic establishments in the Palestinian Territory produced 7,807 tons of solid waste per month, divided into 6,308 tons produced by the economic establishments in the West Bank and 1,499 tons produced by the economic establishments in Gaza Strip.

The results indicated that the percentage of economic establishments that treat solid waste in the Palestinian Territory in 2009 was 2.2%, 61.7% of these economic establishments in the Palestinian Territory in 2009 use the open burning method in treating the solid waste, and 16.2% of the economic establishments used chemical treatment.

Data revealed that the percentage of the economic establishments in the Palestinian Territory in 2009 that dispose of their solid waste themselves was 6.0%, whereas the percentage of the economic establishments served by local authority disposal services was 86.3%. Also, data showed that 7.6% of the total economic establishments in the West Bank dispose of their solid waste by themselves compared with 2.1% of the total economic establishments in Gaza Strip.

## Chapter One

### **Introduction**

#### **1.1 Introduction**

This report provides statistical data on the main environmental indicators for the economic establishments in the Palestinian Territory, based on the Environmental Economic survey which was implemented during the period 22/03/2009 to 28/05/2009.

#### **1.2 Survey Objectives**

The main objective of the survey is to provide reliable data of environmental reality on the economic establishments in the Palestinian Territory, including the methods used to handle water, solid waste and wastewater. It includes also the role of the local authority in providing the suitable environment that will reduce the negative effect of the different types of pollution on the economic sector.

#### **1.3 Report Structure**

This report is divided into five chapters; the first chapter contains the introduction, aims and report structure. The second chapter contains the concepts and definitions in this report. The third chapter defines the main findings of the report. The fourth chapter explains the methodology of collecting and tabulated. The fifth chapter handles data quality through pointing the main notes on the data and estimations of the data sources of this report.



## Chapter Two

### Concepts and Definitions

#### **Wastewater Network**

System of collectors, pipelines, conduits and pumps to evacuate wastewater (rainwater, domestic and other wastewater) from any of the location paces generation either to municipal sewage treatment plant or to a location place where wastewater is discharged.

#### **Solid Waste Disposal**

Ultimate deposition or placement of refuse that is not salvaged or recycled.

#### **Wastewater**

Used water, typically discharged into the sewage system. It contains matter and bacteria in solution or suspension.

#### **Dumping Site**

Site used to dispose of solid wastes without environmental control.

#### **Solid Waste**

Useless and sometimes hazardous material with low liquid content, solid wastes include municipal garbage, industrial and commercial waste, sewage sludge, wastes resulting from agricultural and animal husbandry operations and other connected activities, demolition wastes and mining residues.

#### **Pharmaceutical Waste**

This includes pharmaceutical products, drugs and chemicals, which have been returned from wards, have been spilled or soiled, are out of date or contaminated, or are to be discarded for any reason.

#### **Waste Collection**

Collection or transport of waste to the place of treatment or discharge by municipal services or similar institutions, or by public or governmental and non-governmental corporations, specialized enterprises or general government. Collection of municipal waste may be selective, that's to say carried out for a specific type of product, or undifferentiated, in other words, covering all kinds of waste at the same time.

#### **Open Burning**

Out door burning of wastes such as lumber, scrapped cars, textiles, sawdust and so forth.

#### **Cesspit**

A well or a pit in which night soil and other refuse is stored, constructed with either tight or porous walls.

#### **Establishment**

An enterprise or part of an enterprise in which one group of goods and services is produced (with the possibility of having secondary activities).

**Public Water Network**

Is a network of main sub-assembly pipes expanded in the locality for the purpose of population distribution and delivery of potable water.

**Wastewater Treatment**

Process to render wastewater fit to meet environmental standards or other quality norms. Three broad types of treatment may be distinguished: mechanical, biological, and advanced.

**A set of special symbols**

**was used in the tables of this report**

(-): Nil

(0): The value is less than (0.05)

## Main Findings

This chapter presents the main findings of the report, including the main environmental indicators for economic establishments in the Palestinian Territory in 2009.

