

**An-Najah National University
Faculty of Graduate Studies**

**Investigation of Occupational Health and Safety
Hazards among Domestic Waste Collectors in
Bethlehem and Hebron Districts**

**By
Ahmad Khalil Monjed Milhem**

**Supervisor
Prof. Mohammed Al-Subu
Dr. Issam A. Al-Khatib**

Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Environmental Science, Faculty of Graduate Studies, at An-
Najah National University, Nablus, Palestine

2004



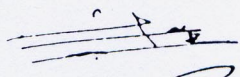
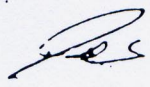
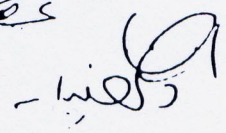
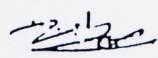
Investigation of Occupational Health and Safety Hazards among Domestic Waste Collectors in Bethlehem and Hebron Districts

By
Ahmad Khalil Monjed Milhem

This thesis was successfully defended on 10/10 /2004 and approved by:

Committee members

Signature

Prof. Mohammed Al-Subu	- Supervisor	
Dr. Issam A. Al-khatib	- Co-Supervisor	
Dr. Nahid Abu Omar	- External Examiner	
Prof. Radi Daoud	- Internal Examiner	

Dedication

**To My Parents, Wife, Children and Friends
To All Who Supported Me in This Study**

IV

Acknowledgments

After thanking Allah, who granted me the power to finish this work, I would like to express my gratitude and appreciation, to all who have contributed to the success of this study. My most profound gratitude goes to Prof. Mohammed Al-Subu and Dr. Essam Al-Khatib, for their encouragement, support and advice through out this work. My thanks go to all waste collectors and the waste collecting facilities in Bethlehem and Hebron districts for their participation.

I am also very grateful to the Environment and Health Departments in the cities, camps, and villages in Bethlehem and Hebron districts for their cooperation. Finally, my special gratitude is due to my parents, wife, children and friends for their constant support and encouragement.

I sincerely hope that this study will be beneficial to the policy makers, strategic planners, and health providers in the sanitary field in all municipalities, camps and villages in Palestine.

List of Contents

	Contents	Page No.
	Committee Decision	II
	Dedication	III
	Acknowledgments	IV
	List of Contents	V
	List of Tables	VIII
	List of Figures	X
	List of Abbreviations	XII
	Abstract	XIII
	Chapter One: Introduction	1
1.1	General introduction	2
1.2	Bethlehem district	4
1.2.1	Geographic location and topography	4
1.2.2	Climate	5
1.2.3	Demography and population	6
1.3	Hebron district	6
1.3.1	Geographic location and topography	6
1.3.2	Climate	7
1.3.3	Demography and population	8
1.4	Economy	8
1.5	Solid waste	9
1.5.1	Introduction	9
1.5.2	Solid waste generation	10
1.5.3	Solid waste management	10
1.5.4	Types of solid waste	11
1.5.4.1	Domestic waste in Hebron district	12
1.5.4.2	Domestic waste in Bethlehem district	12
1.5.5	Industrial waste	12
1.5.5.1	Industrial waste in Hebron district	13
1.5.5.2	Industrial waste in Bethlehem district	13
1.5.6	Biomedical waste	13
1.5.6.1	Medical waste in Hebron district	14
1.5.6.2	Medical waste in Bethlehem district	14
1.6	Occupational health and safety	15
1.6.1	Definitions	15
1.6.1.1	Occupational Injuries	15
1.6.1.2	Occupational Diseases	15
1.7	Literature Review	16

1.7.1	Introduction	16
1.7.2	Studies conducted in Denmark	18
1.7.3	A study conducted in USA	19
1.7.4	A study conducted in Ghana	20
1.7.5	Studies conducted in Italy	21
1.7.6	Studies conducted in India	21
1.7.7	Studies conducted in Netherlands	22
1.7.8	A study conducted in Norway	23
1.7.9	A study conducted in Taiwan	24
1.7.10	A study conducted in Sweden	24
1.8	Objectives of the study	24
	Chapter Two: Methodology	26
2.1	Research design	27
2.2	Population and sampling	27
2.3	Setting	27
2.4	Ethical consideration	27
2.5	Instrument	28
2.6	Data collection	29
2.7	Data analysis	30
	Chapter Three: Results	32
3.1	Results	33
3.2	Presentation of results	33
3.2.1	Subject characteristics	33
3.2.1.1	Demographic characteristics of respondents	33
3.2.1.2	Socio-economic status of respondents	35
3.2.1.3	Working conditions of respondents	36
3.2.1.4	Type of work of respondents	37
3.2.1.5	Type of waste and collection method	38
3.2.1.6	Use of protective measures	39
3.2.1.7	Personal hygiene	40
3.2.1.8	Work related diseases	41
3.2.1.9	Work related accidents	41
3.2.1.10	Cause of injury	42
3.2.1.11	Health care	43
3.2.1.12	Working conditions	44
3.2.1.13	Job satisfaction	44
3.2.1.14	Worker's needs to improve health	45
3.2.1.15	Worker's needs	46
	Chapter Four: Discussion	47
4.1	Discussion of Results	48
4.2	Age categories	49

