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Environmental Assessment of Hazardous Waste Management at Selected Sites in the Gaza Strip

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يقول الله تعالى في كتابه الكريم :

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿ ظهر الفساد في البر و البحر بما
كسبت أيدي الناس ليذيقهم بعض
الذي عملوا لعلهم يرجعون ﴾

صدق الله العظيم

سورة الروم - الآية 41

Dedication

I would like to dedicate this work to my family, the Mayor of Gaza City and my colleagues in Gaza Municipality for their ever-constant endless generous support.

Abdel Rahem Abul Kumboz

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Abstract

There are several environmental problems in the Gaza Strip such as air pollution, water and wastewater problems, marine pollution and solid waste either domestic or hazardous waste.

Globally, evaluation of hazardous waste management continues to be a very essential issue. Subsequently, the study aims to evaluate current mechanisms, standards and practices relevant to this issue.

Five hundred and thirty questionnaires were distributed among workers from the medical fields for instant, (workers in El Shifa hospital-El Sheikh Radwan and El Sorany clinics) as well as the industrial field such as ten factories which produce Hazardous Waste.

The results of the study reveal that knowledge deficit of the various kinds of industrial and medical hazardous waste and inadequacy of managerial related issues such as planning, presence of legislation, coordination and so on. The study indicates that management is the most single factor that could affect hazardous solid waste management. The study illustrates the importance of awareness programs and the provision of structures that are conducive to quality hazardous waste management, such as legislation and the provision of tools and equipment.

Furthermore, the study provided several tentative recommendations, such as developing legislations, coordinating among the various concerned bodies, organizing awareness campaigns and providing training for workers from the different categories. The study contributes towards establishing a baseline for hazardous wastes management and reflects the need for further research.

ملخص

التقييم البيئي لإدارة النفايات الخطرة بمواقع مختارة في قطاع غزة

موضوع الدراسة تم اختياره لما تشكله النفايات الخطرة من مخاطر على صحة الإنسان والبيئة، وقد سلط الضوء على قطاعي الصحة والصناعة حيث أن النفايات الخطرة المنتجة منهما تشكل ما يزيد عن 70% من مجموع النفايات الخطرة المنتجة يومياً.

هدف الدراسة:

- تحديد الأنواع المختلفة من النفايات الخطرة والتي تنتج من مواقع الدراسة وكذلك لتقييم وضع النفايات الخطرة بقطاع غزة.
- تقييم استراتيجيات إدارة النفايات الخطرة الجاري تطبيقها في المؤسسات التي تم اختيارها.
- تقييم مدى المعرفة لدى العاملين وتوجهاتهم وممارساتهم في مجال إدارة النفايات الخطرة.
- تحديد مواقع القوة والضعف بإدارة النفايات الخطرة.
- تزويد متخذي القرارات بالوزارات والمؤسسات المعنية باقتراحات وتوصيات من خلال نتائج بحث إدارة النفايات الخطرة.

الفئة المستهدفة:

كل المتعاملين مع النفايات الخطرة في كل من المجال الصحي مثل الأطباء والمرضى والصيادلة والعمال والمجال الصناعي مثل المهندسين والعمال الفنيين والعاديين.

جمع البيانات:

تم جمع البيانات من خلال استبيان يتضمن أسئلة تتعلق بالمعرفة والتوجه والممارسة بإدارة النفايات الخطرة ، وقد تم توزيع 530 استبيان حيث كانت نسبة الاستجابة 84.9%.

تحليل البيانات:

تم استخدام برنامج SPSS في التحليل و قد اختبرت النتائج باستخدام اختبار " chi-square, ANOVA and t-test " وقُبلت النتائج عندما كانت الفروقات الإحصائية بنسبة أقل من 5%.

نتائج البحث:

- ❖ دلت النتائج على نقص وجود قوانين وتشريعات تنظم إدارة النفايات الخطرة.
- ❖ التنسيق فيما بين المؤسسات ذات العلاقة بالموضوع بشكل متدني لا يحكمه أي نظام.
- ❖ فصل النفايات من المصدر شبه معدوم إلا في بعض المؤسسات الصحية وبمبادرات بسيطة لفصل بعض أنواع النفايات الطبية كالأبر والمشارط وما شابه مع العلم بأنه لا يتم الفصل في المجال الصناعي
- ❖ بالنسبة لجمع النفايات حيث أن الفصل من المصدر لا يتم بطريقة منظمة وُجد أنه يتم جمع ما يتم فصله في بعض المؤسسات ، إلا أن الجمع لا تتبعه العمليات الإدارية السليمة من نقل ومعالجة وتخلص بل يتم التخلص في حاويات البلدية خلافاً للتعليمات.
- ❖ معرفة العاملين بأنواع النفايات متفاوتة حيث أظهرت النتائج معرفة مرتفعة بين العاملين في المجال الصحي للنفايات الحادة مثل الإبر والمشارط أما الأنواع الأخرى مثل النفايات المشعة والعلب المضغوطة وخلافه فكانت المعرفة بها دون المتوسط.



