مركز الإحصاء
STATISTICS CENTRE

Methodology

Waste Statistics

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1. Overview

1.1. Introduction

Statistics Center - Abu Dhabi (SCAD) is the official authority responsible for calculating and issuing Waste statistics for Abu Dhabi. SCAD collects annual data on the waste produced in the Emirate of Abu Dhabi to compile its waste statistics.

Given the importance of Waste statistics, an integrated system has been put in place that covers waste according to its type and source. The data collection is carried out by SCAD where primary data is collected through the Environmental Survey and secondary data is derived from Administrative records.

Data is collected from a range of sectors across 3 sub-regions in the emirate. The data are classified using the Framework for the Development of Environmental Statistics 2013 (FDES) issued by the United Nations.

The methodology used to calculate the waste statistics are consistent with international best practices and recommendations in this field (see details below).

1.2. Concepts and definitions

SCAD defines waste as materials that are not of first quality (i.e. products for the market). Its entity of origin will not use it for any manufacturing, transformation, or consumption business, but will dispose of it, intends to dispose of it, or is required to dispose of it. This definition excludes waste materials that are directly recycled or reused at the point of generation (i.e. the establishment), as well as waste materials that are disposed of directly into water or the ambient air as wastewater or land waste.

Key environmental indicators in this environmental sector are:

- waste generation
- waste collected
- waste management facilities
- waste composition
- final waste disposal

Waste generation is the amount of waste generated in a country – in total, per unit of GDP, by sector (industrial and municipal solid waste) and by negative impact (hazardous waste). It is expressed in million metric tons per year. The total waste intensity should be presented in kilograms per unit of GDP at constant prices, and municipal waste intensity should be expressed in kg per capita or in m3 per capita. The waste intensity represents a driving force indicator and shows the response to anthropogenic activities.

The total amount of hazardous waste, expressed in metric tons per year, corresponds to exported and imported hazardous waste by a country. Waste reused or recycled as a share of the total waste in a country is an important component of the sustainable use of resources in general and sustainable solid waste management. Final waste disposal is the share of the total amount of waste generated – in total, broken down by sector and broken down by negative impact – that is, finally disposed of by incineration (without energy recovery or use as a fuel) or land filling on a controlled site. The indicator provides a measure of the pressure on the environment and the response to the efficiency of the waste management system.

In the EU, the Waste Framework Directive provides for increased efforts to prevent and reduce waste generation, recover waste and develop new techniques for the final disposal of waste. In order to guarantee international comparability, waste statistics should group waste according to the main economic activities (ISIC).

Assessing reused and recycled waste requires a precise assessment of the total waste and the specific category of waste (industrial, municipal, or hazardous). The indicator of waste reuse and recycling is obtained by dividing the quantity of waste reused and recycled by the total quantity of waste and specific-category waste generated.

1.3. Abu Dhabi special considerations

It should be noted that Abu Dhabi is an emirate and one of 7 emirates in UAE, therefore certain limitations apply in collecting and obtaining data. The waste statistics, however, are based on a survey tailored to the emirate of Abu Dhabi and administrative data are available specifically for the Abu Dhabi region. Therefore, the waste statistics compilation can be considered as accurate as otherwise for a national state and is not subject to any particular constraints.

1.4. Classifications and standards applied

SCAD aligns its data collection and processing, where possible, with European Commission's Eurostat Waste Statistics Guide. The waste statistics are classified according to the Framework for the Development of Environmental Statistics2. SCAD classifies waste into hazardous and non-hazardous and under these classifications publishes data on the following breakdowns:

Non-Hazardous Waste:

1. **Construction and demolition waste:** Construction waste consists of insulation materials, nails, electrical wires, reinforcing steel, etc. As for demolition waste, it is caused by the destruction of buildings, roads, bridges, or other structures including concrete, wood products, asphalt shingles, brick tiles, clay, steel, and dry walls. It may also contain hazardous materials
2. **Industrial and Commercial Waste:** It is solid waste resulting from warehouses, offices, restaurants, storage facilities and non-industrial activities in industrial establishments, whether hazardous or non-hazardous (determined based on the manufacturing process or laboratory tests)
3. **Agricultural Waste:** It is the waste generated from agricultural activities, including agricultural crops, gardens, plant waste and animal residues.
4. **Municipal Waste:** It consists of the waste of individuals that start from residential, commercial, professional, industrial and other places.
5. **Solid Waste**: It consists of all solid waste generated by different disposal methods including recycling, incineration, composting, landfill, in dumpsites and others.
6. **Municipal Solid Waste:** consists of all municipal waste generated by different disposal methods including recycling, composting, landfill, in dumpsites and other