VII

4.2.1	Age and work related diseases	49
4.2.2	Age and cause of injury	51
4.3	Monthly income	51
4.3.1	Monthly income and work related diseases	51
4.4	Education levels	53
4.4.1	Education levels and cause of injury	53
4.4.2	Education levels and work related diseases	54
4.4.3	Education levels and health care	55
4.5	Conclusion	56
4.6	Recommendations	57
4.6.1	Safety at work	57
4.6.2	Education and communications	58
4.6.3	Equipment maintenance	59
4.6.4	Recommendations to do a perfect job	59
	References	60
	Appendices	64
	Appendix A: A Permission letter from An-Najah National University	65
	Appendix B: A Consent form in Arabic	66
	Appendix C: A questionnaire	67
	Arabic Abstract	ب

VIII

List of Tables

Table No.		Page No.
Table 1	Distribution of the study sample.	33
Table 2	Sample distribution with respect to locality.	34
Table 3	Sample distribution of domestic waste collectors in relation to age categories.	35
Table 4	Sample distribution of domestic waste collectors in relation to place of permanent residence.	35
Table 5	Sample distribution of domestic waste collectors in relation to educational level.	35
Table 6	Sample distribution of domestic waste collectors in relation to monthly income.	36
Table 7	Sample distribution of domestic waste collection in relation to sources of water.	36
Table 8	Sample distribution of domestic waste collectors in relation to place of work.	36
Table 9	Sample distribution of domestic waste collection in relation to time of work.	37
Table 10	Sample distribution of domestic waste collectors in relation to type of contract.	37
Table 11	Sample distribution of domestic waste collectors in relation to type of work.	37
Table 12	Sample distribution of domestic waste collectors in relation to type of health insurance.	38
Table 13	Sample distribution of domestic waste collectors in relation to type of waste and collection method.	39
Table 14	Sample distribution of domestic waste collectors in relation to personal protective measures.	39
Table 15	Sample distribution of domestic waste collectors in relation to personal hygiene.	40
Table 16	Sample distribution of domestic waste collectors in relation to incident of diseases and injuries.	41
Table 17	Sample distribution of domestic waste collectors in relation to type of incident.	42
Table 18	Sample distribution of domestic waste collectors in relation to the cause of the injured part of the body.	42
Table 19	Sample distribution of domestic waste collectors in relation to professional and managerial response to professional and managerial response to incident.	43
Table 20	Sample distribution of domestic waste collectors in	44

IX

	relation to work structure.	
Table 21	Sample distribution of domestic waste collectors concerning the level of satisfaction during work.	45
Table 22	Sample distribution of domestic waste collectors regarding their requirement to improve their safety at work.	45
Table 23	Sample distribution of domestic waste collectors regarding their needs to do a perfect job.	46

List of Figures

Figure No.		Page No.
Figure 1	Distribution of age categories in relation to sore throat, cough and high temperature.	50
Figure 2	Distribution of age categories in relation to lifting over capacity.	51
Figure 3	Distribution of monthly income in relation to shortness of breath.	52
Figure 4	Distribution of education level in relation to hit by sharp object.	54
Figure 5	Distribution of education level in relation to twisted ankle.	55

List of Abbreviations

CO	Carbon Mono Oxide.
Dioxin	Polychlorinated Dibenzo-p-Dioxin.
Furan	Polychlorinated Dibenzo Furans.
GDP	Gross Domestic Product.
GNI	Gross National Income.
GNP	Gross National Product.
ILO	International Labor Organization.
ISWM	Integrated Solid Waste Management.
NAL	Nasal Lavage
NOx	Nitrogen Oxides.
OHS	Occupational Health and Safety.
PCB's	Poly Chlorinated Biphenyl's.
RC's	Refugee Camps.
SOx	Sulfur Oxides.
UFC/m³	Refers to the total number of airborne micro-organism counted in a cubic meter of air.
UFU/m³	Refers to the bio-aerosol count in one cubic meter of air.
UNRWA	United Nation Relief Work Agency.
USA	United States of America.
USEIA	United State of Environmental Impact Assessment.
USPHS	United States of Pubic Health Services.
US\$	United States Dollars.
VOC	Volatile Organic Compound.
WHO	World Health Organization.

**Investigation of Occupational Health and Safety
Hazards among Domestic Waste Collectors in
Bethlehem and Hebron Districts**

By

Ahmad Khalil Milhem

Supervisor

Prof. Mohammed Al-Subu

Dr. Issam A. Al-Khatib

Abstract

The present study aimed to investigate all types of wastes collected (households, commercial, industrial, and biomedical) and their potential health hazards at domestic waste collectors in Bethlehem and Hebron districts. It also aimed to investigate the ways used in collecting waste and the safety measures which was taken while collecting waste.

A self designed questionnaire was used to study, and investigate the occupational health and safety hazards. The target population was (370) of domestic waste collectors, waste drivers, and their direct supervisors. A convenience sample of 209 was taken (non probability sampling).