### 3.1 Water

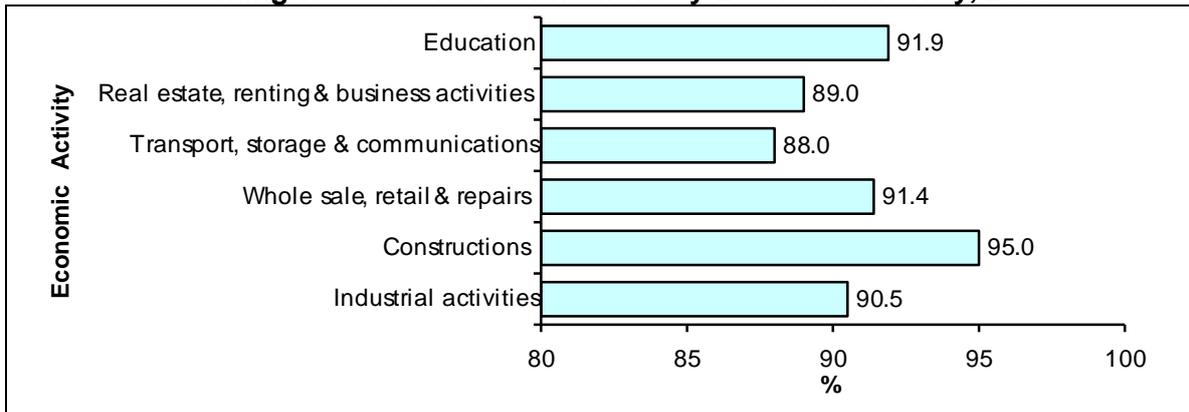
#### **Economic establishments consumed around 3,071 thousands m<sup>3</sup> of water/ month**

Survey results showed that the average quantity of water consumed by economic establishments in the Palestinian Territory in 2009 was 3,071 thousand cubic meters per month. The average quantity of water consumed by the wholesale, retail and repairs sector establishments was 900 thousand cubic meters per month compared with 22 thousand cubic meters per month for constructions sector establishments. Geographically, the average quantity of water consumed by the economic establishments in the West Bank was 1,664 thousand cubic meters per month, and 1,407 thousand cubic meters per month in Gaza Strip.

#### **Water network is the main source of water**

Results showed that the main source for obtaining water in the economic establishments in the Palestinian Territory in 2009 was the public water network; 92.0% used this source compared with 87.5% in 2008.

**Figure 1: Percentage of Economic Establishments in the Palestinian Territory which Obtaining Water from Water network by Economic Activity, 2009**



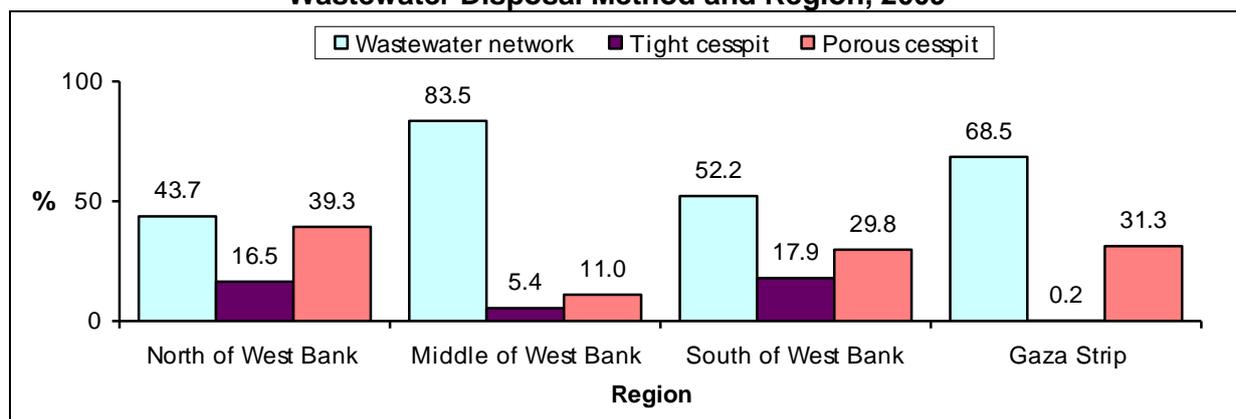
Geographically, the percentage of economic establishments that obtain water from the public water network in the West Bank was 92.7% of economic establishments, compared with 90.6% in Gaza Strip. The Middle of the West Bank ranked as the highest region that obtains water from the public water network, amounting to 98.9%, compared with 86.1% of the economic establishments in the South of the West Bank.

### 3.2 Wastewater

#### **Wastewater network is the main method of disposing of wastewater**

Data indicated that the percentage of economic establishments in the Palestinian Territory in 2009 that used the wastewater network to dispose of their wastewater was 59.9%, compared with 29.9% using porous cesspits.