[1] See http://ec.europa.eu/environment/waste/framework/index.htm

[2] See https://unstats.un.org/unsd/classifications/unsdclassifications/COICOP_2018_-_pre edited_white_cover_version_-_2018-12-26.pdf

Hazardous Waste

1. Hazardous Industrial Waste: It is waste which, due to its quantity or physical or chemical composition, constitutes a danger to human health or the environment when handled, stored, or disposed of inappropriately.
2. Hazardous Medical Waste: It is waste that contains infectious germs (bacteria - viruses - parasites - fungi) or pathological waste including residues of delivery rooms, human organs and tissues and excised tumors. This is in addition to the waste of contaminated sharp objects, which are mostly from hospitals and health clinics

1.5. Available breakdown

Waste data is not only classified into Hazardous and Non-Hazardous but is also classified by source (i.e. sector) and method of disposal. SCAD publishes the breakdown of waste statistics to all users on the annual Waste Statistics publication which contains:

- Total non-hazardous and hazardous solid waste in Abu Dhabi Emirate.
- Non-hazardous solid waste generation by source activity.
- Non-hazardous solid waste generation by region and source activity.
- Construction and demolition waste.
- Solid waste generation by the method of disposal.
- Municipal solid waste by the method of disposal.
- Hazardous solid waste generation by source activity.
- Waste management plants in the Emirate of Abu Dhabi.

Survey and administrative data are collected on a regional level at the detailed classification and is aggregated for the overall Abu Dhabi Waste Statistics. SCAD produces a regional Waste Statistics breakdown, split into the three main districts of the Emirate of Abu Dhabi:

- Abu Dhabi
- Al Ain
- Al Dhafra

1.6. Importance and objectives of the indicator

Waste management and treatment are given special attention in the Emirate of the Abu Dhabi, reflecting the government's desire to reduce the adverse impact of waste on heath and the Emirate's image. The key uses of Waste Statistics are outlined below:

- Policymakers, particularly local governments, require statistics on waste to assess how its generation changes over time. This in turn assists in planning for present and future waste management in terms of transportation and facilities required.
- Statistics on waste are also needed to develop strategies to encourage waste reduction, reuse and recycling and better encourage proper waste management.
- To reduce the amount of waste generated and increase the share of waste that is recycled and reused as material or energy source are central to sustainable consumption and production and natural resource management.

2. Indicator information

2.1. Geographical coverage

The current scope of the Waste management is to collect data from all sources and entities in the Emirate of Abu Dhabi. It includes the geographical divisions of the Abu Dhabi, Al Ain and Al Dhafra regions.

2.2. Statistical population

Abu Dhabi covers all three geographical divisions of Abu Dhabi.

2.3. Periodicity

The Waste statistics are updated every July on an annual basis.

2.4. Timeliness

SCAD publishes the Waste Statistics to two target audiences:

- Affiliated government users
- All users: Up to 7 months after the end of the reference year every July

In general, the timeliness is in line with the frequency of international benchmark countries and the international standards issued by the Eurostat[3].

2.5. Units

Following international standards, SCAD reports its waste metrics in tons per year or millions of tons per year. SCAD also tracks and reports on the number of waste management plants by type and by region.

2.6. Reference period

The reference period is the period between the release of data on the relevant indicators and the reference year. The reference year is the calendar year prior to release. The Waste Statistics release covers the period January - December and is published in July of the following year.

3. Methodology

3.1. Alignment to international standards

The compilation of the Waste Statistics broadly follows, where possible, the European Commission's Eurostat Waste Statistics Guide published by the European Commission. The waste statistics is classified according to the Framework for the Development of Environmental Statistics. This means that procedures for data collection and validation, and data imputation are consistent with the methodology outlined therein and is broadly consistent with other national statistical offices' best practices.

[3] See https://ec.europa.eu/eurostat/documents/3859598/5926045/KS-RA-13-015-EN.PDF.pdf/055ad62c-347b-4315-9faa-0a1ebcb1313e?t=1414782620000

3.2. Data sources

The main data sources of the statistics are the Centre of Waste Management – Abu Dhabi, and Abu Dhabi National Oil Company (ADNOC). Data is processed in the Statistics Centre – Abu Dhabi (SCAD) for more editing and research.

3.2.1 Survey data

The annual Environment Survey is a key data source for the Waste Statistics compilation. Documents of the survey include a questionnaire, training manual for field researchers and audit rules manual. The questionnaire was designed to collect all survey objectives.

The survey collects data regarding:

- Introductory and general data about the establishment.
- Value of environmental protection expenditure.
- Occupational health and safety information
- Water consumption statistics.
- Energy consumption statistics.
- Waste management statistics.