The study showed that household and commercial wastes are the most wastes collected at 98.1% and 97.1% respectively. It also showed that most waste collectors do not wear face mask (98.6%), overall (85.5%), rubber boot (78.9%), and protective gloves (45%). The study also showed that waste collectors suffered from different types of diseases and symptoms, such as sore throat, cough, and high temperature (55.3%), diarrhea or bloody stool (27.9%), shortness of breath (25%), and skin disease (20.2%). Waste collectors were prone to different injuries, such as hit by any hard or sharp objects (61.1%), lift more than their capacity (37.4%), and fall while pulling or pushing the waste trolley (35.6%). The study also showed that waste collectors whom were stuck with hard objects

XIII

(21.6%), pricked by hypodermic needles (20.2%), twisted ankle while on duty (34.1%), and suffered from a muscle tear (22.1%). It showed that (93.8%) of waste collectors were not vaccinated for tetanus and (85.6%) were not vaccinated for hepatitis.

In conclusion, waste collectors face a tremendous health challenges. Waste collectors with middle age and with low level of education were at higher risk. Waste collectors should be provided with the necessary protective measures (face mask, protective gloves, overall, and rubber boot). Education and training programs should be provided to all, and routine medical check up program should be implemented and maintained, to keep them safe and secure.

Chapter One

Introduction

1.1 General introduction

Municipal waste is produced as a result of economical productivity and consumption. It includes non hazardous wastes from households, commercial establishments, institutions, markets, and industries. Since 1970's, when it became apparent that even controlled landfills were causing significant water pollution, sanitary landfill technology was developed to provide barriers to pollutant migration, as well as to provide leachate and gas management system (Cointreau, 2004).

For the past two decades, occupational health and safety protection has become increasingly regulated to minimize work related risks and labor unions have also successfully changed working condition. In Palestine, the health-related understandings of solid waste management still need to be addressed; even the minimal regulatory framework, which exists for environmental protection and occupational health, and safety, is not enforced.

Waste collectors in Palestine use old equipment and virtually no dust control or worker protection. Collection workers in Palestine have direct contact with solid waste and thus are exposed to more potential particulates, toxic materials and infectious microorganisms. They are exposed to a wide variety of risks. Waste collectors have high occupational health risks, including risk from contact with human fecal matter, papers that may have become saturated with toxic materials, bottles with chemical residues, metal containers with residue pesticides and solvents, needles and bandages from hospitals, and batteries containing heavy metals, exhaust fumes of waste collection trucks traveling to and from disposal sites, dust

from disposal operations, and open burning of waste, all do contribute to occupational health problems.

With the existing management system of solid waste, Palestine faces an increasing solid waste management problem. Over the past 30 years, management of solid waste at all stages of collection, transportation, and disposal has faced a tremendous challenge due to the Israeli Occupation. The Israeli Authority has restricted the mobility of Palestinians within the Palestinian territories, by placing checkpoints or digging deep ditches at the entrance of each Palestinian city or town. This restricted mobility of Palestinians had disabled and prevented solid waste from being delivered to the disposal sites, thus, waste collectors are more potential to inhale the accumulated waste fumes, or developed infectious diseases due to direct contact with degraded wastes.

Palestinian Waste Collectors are also more potential to have vehicle accidents during transportation due to the long travel, which has been developed due to the Roadblocks that have been built by Israeli army.

The estimated increase in the amount of emissions uses the WHO standards amounts to 0.1573kg of Carbon Mono Oxide (CO), 0.0162kg of (Sulfur Oxide (SO_x), 0.0178kg of Nitrogen Oxide (NO_x), and 0.0223kg of Volatile Organic Carbon (VOC) per kilometer driven. Passing from Beit Jala to By-Pass road to Hebron normally is only around 400m short journey, but due to the Road Blocks, the route around the Hillside to By-Pass road is around 5.6km in length, this journey is extended by 5.6km, this extension adds to the emission from the journey by 0.88kg of CO, 0.09kg of SO_x, 0.10kg of NO_x and 0.12kg of VOC (Ghanayem et al, 2001). The quantities of solid waste generated in urban areas are higher than those

generated in rural areas. The per capita solid waste generation rates in the West Bank were estimated from several studies. These studies showed figures in a range of 0.5 to 1.0kg waste per capita per day. It is estimated that approximately 500 thousand tons of domestic waste is generated yearly in the West Bank, i.e. about 1,370 tons per day (Ghanayem, 2001).

These hard working people are working in a hard, dangerous, and poor working conditions, insecure and ignored, and lack of work protection gear. Studying these hard working people is of great value to all.

1.2 Bethlehem district

1.2.1 Geographic location and topography

Bethlehem District is located eight kilometers south of Jerusalem city, in the southern part of the West Bank. It is bounded by the Hebron District to the south and south west, the Dead Sea to the east and Israel to the west.

The Bethlehem District, with a total area of 575 km², includes within its boundaries the three major municipalities of Bethlehem, Beit Sahour, and Beit Jala. It also includes 7 smaller municipalities, 29 villages, and 3 refugee camps (Imseih, 2003). It also includes 20 Israeli settlements, Israeli designed closed military areas, military bases and nature reserves. Palestinian jurisdiction over land after the Oslo Agreement and until the final negotiations stage is confined to the populated areas of the district, hampering full scale planning. Besides being narrow and small in size, Bethlehem district is characterized by great variation in topography and altitude. The highest elevation of approximately 900 m above sea level is found in the Beit Jala area in the west. The eastern parts of the district are characterized by sharp slopes called the Eastern Slopes, where elevation

drops from 900m in Beit Jala and 650m in Beit Sahour to 400m below sea level in the Dead Sea area. The short horizontal distance between highest and lowest elevation is only 25 km.