- ❖ توجهات العاملين في المجال الصحي والصناعي مرتفعة من حيث طلبهم للتدريب واستعدادهم للتعاون بين المؤسسات المختلفة وطلبهم لوجود لوائح تنظم العمل.
- ❖ ممارسات العاملين بمجال النفايات الخطرة كالفصل والترحيل والمعالجة محدودة جداً وذلك بسبب قلة الوعي والنقص الشديد في الإمكانيات سواء التشريعات أو الأدوات وحتى التنسيق بين المؤسسات لاستكمال السلسلة ذات الحلقات المنبثقة من مؤسسات مختلفة كوزارة البيئة والصحة والصناعة والبلديات.

أهم التوصيات:

- ضرورة وجود قانون ينظم إدارة النفايات الخطرة مع عمل لوائح مكملة للقوانين في المؤسسات ذات العلاقة.
- إنشاء لجنة عليا من المؤسسات ذات العلاقة لتنسيق إدارة النفايات الخطرة.
- عمل نظام للمعلومات بكل مؤسسة لتسجيل الحالات المرضية والإصابات الناتجة عن النفايات الخطرة.
- برامج تدريب لجميع الفئات التي تتعامل مع النفايات في المؤسسات ذات العلاقة.
- الكشف الطبي الدوري للعاملين وذلك للكشف المبكر عن الإصابات.
- فصل وجمع النفايات الخطرة من المصدر لتوفير الجهد والمال.
- برامج توعية وإرشاد للعاملين في مجال النفايات الخطرة.

Table of Contents

Chapter (1) Introduction

Contextual Background "History and Demography"	1
Environmental Background	2
Value and Significance of the Study	5
Overall Aim of the Study	7
Specific Objectives	7
Research Questions	8
Industrial Wastes in the Gaza Strip	9
Medical Wastes in the Gaza Strip	9

Chapter (2) Literature Review

Conceptual Definition of HW	11
Characteristics of Hazardous Materials	13
Classification of Hazardous Health Care Waste	14
Categories of HW	16
Domestic Hazardous Waste	16
Industrial Hazardous Waste	17
Medical Hazardous Waste	19
Agricultural Hazardous Waste	22
Hazardous Waste Generation	23
Environmental Health Risks	26
Health and Injuries: Occupational Health Risks	27
Hazardous waste management	32
Legislative aspects	32
Implementation Aspects	35

Chapter (3) Methodology

Study Design	38
Method of Study	38
Period of Study	39
Study Location	39
Study Population	39
Inclusion and Exclusion Criteria	39
Sample Size	40
Sample Method	40
Questionnaire Design	40
Ethical Matter	41
Instrument Validity	42
Pilot Study	43
Data Collection	43
Response Rate	44
Limitations of the Study	44
Data Coding and Data Entry	46
Statistical Analysis	46

Chapter (4) Results

Knowledge, Attitude and Practices of Study Population towards HWM.	47
Characteristics of the Study Population	47
Distribution of the Study Population by their Awareness and Relation to HWM	50
Practice of Managerial Issues Related to HWM	54
Distribution of the Study Population by their Perception of Risks, Training and Attitudes towards HW	55
Categories of Hazardous Medical Waste	57
Distribution of the Study Population by Category of the Organization and the Presence of HW Tools, Regular Medical Examination, Separation and Collection of HW and Development of Service	58
Knowledge of the study population of HW	62
Relationship between participant's knowledge about HW and presence of special tools and health education visits	65
Relationship between development of HW services and health education visits and environmental advantages	67
Comparison between HW managerial related issues for organizational variables, processes variables and HW impact	69
Comparison between participants knowledge of HW and selected variables	73
Independent t-test comparing managerial concern and knowledge about HW and selected variables	76

Chapter (5) Discussion

HWM in Different Localities	78
The Study Population's Characteristics and HW	79
Presence of HWM	80
Planning of HW	81
Presence of legislation	82
Team Dealing with HW	83
Coordination with the Others	83
Knowledge about Medical Hazardous Waste	84
Processes of HWM	90
Recent Improvements of HWM	93
Hazards of Mismanagement of HW	95
Awareness and Training Related to HW	96