**Figure 2: Percentage of Economic establishments in the Palestinian Territory by Their Wastewater Disposal Method and Region, 2009**



### 3.3 Solid Waste

#### Solid Waste Quantity

##### **7,807 tons of solid waste produced monthly by economic establishments**

The results indicated that the economic establishments in the Palestinian Territory produced 7,807 tons of solid waste per month, divided into 6,308 tons produced by the economic establishments in the West Bank and 1,499 tons produced by the economic establishments in Gaza Strip.

#### Solid Waste Components

##### **The solid waste produced by 82.7% of the economic establishments contained paper and cartoon**

82.7% of economic establishments in the Palestinian Territory produced waste that contained paper and cartoon, 67.7% of the economic establishments produced waste that contained food wastes, and 58.1% of economic establishments produced waste that contained plastic and rubber.

#### Solid Waste Separation

##### **71.4% of the economic establishments which produced chemical waste separate this type of waste**

The percentage of economic establishments that produced and separated chemical waste was 71.4%. The percentage of economic establishments in the Palestinian Territory in 2009 that used plastic bags to contain the collected separated solid waste was 75.0%, compared with 3.9% of the economic establishments that used metal boxes. Concerning the non-separated solid waste, the percentage of economic establishments that used plastic bags to contain these wastes was 74.3%, compared with 8.2% of the economic establishments that used plastic boxes.

#### Solid Waste Treatment

##### **Less than 3% of the economic establishments treated solid waste**

The results indicated that the percentage of economic establishments that treat solid waste in the Palestinian Territory in 2009 was 2.2%, 61.7% of these economic establishments in the

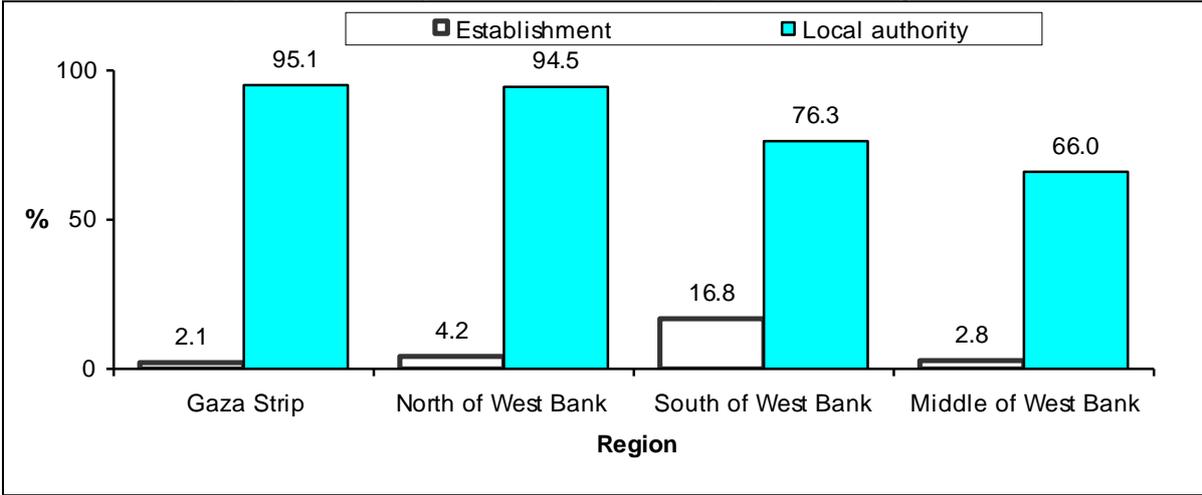
Palestinian Territory in 2009 use the open burning method in treating the solid waste, and 16.2% of the economic establishments used chemical treatment.

**Solid Waste Disposal**

**More than 80% of the economic establishments served by local authority solid waste disposal services**

Data revealed that the percentage of the economic establishments in the Palestinian Territory in 2009 that dispose of their solid waste themselves was 6.0%, whereas the percentage of the economic establishments served by local authority disposal services was 86.3%. Also, data showed that 7.6% of the total economic establishments in the West Bank dispose of their solid waste by themselves compared with 2.1% of the total economic establishments in Gaza Strip.