1.2.2 Climate

Bethlehem District features a climate that ranges from arid to semi-arid, with an increase in aridity towards the southern and southeastern direction in across the Eastern Slopes in the Jerusalem Desert. This climate variation is primarily due to the drastic drop in the elevation from the western to the eastern part of the district. While the western parts receive an average of 700 mm of rainfall annually, the eastern proximity receives less than 100 mm (ARIJ, 1995).

The rainy season in Bethlehem District starts in the second half of autumn (mid October), and continues until the end of April. Heavy rain, however, is limited to a less than 50 days, where around 70% of the rainfalls during November to February (ARIJ, 1995).

The average annual temperature in Bethlehem District is 17-19°C with an upper limit of 22°C in summer, lower limit of 7°C in winter, and reaches the average temperature of 21-23°C in the lower elevations close to the Dead Sea. The district's highland is influenced by the Mediterranean Sea breeze around midday. Westerly humid winds blow on the area during autumn and spring, with the mean annual wind speed of 3 meters per second, according to ARIJ's weather station (ARIJ, 1995).

The average annual relative humidity in the district is 60% and reaches its highest rate during the months of January and February. In May,

humidity levels are at their lowest. Night dew may occur in up to 180 days per year (Benvenisti, 1986).

Bethlehem District receives an average of seven hours of sunshine a day during winter and thirteen hours during summer. The average solar radiation ranges from 188k/Calories/cm/year (Atlas of Israel, 1985).

1.2.3 Demography and population

The total population of the Bethlehem District is estimated at 132,090 (PCBS, 1999), and 137,286 at the end of 1997 representing 4.7% of the total population of the Occupied Palestinian Territories (Sbeih, 2002). The total population by type of locality is estimated at 45,471 people living in urban areas, 76,056 people living in rural areas, and at 10,563 people living in refugee camps. The projected Mid-Year Population for Bethlehem Governorate is estimated at 177,170 people in Mid-Year 2004, and at 226,321 people in Mid-Year 2010 (PCBS, 1999).

1.3 Hebron district

1.3.1 Geographical location and topography

Hebron District is located 36 km south of Jerusalem City, in the southern part of the West Bank. It is bounded by Bethlehem District from the north and by the 1984 ceasefire line from the other directions. Hebron District has a total area of 105,000 hectares with six major land use classes distinguished. These are; Palestinian built-up areas, Israeli settlements, military areas and bases, nature reserves, forests, and cultivated areas.

There are 94 Palestinian built-up areas in the district, 8 major municipalities, 9 smaller municipalities, 75 villages and 2 camps (Imseih,

et al, 2003). The Hebron District is characterized by great variation in topography and altitude. The highest elevation of approximately 1011m above sea level is found in Halhul area. The eastern part of the district is characterized by sharp slopes, called the Eastern Slopes, where elevation drops from 1011 to 100m above sea level. Most of the Palestinian built up areas in the district is located at elevations between 600m and 1000m above mean sea level (ARIJ, 1995).

1.3.2 Climate

The climate of the Hebron District ranges from arid to semi-arid with an increase in aridity towards the Negav desert in the south and Jordan valley in the east. Hebron District experiences western winds. During autumn and spring seasons, these western winds from the Mediterranean are humid. During the summer, the prevailing winds come from northwest, at an average speed of 10 km/hour during the day, decreasing to 5 km/hour during night and early morning hours. In winter, the winds are most frequently from the south-west, with a wind velocity reaching 35 km/hour. Storms have been observed in winter with wind speed up to 40 km/hour (Kessler, 1994). From late April to mid-June, the Hebron District is often hit by storms known as the Khamaseen, which originates from the Arabian Desert and brings very hot dry winds full of sand and dust to the District (ARIJ, 1995).

The Hebron District temperature ranges from 7.5-10°C in winter to 22°C in summer. The minimum temperature is -3°C in January and the maximum is 40°C in August. The ground temperature ranges from a minimum of -5°C in January, to a maximum of 40°C in the summer season (Kessler, 1994). The mean range of annual relative humidity is 60-75%.

The relative humidity reaches 40% in mid-day and increases gradually to reach 80-100% as an average at night (Kessler, 1994). The mean annual rainfall, for the period of 1970-1992 at the Hebron meteorological station was 588mm/year. The amount of rainfall decreases from 638.4mm at Al-Aroub in the north to reach 383 mm at Al-Dhahriya in the south of the district and 200 mm at the eastern boundaries. During the wet year 1979/80, rainfall reached up to 876 mm and in 1991/1992 reached 1027 mm (Kessler, 1994).

1.3.3 Demography and population

The total population of the Hebron District is estimated at 390,272 people (PCBS, 1999), and 405,664 people at the end of 1997 representing 14% of the total population of the Occupied Palestine Territories (Awad, 2002). The total population by type of locality is estimated at 261,665 people living in the urban areas, 117,748 people living in the rural areas, and 10,859 people living in the refugee camps. The projected Mid-Year Population for Hebron Governorate is estimated at 530,541 people in Mid-Year 2004 and at 691,426 in Mid- Year 2010(PCBS, 1999).