Chapter (6) Conclusion and Recommendations

Conclusion	99
Recommendations	101

References	104
List of Annexes	112

List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
GCSWDP	Gaza City Solid Waste Disposal Project
GDP	Gross Domestic Product
HCW	Health Care Waste
HMW	Hazardous Medical Waste
HW	Hazardous Wastes
HWS	Hazardous Waste Section
IHE	International Institute for Infrastructure, Hydraulic and Environment.
MEnA	Ministry of Environmental Affaires
MOPIC	Ministry of Planning and International Co-operation
MOG	Municipality of Gaza
MOH	Ministry of Health
OECD	Organization for Economic Co-operation and Development
PCBS	Palestinian Central Bureau of Statistic
PEPA	Palestinian Environmental Protection Authority
PHC	Primary Health Care
RCRA	Resource Conservation and Recovery Act
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
UNEP	United Nations Environmental Program
UNRWA	United Nations Relief and Works Agency
USEPA	United States Environmental Protection Agency

Operational Definition

Al-Mazraa: Municipality of Gaza Landfill which all solid waste are disposed of.

Landfill: Large pits where waste is dumped and buried, the bottom is lined with clay and/or heavy plastic to reduce the chance of contaminated groundwater.

Leachate: Liquid that has percolated through solid waste and has extracted, dissolved or suspended materials in it, this liquid may contaminate ground or surface water.

Medical Waste: Is generated by medical establishments as hospital, clinics, pharmacies, blood banks and so on.

Industrial Hazardous Waste: A chemical that has the potential of being toxic, ignitable, corrosive and reactive if improperly stored, used, or disposed

Domestic Waste: Waste generated by household, commercial activities, street sweeping and collected by municipalities

Agricultural Waste: Which generated by agricultural activities such as empty pesticide containers, excess product, rinse waste from containers, material from clean up of spills and contaminated greenhouse plastics.

Incineration: process of burning waste at very high temperature to produce gases and residues ashes.

Mutagen: A chemical, which causes changes in genetic material (DNA)

Pesticide: An agent that kills pests (insects, fungi, rodents, etc.)

Treatment: Any method, technique or process for altering the biological, chemical, or physical characteristics of waste to reduce the hazards it presents and facilitate, or reduce the costs of disposal.

Managerial Issues: the questionnaire included six questions related to the management of HW, the answers of these questions were re-coded to numbers in order to facilitate the analyses by using either t-test or ANOVA test.

List of Tables

Table	Topic	Page No.
Table (1)	Summary of the main characteristics of the study population	47
Table (2)	Distribution of the study population by their awareness about HWM	50
Table (3)	Distribution of subjects in relation to HWM and improvements	51
Table (4)	Distribution of subjects by their perception of risks linked to HW	55
Table (5)	Distribution of participants by their training and attitudes towards HW	56
Table (6)	Distribution of the study population by category of the organization and the presence of HW tools	58
Table (7)	Distribution of study population by category of the organization and availability of preventive equipment	58
Table (8)	Distribution of the study population by category of the organization and their evaluation of dealing with HW	59
Table (9)	Distribution of participants by regular medical examination	59
Table (10)	Distribution of the study population by category of the organization and separation of HW	60
Table (11)	Distribution of the study population by category of the organization and collection of HW	60
Table (12)	Distribution of the study population by category of the organization and their perception of HW improvements since the presence of PNA	61
Table (13)	Distribution of the study population by their knowledge of HW	62
Table (14)	Distribution of participants of the different organizations by their knowledge of HW	62
Table (15)	Distribution of the study population of the different organization by conducting regular medical exam	63
Table (16)	Distribution of participants by their educational level and knowledge about HW	63
Table (17)	Distribution of health sector subjects by knowledge of HW	64
Table (18)	Distribution of industry sector participants by their knowledge about HW	65
Table (19)	Relationships between participants' knowledge about HW and the presence of special tools for HW	65
Table (20)	Relationships between participants' knowledge about HW and health education visits	66
Table (21)	Relationships between development of HW services and health education visits	67
Table (22)	Relationships between development of HW services and environmental advantages	68
Table (23)	Comparing HW managerial related issues and organizational variables	69
Table (24)	Comparison between HW managerial related issues and its processes variables	70
Table (25)	Comparison between HW managerial related concern and HW impact	72
Table (26)	Comparing participants' knowledge of HW and selected variables	73
Table (27)	Independent t-test comparing managerial concern about HW and selected variables	76
Table (28)	Independent t-test comparing knowledge about HW and selected variables	76