**Figure 3: Percentage of Economic Establishments in the Palestinian Territory by the Responsible Party for Solid Waste Disposal and Region, 2009**



**Common solid waste disposal places are the local authority dumping sites**

Data showed that 80.2% of economic establishments in the Palestinian Territory in 2009 disposed of their solid waste in local authority dumping sites. By region 74.4% of economic establishments in the West Bank in 2009 disposed of their solid waste in local authority dumping sites, compared with 94.7% in Gaza Strip.

**3.4 Environmental accounts in the economic establishments**

The total monthly payment by economic establishments for water consumed was NIS 10 million. NIS 1.8 million was the total monthly payment from economic establishments for wastewater disposal and the total monthly payment from economic establishments for waste disposal was NIS 3.8 million.

**3.5 Economic establishments' evaluation of their environmental status**

61.1% of economic establishments in the Palestinian Territory in 2009 evaluate the quality of the water they use as good quality, 56.6% of economic establishments evaluate the water supply service as good service, 46.2% of economic establishments evaluate the wastewater disposal service using a wastewater network as good service, 47.9% of economic establishments evaluate the quality of the container which used for solid waste collection as good quality, 62.9% of economic establishments evaluate the container size for the produced waste quantity as being a good size, and 71.3% of economic establishments evaluate the frequency of waste collection as good.



## Chapter Four

### **Methodology**

This chapter presents the scientific methodology used in the planning and implementation of the environmental economic survey, including the design of the survey tools and methods of collecting, processing and analyzing data.

#### **4.1 Questionnaire**

The environmental questionnaire was designed according to international standards and recommendations for the most important indicators, taking into account the special situation of Palestine. Many visits for economic establishments were made in order to improve the survey tools and to test the questionnaire before implementing the survey; consequently some modifications were made on the questionnaire and on the instructions following the visits.

#### **4.2 Sample Design**

The sample was a single-stage stratified cluster random sample using 3,922 Palestinian economic establishments distributed according to economic activities and governorates.

#### **Target Population**

All of the Palestinian economic establishments were included in the Economic Series Survey sample in the Palestinian Territory.

#### **Sample Frame**

The sampling frame was based on the Establishments' Census-2007 conducted by PCBS.

#### **Stratification**

Three levels of stratification were followed in designing the sample of the economic survey including:

1. Stratification by region: West Bank and Gaza Strip and classification according to governorates.
2. Stratification by economic activity according to ISIC3.
3. Stratification by employers group.

#### **4.3 Fieldwork**

##### **Training Fieldworkers**

The field workers were trained on the main skills before the start of data collection. The interviewers were trained on the environmental survey in training courses in three locations in the West Bank and one location in Gaza Strip. The trainers provided the participants with aims and definitions of the different indicators of the survey and how to fill in the questionnaire.

##### **Data Collection**

Field operations started on 22/03/2009 and lasted until 28/05/2009. The fieldwork team consisted of a coordinator and the directors of the fieldwork offices and field workers, and each team consisted of supervisors and five field workers.

During fieldwork 3,922 economic establishments were visited in the Palestinian Territory, the end results for the interview become as following:

<b>interview results</b>	<b>Frequency</b>	<b>Percentage</b>
Completed questionnaires	3,112	79.3
Completely closed	228	5.8
Temporarily closed	49	1.2
Not found unit	32	0.8
Did not practice any activity during the reference period	103	2.6
The economic activate are different	7	0.2
Refusal	247	6.3
Repeated	17	0.4
Israeli ownership	10	0.3
Others	117	3.1
<b>Total</b>	<b>3,922</b>	<b>100</b>

#### **4.4 Data Processing**

The data processing stage contained the following operations:

1. Editing before data entry: all questionnaires were edited again in the office using the same instructions adopted for editing in the fields.
2. Data entry: In this stage data were entered into the computer, using Access database.
3. The data entry program was prepared to satisfy a number of requirements such as:
  - Duplication of the questionnaire on the computer screen.
  - Check for logic and consistency of data entered.
  - Possibility for internal editing of questions answers.
  - Maintaining a minimum of digital data entry and fieldwork errors.
  - User-friendly handling.
  - Possibility of transferring data into another format to be used and analyzed using other statistical analytical systems such as SAS and SPSS.

## Data Quality

The concept of data quality consists of many aspects starting from the planning to the survey and on to the publishing method and data analysis. The main principles of statistical quality are accuracy, comparability, and data quality assurance procedures.