1.4 Economy

Unfortunately, there are no figures or studies concerning the per capita Gross National Product (GNP) or Gross Domestic Product (GDP) for Bethlehem and the Hebron Districts. Based on the World Bank official statistics, the overall economy in Palestine is characterized by a per capita GNP of US\$ 1,715 and a GDP of US\$ 1,275 for 1991 (World Bank, 1993). The findings of the National Accounts at constant prices of the Palestinian

Territory for the years 2001, shows Substantial decline in the performance of the economy for the years 2001.

The GDP and the GNI estimates have substantially decreased during those years, as well as their per capita indicators. The GDP per capita was 1,617.2 US\$ in 1999, which declines to 1,203.4 US\$ in 2002, and the GNI per capita was 1,934.9 US\$ in 1999, which was declined to 1,319.3 in 2002 on constant prices (1997 is the base year).

Different economic activities contribute to such decline, such as industrial, agricultural, financial, construction and transport (PCBS, 2004).

1.5 Solid waste

1.5.1 Introduction

All human activities, domestic, commercial, industrial, healthcare, and agriculture generate solid waste. The quantity and nature of waste vary with the level of technological development in a country (Garg, 2002). Solid Wastes are also defined as all wastes arising from human and animal activities that normally solid and are discarded as useless or unwanted (Tchobanoglous *et al*, 1993).

Technically, solid wastes also refer to liquids and gases in containers. If solid wastes are not managed properly, they can have an adverse impact on the environment, and public health arising from contamination of oil-water and pollution of air through spread of diseases via vectors living on waste (Garg, 2002). The relationship between public health and the improper storage, collection and disposal of solid wastes is quite clear. The US Public Health Services (USPHS) has published the results of a study

tracing the relationship of 22 human diseases to improper solid waste management (Hack, 1967).

Increasing public awareness and experience of hazard and unregulated disposal of waste have promoted the developed and developing countries to pay attention to the problem of waste and adopt strategies for integrated solid waste management (Hack, 1967).

1.5.2 Solid waste generations

Municipal solid waste is produced as a result of economic productivity and consumption. Countries with higher income produce more waste per capita and per employee, and their wastes have higher portion of packing materials and recycling wastes. In low-income countries, there is less commercial and industrial activity, as well as less institutional activity, thus resulting in lower generation rates.

1.5.3 Solid waste management

Integrated solid waste management (ISWM) is a term applied to all activities associated with the management of society's waste. The basic goal of ISWM is to manage society's waste in a manner that meets public health and environmental concerns and the public's desire to reuse and recycle waste materials (Palnitkar, 2000). An organized program for solid waste management in urban areas is essential and an institutional planning is the key to achieving an acceptable and affordable system. The responsibility for waste collection in the Bethlehem and Hebron districts is divided between the municipalities, towns or village councils and UNRWA in the refugee camps. There are common methods for waste disposal in the district. Municipal or village waste is disposed in waste dumps, or open

dump sites, and a large amount of individual waste is disposed randomly in nearby open spaces or road sides.

Over the past decades, the responsible parties have paid little attention to improve the financial and technical management of their solid waste operations and have made no attempt to encourage re-use and recycling of materials. Lack of public cooperation, siege and check points around the Palestinian cities, towns, villages and camps by the Israeli authorities for days, weeks, and months, and the inability of solid waste collectors to collect waste due to curfews made by Israeli authorities, and lack of public cooperation, are significant obstacles to effective solid waste management, and increased the potential to health hazards.

1.5.4 Types of solid waste

The "Municipal Solid Waste" includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes (Ministry of Environmental and Forests, India, 2000).

Domestic waste: It Consists of household waste, kitchen, house cleaning, old papers, packing bottles, crockery wares, furniture materials, and garden trimmings, etc. (Palnitkar, 2000).

Commercial waste: Waste generated at business premises, shops, offices, markets, departmental stores, organic, inorganic, and chemically reactive and hazardous waste (Palnitkar, 2000).

Institutional waste: Schools, colleges, large hotels, vegetable market, fruits, meat, etc. community halls, religious places, etc. (Palnitkar, 2000).

Street waste: It includes uncontrolled throwing, litter by pedestrian and vehicular traffic, stray animals, roadside tree leaves, rubbish from drain cleaning, debris, etc. (Palnitkar, 2000).

Industrial/Trade waste: Manufacturing and material processing trade generated waste (Palnitkar, 2000).

Debris or Construction Rejects: It consists of frequent digging of roads by various utilities comprising earth, brickbats, stones, wooden logs, etc. (Palnitkar, 2000).

Waste-offal, Dead animals, etc.: Offal waste generated from slaughterhouse, food packing institutions and cold storage premises, etc. (Palnitkar, 2000).

Biomedical waste: Waste generated at hospitals, clinics, medical labs, pharmacies, and medical institutions.