3.2.1.1 Collection method

Data is collected from 'Establishments' engaged in specified economic activities. Industry Classification was based on the "Two Digit Level" of the International Standard Industrial Classification of All Economic Activities (ISIC Rev.4). The sectors covered by the survey are:

- Industrial activity:
    - Mining and quarrying.
    - Manufacturing.
    - Electricity, gas, steam, and air conditioning supply.
    - Water supply; sewage, waste management and remediation activities.
- Construction activity.
- Trade activity:
    - Wholesale and retail trade; repair of motor vehicles and motorcycles.
- Transportation and storage activity.
- Services activity:
    - Accommodation and food services activities.
    - Real estate activities.
    - Professional, scientific and technical activities.
    - Public administrative and support services activities.
    - Education.
    - Human health and social work activities
    - Arts, entertainment and recreation.
    - Other service activities.

3.2.1.2 Sample design

The stratified sampling method is used to design the survey. Stratified sampling is a sampling method in which the total or target population is divided into smaller groups or strata to complete the sampling process. The strata is formed based on some mutual features in the population data. After dividing the population into strata, the sample is randomly selected proportionally.

The target population for SCAD's environment survey is all the operating economic establishments of Abu Dhabi Emirate for year of the survey. The types establishments not included are mentioned below:

- Agriculture, forestry, and fishing
- Public administration and defense; compulsory social security
- Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
- Activities of extraterritorial organizations and bodies
- Information and Communication
- Financial and insurance activities
- ADNOC's Companies and ADWEA

The Yearly Environmental Survey involves establishments across the three regions of the emirate: Abu Dhabi, Al Ain and Al Dhafra. These are establishments which carry out the below mentioned economic activities classified according to the International Standard Industrial Classification as:

- Industry – ISIC2
- Construction – ISIC1
- Services –ISIC1 (55&56 by ISIC2)
- Trade –ISIC1 (45 by ISIC2)
- Transportation –ISIC2

The frame for the survey is based on the 2011 "Frame Update Project" for the Emirate of Abu Dhabi. The frame is a database of all known establishments engaged in the production of goods and services in the Emirate of Abu Dhabi. The frame has been divided into four strata: large, medium, small, and infinitely small based on the number of employees. This classification differs between sectors:

Sector	Infinitely Small	Small	Medium	Large
Manufacturing	1-9 employees	10-100 employees	101-250 employees	250+ employees
Trade	1-5 employees	6-50 employees	51-200 employees	200+ employees
Services	1-5 employees	6-50 employees	51-200 employees	200+ employees
Construction and Transportation	1-4 employees	5-19 employees	-200 employees	200+ employees

3.2.2 Administrative data

The Environment Survey is accompanied by a number of secondary sources. Data is collected and calculated through administrative records from the Waste Management Center and the ADOC Environment survey. This type of administrative data helps to increase the amount of waste statistics observed substantially with minimal human and financial resource effort (e.g. field surveys). Moreover, the use of admin data reduces the response burden for sectors. Therefore, obtaining a large administrative dataset is a key element of achieving a high level of data accuracy at a low-cost burden. SCAD collects administrative data from the following sources for the purpose of calculating:

- Amount of municipal waste collected
- Amount of municipal waste by disposal method
- Amount of non-hazardous waste collected
- Amount of non-hazardous waste collected by source
- Amount of non-hazardous waste by disposal methods
- Amount of hazardous waste collected
- Amount of hazardous waste collected by source
- Amount of hazardous waste by disposal method

3.3. Data validation and editing

3.3.1 Data validation

The validation and editing process of raw data is important as it constitutes the basis for subsequent statistical analysis. When compiling the data all survey editing procedures are applied and desk editing is conducted, and all compliance rules are followed. In case the reports were not available, SCAD estimates calculations performed based on the information received from contractors of waste collection and landfills. SCAD also validates the data collected by analyzing historical trends and raise concerns to the establishment which provided the data when inconsistent data points are identified.

3.3.2 Missing data adjustments

Data editing allows for the identification of missing data. Missing data might be corrected by contacting the respondent or administrative data supplier once again, carrying forward the last observation in time-series studies, replacing the missing value with a set of plausible values or estimating the missing data based on parameters which have already been estimated. Any suggested amendments are checked after the data is entered and a list of data error indicators is produced to assess the level of accuracy of the data and to drive continued improvements in data accuracy.

The Statistical Data Quality Framework for Abu Dhabi outlines the quality standards which SCAD is committed to achieve, whether the source of such data is statistical surveys or administrative records. The framework seeks to create a unified understanding of statistical quality for all entities in the Statistical System in the Emirate of Abu Dhabi (SSAD), which will enable these entities to prepare consistent mechanisms and procedures in order to monitor, evaluate and develop the statistical quality of its administrative and survey data.