### 5.1 Accuracy

It includes many aspects of the survey, mainly statistical errors due to the sample, and also non statistical errors refers to the workers and survey tools, and includes also the response rates in this survey and their effect on the assumptions. This section includes:

#### Sampling Errors

These types of errors evolved as a result of studying a part of the society and not all of it, and because this survey is sample based, the data of this survey will be affected by sampling errors due to using a sample and not the whole frame of the society, and therefore differences appear compared with the actual values that could be obtained through a census. For this survey, variance calculations were made for amounts of water consumed in the economic establishments by region and activity, and the main source of obtaining water in the economic establishments by region and activity.

**Table of Variance for Environmental Economic Survey 2009**

Variable	Estimate		Standard Error	C.V %	%95Confidence Interval	
	Unit	Value				
Main source of water in the north of West Bank– Public Water Network	%	93.9	1.11	0.011	91.4	95.8
Consumed water - in the north of West Bank	M <sup>3</sup>	498,124	71,673	0.236	357,603	638,645
Main source of water in the Industrial activities – Public Water Network	%	90.6	1.02	0.026	88.4	92.4
Consumed water in the industrial activities	M <sup>3</sup>	830,260	77,067	0.092	679,164	981,355

#### Non Sampling Errors

Several measures were adopted to minimize the effects of these errors. The interviewers, editors and coders underwent intensive training and were provided with fieldwork manuals to consult when facing any problem.

The data entry program was designed in a way that allows error detection and correction. This applies particularly to logical errors that might not be discovered before data entry operations. A consistency check was also performed to assure accuracy after data entry.

These errors are due to non-response cases as well as the implementation of surveys. In this survey, these errors emerged because of (a) the special situation of the questionnaire itself which depends on type of estimation; (b) diversity of sources (e.g. the interviewers, respondent, editors, coders, data entry operator, etc).

It is important to mention that 5% from the sample of this survey was re-interviewed, and the results of this re-interview were reported by the supervisors. The re-interview shows the variance in estimation by interviewers for quantities of water consumed and solid waste

produced, when the interviewer who answers for the main survey questionnaire is different from the one who answers the re-interview questionnaire.

$$\begin{aligned} \text{None response rate} &= \frac{\text{Sum of none response cases}}{\text{Net sample}} \times 100\% \\ &= \frac{707}{3,922} \times 100\% = 18.1\% \end{aligned}$$

$$\begin{aligned} \text{Response rate} &= 100\% - \text{none response rate} \\ &= 100\% - 18.1\% = 81.9\% \end{aligned}$$

The none response cases were treated using adjustment groups (strata) and the following equation shows this

$$fg = \frac{\sum_{ng} wi - \sum_{o.c} wi}{\sum_{rg} wi}$$

Where

$\sum_{ng} wi$  Total weights in g group

$\sum_{o.c.g} wi$  Total weights over coverage

$\sum_{rg} wi$  Total weights responding in the survey

Each unit is given  $fg$  value for the interval lies in and finally we get  $w'i$  using the following equation

$$w'gi = wi * fgi$$

## 5.2 Comparability

The data of the environmental economic survey is comparable geographically and against time; the results when comparing the data between different geographical areas and when comparing the data of this survey with the data of previous rounds were typical and there were no significant differences.

## 5.3 Data Quality Assurance Procedures

Several measures were made to ensure quality control in the survey, such as the training of the fieldworkers on main skills before the start of data collection, and conducting field visits to field researchers to ensure the integrity of data collection, in addition to conducting a re-interview for 5% of the economic establishments. Audit of questionnaires was carried out before data entry, and then a program was used that does not allow any mistakes during the process of data entry. Data was examined to ensure that they were free from errors not previously discovered. After the receipt of the raw data file, cleaning and inspection of the anomalous values was made, and also inspection of the consistency between the different questions on the questionnaire.

#### **5.4 Special Technical Notes**

This part presents the important technical notes on the indicators presented in the results of the survey:

- Data from the Gaza Strip should be handled carefully because of the economic situation which was dominant there during the implementation of the survey.
- Tables of water quantities (tables 2 and 3), and tables of solid waste quantities (tables 8, 9) were based on the estimations by respondents.
- The table of solid waste treatment (table 26) was published on the level of the Palestinian Territory because the number of observations was not sufficient for publishing on a level less than the Palestinian Territory level.
- Tables of container volumes (tables 33, 34), and tables of distance between the establishment and solid waste disposal place (tables 37, 38) were also based on the respondent estimation.



## References

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