1.5.4.1 Domestic waste in Hebron district

Collection of domestic waste is either the responsibility of the municipality, town and village councils or UNRWA in the refugee camps. The quantity of the generated domestic solid waste in the district of Hebron is estimated to be 260 tons/day excluding the refugee camps. According to UNRWA officials, the two camps Aroub and Fawwar generate close to 10.3 tons/day of domestic waste (ARIJ, 1995).

1.5.4.2 Domestic wastes in Bethlehem district

The quantity of domestic solid waste generated in the Bethlehem district is estimated at 140 tons/day, excluding the three refugee camps, Deheisheh, Azzeh (Beit-Gibreen), and Aida camp (ARIJ, 1995). Collection of domestic solid waste in the district has been the responsibility

of the municipalities, town and village councils and UNRWA in the refugee camps. According to the UNRWA, the three RC's generate approximately 4,450 tons/year of domestic solid waste (ARIJ, 1995).

1.5.5 Industrial waste

Industrialization generates huge quantities of unwanted and undesirable toxic wastes with extremely long-term impacts. Such wastes are usually a by-product of industrial operations which involve heavy metals, products such as Poly Vinyl Chloride (PVC) and plastics, waste products from photocopies, chemicals such as Polychlorinated Biphenyls (PCB's), and by-products such as dioxin and furans which are now recognized as extremely toxic substance affecting all forms of life.

1.5.5.1 Industrial waste in Hebron district

The Hebron District is distinguished in its industrial activities. Quarrying, leather and metallic industries are the core of Hebron's Industrial Base. Leather industries including leather tanning, shoe factories constitute approximately 40% of stone cutting factories and quarries constitute approximately 15%, and the metallic industries form about 14% of the total industries in the district (ARIJ, 1995).

1.5.5.2 Industrial wastes in Bethlehem district

A survey conducted by ARIJ, in 1995, estimated that the food, beverage and cigarette industries contribute to approximately 70% of the total of these kinds of industrial wastes in the district, generating 3,200 tons of industrial waste/year. Construction industry generates 1,150 tons of industrial waste/year, while textile industry generates 200 tons of industrial

waste/year, and the metal industry generates around 60 tons industrial waste/year.

1.5.6 Biomedical waste

Biomedical waste means any waste, which is generated during the diagnosis, treatment or immunization of human being or animal or in research activities pertaining there to or in the production of testing of biological and including human anatomical waste, waste sharps, discarded medicines and cytotoxic drugs, solid wastes, liquid waste, incineration ash, chemical waste, etc. (Palnitkar, 2000). Medical wastes contain pathological waste, infectious waste, sharp objects, pharmaceutical waste, chemical waste, aerosols and pressurized containers.

1.5.6.1 Medical waste in Hebron district

The medical waste generated in the Hebron district, is a threat to the population of the area, as little of the generated medical waste is properly treated before disposal and most ends up with the municipal garbage, none of the medical centers have any special dumps or incinerators for the medical waste.

Most of the waste is disposed and mixed with municipal waste. More than 87% of all medical centers surveyed dump sharp objects without any special treatment (ARIJ, 1995). This increases the risk of infection, needles prick and injuries to people who are dealing with such objects during collection of the garbage.

1.5.6.2 Medical wastes in Bethlehem district

In the district, there are seven hospitals, one of which has been closed, and 32 community health centers and clinics (ARIJ, 1995). Medical institutions generated the following kinds of waste: syringes, needles, lancets, sticks, towels, tips, plates, tubes, media used for bacteria cultures urine and stool cups, swaps, curvets, slides and waste generated from medical operations. This medical waste is either disposed of in municipal waste collection containers, on-site burning facilities, or in the wastewater collection net works. Only two of the surveyed medical institutions use on-site burning facilities to dispose of their wastes (ARIJ, 1995).

1.6 Occupational health and safety

1.6.1 Definitions

1.6.1.1 Occupational injuries

It is defined as sudden, anticipated, and unwanted events during work, leading to harm or damage to at least one part of the body (Poulson, et al, 1995). Waste collectors collect wastes in all climate conditions; they use dangerous vehicles, contact with sharp objects, pull and push heavy containers, and lift heavier loads, often to higher loading locations. To ensure health and safety for such workers, different definitions and laws were implemented, and local and global strategies were put to decision makers for further investigations and suggestions. In Palestine, the Palestinian labor law, has defined the work injury in section one, chapter 1, article 1, as an accident that happens to worker during work, because of work or while going to or returning from work, it is considered as one of the vocation diseases specified by the system (Ministry of Labor, 2002; Palestinian labor law. No.7, 2000).

1.6.1.2 Occupational diseases

Despite the continued efforts in improving working conditions and the rapid development of safety and health technologies for the workplace, work-related hazards exist in almost all occupations. The International Labor organization (ILO), in paragraph 6(1) of the afore-mentioned recommendations N0.121 defines occupational diseases as follows; "Each Member should under prescribed conditions, related diseases known to arise out of the exposure to substances and dangerous condition in process, trades, or occupations as occupational diseases". The protocol of 2002 of the Occupational Safety and Health Convention in 1981, defines occupational disease as any disease contracted as a result of an exposure to risk factors arising from work activity (African Newsletter on Occupational Health and Safety, 2002). Based on Health Studies of waste pickers conducted in India, tuberculosis, bronchitis, asthma, pneumonia, dysentery, parasites, and malnutrition are the most commonly experienced diseases among waste pickers conducted in Bangalore, Manohar, and New Delhi (Huisman, 1994).