Furthermore, the Manual of Statistical Quality Standards and Procedures for Administrative Records presents key standards and procedures to ensure the statistical quality of administrative records data. The manual, which is consistent with adopted international and local standards, outlines and describes the following quality dimensions: 1) organizational structure; 2) relevance; 3) clarity of administrative records preparation methodology; 4) accuracy; 5) coherence and consistency; 6) accessibility; and 7) timeliness, periodicity and punctuality.

3.4. Data processing

Compiling the waste statistics data requires merging different datasets of primary and administrative data. SCAD carries out the following steps to calculate the waste statistics:

- SCAD calculates the absolute change (increase/decrease) in waste statistics in its annual Waste Statistics publication
- SCAD calculates the % share relative to the total value for several key waste statistics in its annual Waste Statistics publication. This includes:
    - Non-hazardous solid waste generation by region: share from each region.
    - Solid waste generation by method of disposal: share of each disposal method.
    - Municipal solid waste by method of disposal: share of each disposal method.
    - Hazardous solid waste generation by source activity: share from each source

3.4.1. Linking different datasets

Linking different datasets is not applicable to this publication.

3.4.2. Sample weighting

Weighting is not applicable to the production of the waste statistics.

3.4.3. Statistical calculation method

- The solid waste collected data in Abu Dhabi, Al Ain, and Al Dhafra are calculated using estimates of waste generation from the Environment Survey and administrative data from the Waste Management Center.
- Liquid waste collected is calculated according to the amount of waste received in treatment facilities.

3.4.4. Seasonal adjustment

Seasonally adjusted estimates are not produced for this publication.

3.4.5. Chain linking

Chain linking is not applied to this production.

4. Special cases

The waste statistics do not present special cases of indicators.

5. Outputs and quality

5.1 Dissemination and accessibility

Data are disseminated in SCAD official website and available in Excel and PDF on annual basis.

5.2. Length of available dataset

Waste data is available from 2009.

5.3. Methodology changes

SCAD's waste statistics methodology has not changed.

5.4. Data coherence and comparability

Waste statistics are measured in standard units (tons), and are therefore comparable with other polities, and over time.

5.5. Data accuracy and potential sources of errors

- The potential for error exists in any statistic that is calculated using survey data, as participants in the survey may make errors in reporting.
- Double-counting errors are also common in waste statistics, as data is taken from waste generation, collection, processing, and disposal sources.

It should be noted that waste composition is estimated from waste disposal and generation data. Errors in estimating waste composition may therefore occur if waste is disposed of incorrectly by waste management agents

5.6. Revision policy

Waste statistics are prepared on a monthly and annual basis, in the second quarter of the calendar year following the data reference period. The published waste statistics are final and are not subject to future reviews as a result of any new data that becomes available. If an error is discovered, there are procedures that were previously established with the Project Management Office to remove/amend the published error. These procedures are in line with the policy of the Statistics Centre - Abu Dhabi. Thus, the following year's report will contain amendments.

5.7. Limitations of dataset

It should be noted that waste statistics released by SCAD are not adjusted for a per-capita basis, which is advisable before making international comparisons.

6. Institutional environment

Statistics Centre – Abu Dhabi (SCAD), as the competent government entity in charge of organizing statistical activities in the emirate, plays a pivotal role in supporting decision-makers, and policymakers in Abu Dhabi. The statistical activities in the emirate are organized by SCAD, with its strategic partners in the Statistical System of Abu Dhabi. The Law entrusts SCAD with the task of developing and organizing statistical in Abu Dhabi Emirate.

7. Glossary

Municipal Solid Waste (MSW):

The waste that consists of organic materials and trash generated in the kitchen and other households uses. Households and buildings in the residential areas generate MSW.

Commercial and Industrial Waste:

It includes municipal waste generated by restaurants, hotels, shopping malls, labour camps and other public and private facilities.

Industrial Hazardous Waste:

The waste generated from industrial activities, laboratories, workshops and other public and private facilities that deal with hazardous materials.

Medical Hazardous Waste:

The waste generated from hospitals, clinics and medical laboratories. It consists of human parts, tissues, blood, and waste resulting from surgical operations.

Mixed Waste:

The waste composed of household trash mixed with building materials and sand in storage locations and / or during the collection.

Safe Waste Landfill:

The site where waste buried and processed in secure cells. Unlike medical waste landfill, safe waste landfill has no sewage system for contaminated water.

Waste Tires:

Waste tires collected from factories and repair workshops.

Construction and Demolition Waste:

The waste results from construction and demolition activities.

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