1.7 Literature review

1.7.1 Introduction

The standards and norms for handling solid wastes in industrialized countries have reduced occupational health and environmental impacts substantially. Most waste collection in these countries involves vehicles with low-loading heights and easy to lift plastic containers or bags (Cointreau, 2004).

All wastes are required to be fully contained, either in a covered metal or plastic bin, or within a plastic bag. Loading is commonly made as easy and mechanized as possible, thus minimizing occupational health and injury risk. From 1984 to 1992, the relative risk for musculoskeletal problems among Danish waste collectors was (1.9). Several studies on waste collection movements have demonstrated that mechanical loads on the skeleton frequently exceeded maximum acceptance limits recommended; throwing waste bags results in high shear forces on the spine, and carrying loads results in excessive torque to the shoulder (Poulsen, *et al*, 1995).

German studies found that the effect of vibration on drivers of landfill equipment is significant. Spinal injuries experienced by landfill equipment operators develop from higher than average degeneration of the vertebrae and intense vibration of hands and arms from operating the equipment levels (Wilhelm, 1989).

In developing countries, the waste sorting activities are typically conducted in micro and small-scale enterprises, with old equipment and virtually no dust control or worker protection. The waste collected is seldom stored in a plastic or metal container and covered with a lid. Sometimes, the waste is placed on the ground directly, thus requiring being shoveled by hand, or it is left in an open carton or basket to be picked by hand. In either case, the waste awaiting collection is readily available to insect and rodent vectors and scavenging animals. So, collection workers have significantly direct contact with solid waste, and are also exposed to more potential particulates, toxic materials, and gases and infectious microorganisms.

In El Bolson, an Argentine resort town, an outbreak of hanta virus, a disease spread by contact with rodent droppings or inhaling dust contaminated with rodent urine, killed 120 people in 1996 and devastated the economy for the town's population of 18,000 (Sims, 1996). Airborne contamination is also one of the greatest threats to solid waste workers and waste pickers. Air monitoring needs to be regularly conducted at all land disposal and solid waste handling facilities. Direct reading instruments which measures methane and oxygen deficiency are of primary importance, and include combustible gas indicators, flame ionization detectors, and oxygen meters (National Institute for Occupational Safety and Health, 1985).

Occupational accidents are very frequent among waste collectors. Based on current knowledge, it appears that risk factor should be considered as an integrated entity, i.e. technical factor (poor accessibility to waste, design of equipment), may act in concert with high working rate, and perhaps muscle fatigue due to high work load. Musculoskeletal problems are also common among waste collectors (Poulsen *et al*, 1995). In Bangalore, waste pickers complained of musculoskeletal pain if they were engaged in sorting wastes in a sitting position and of backaches if they were carrying heavy loads of waste (van Eerd, 1995). In developing countries, there have been very few data available concerning the health impacts of exposure to domestic wastes and occupational injuries among domestic waste collectors.

In Palestine, no studies concerning domestic waste collectors were carried out, hoping this study will be the first step toward the development of health promotions of domestic waste collection, and in assessing both

risk and effects of exposure, permitting better management of domestic waste, and in the planning of adequate protective measures.

Herein, some scientific studies, which was investigated and reported regarding occupational health and safety hazards:

1.7.2 Studies conducted in Denmark

Ivens, Lassen, Kaltoft and Skov conducted a study on 667 employees in the waste collection company that operates in Copenhagen, the capital of Denmark, in 1993, trying to find out the risk circumstances associated with injuries among waste collectors. Of the 667 employees at the company, 491 were waste collectors, 114(17%) experienced an injury in 1993. The study shows that the number of injuries was decreased with increasing seniority. This may be due to the more awareness of possible hazards in the working environment of more senior collectors. It also explains the reduction of risk experiencing an injury with age, as high age was usually associated with high seniority (Ivens, *et al*, 1997).

In a study conducted in 1995, the relative risk for occupational accidents among Denmark's waste collectors was about 5.6, compared to Denmark's total work force. From 1989 to 1992, the number of occupational accidents in the Danish waste collection activity was 95 per 1000 workers per year, compared to only 17 per 1000 nationally for all workers. The most commonly reported accidents for Danish waste collectors were fractures, sprains, wounds, soft tissue accidents, and chemical burns (Poulsen, *et al*, 1995).

In 1995, Poulsen and others conducted a study in Denmark, on waste collectors. Bio-aerosols were found as high as 10^6 and 10^7 cfu/m³ at the

loading hopper and that waste collector carrying containers to the curb were exposed to only 25% of the bio-aerosol count confronting collectors emptying containers into the truck. When the trucks were equipped with a cover over the loading hopper and an exhaust to pull air under the cover, exposure levels dropped substantially to less than 2×10^4 cfu/m³. The fraction of these bio-aerosols which were molds ranged from 77.5-98.5 (Poulsen, *et al*, 1995).

1.7.3 A study conducted in USA

Cimino J.A. conducted a study on waste workers in New York City in 1975. The study showed that solid waste workers experienced 20% times more than that of all U.S.A. workers (148 injuries per 1 million man-hours of solid waste work, compared to 7.35 for all U.S.A. industries in 1975 and 29.42 for U.S.A. underground mining). Most injuries among New York solid waste workers were experienced during waste loading (60%) and driving (30%), with over 60% of all injuries occurring during the later part of the work shift suggesting a fatigue factor. Injury reports indicated that nearly 50% of the New York collectors were either standing or bending when they were hurt. In a 20 year work period, the risk among New York collectors of suffering a fracture or dislocation was estimated to be about 7 in 10 (Cimino, 1975).

In 1996, the World Health Organization reported that, in USA, 31 health workers who were infected with HIV by contaminate puncture wounds, but none in housekeeping workers. The risk of HIV infection after puncture has been estimated to be about 0.3%. However, the risk of hepatitis B virus infection from a comparable injury was estimated to be at least 10 times higher or 3% or more. Solid waste workers in USA are

currently estimated to have a risk of contaminated puncture which is roughly 1/1,000th the risk level of hospital nurses (WHO, 1996).

In 1983, Gellin has conducted a clinical evaluation of the skin changes and injuries among refuse (waste) collectors in San Francisco. He found that almost 75% had palmary calluses, as a result of repeated pressure and friction compared to those workers who wear protected gloves (normal skin, with minor or absent calluses). The majority of collectors sustained work-related injuries each year. Those injuries consisted mainly of sprains, abrasions and lacerations, fractures, and eye injuries (Gellin, 1985).

1.7.4 A study conducted in Ghana

Meinel J. has conducted a study in Accra, Ghana, in 1994. He provided some indication of the differences in worker health and safety among solid waste collectors, versus a group of workers in construction. He found that the solid waste workers experienced a higher incidence of sick days, work-related accidents. The number of people reporting sick during the year was 47.6% of the total solid waste staff, versus only 33% of the total construction staff. Sick days consumed 0.7% of the total days among solid waste staff, but only 0.5% among the construction staff (Meinel, 1994).

1.7.5 Studies conducted in Italy

In 1990, Institute of Hygiene and Preventive Medicine at University of Genoa, studied infectious diseases of solid waste workers. Clinical examinations were conducted on 1396 solid waste employees of Genoa, Italy, for hepatitis B and D virus markers. Higher prevalence of hepatitis B surface antigen (HBsAG) carriers (2.9%) compared to general population

(2%) was reported. Higher prevalence of anti-HBs and anti-HBc positive subjects was 13.8% against general population (11.8%). Data indicated that probability of hepatitis B virus contact increases with working years (Kantiz *et al*, 1991).

1.7.6 Studies conducted in India

At Bombay's open dump sites, Konnoth N. has conducted a study on the working conditions and occupation hazards at the dumping sites of Bombay. He found that 25% of waste workers examined had coughs and 26% experienced dyspnea. The majority (73%) complained of aggravated symptoms of coughs and breathlessness during working hours. Abnormal pulmonary function tests were presented in 23% of the dumpsite workers, of which 26% had restrictive patterns. Chest x-rays showed 17.5% had non-specific Shadows like post tuberculosis fibrosis, and about 11% presented reticulondular shadows. 95 solid waste workers reported experiencing continuous backache, neck ache, and wrist/ knee/ ankle joint pain (Konnoth, 1991). At the Calcutta's open dumps, about 180 waste pickers were studied in 1995. During the course of one year, 40% had chronic cough, and 37% had jaundice. The average quarterly incidence of diarrhea was 85%, of fever was 72%, of cough and cold was 63%. Eye soreness or redness occurred quarterly in 15% and skin ulcers in 29%, with nearly all rates higher at the largest dumpsite than these averages (Direct Initiative for Social and Health Action, 1996).

In the early 1970s, about 1500 solid waste samples were analyzed from 33 Indian cities. *Trichuris trichiura* (human whipworm) and *Ascaris Lumbricoides* (human roundworm) were commonly present. More samples were found to contain these parasites during monsoon season, than during

summer or winter season. Stool samples collected from solid waste collectors and a control group of similar socio-economic background revealed 98% of solid waste collectors were positive for parasites, while only 33% of the control group were positive (Bhide *et al*, 1984).

1.7.7 Studies conducted in Netherlands

In Netherlands, Wouters and others conducted a study on 47 waste collectors and 15 controls, to compare respiratory symptoms and upper airway inflammation in domestic waste collectors and controls, and to find the association between measures of upper airway inflammation on the one hand and exposure concentrations of organic dust or respiratory symptoms on the other hand. Fieldwork was performed from June to September 1997. All subjects filled out a health questionnaire and underwent Nasal Lavage (NAL), before and after the work shift at the beginning and at the end of the week. Waste collectors show signs of increased upper airway inflammation and respiratory symptoms compared with control exposure to organic dust probably underlies the inflammation mediated by neutrophils that result in respiratory symptoms (Wouters, *et al.*, 2002).

Hildebrandt, Bongers, van Dijk, Kemper and Dul, conducted a study to explore the influence of climatic factors on non-specific back and neck-shoulder disease. Questionnaire data were collected on musculoskeletal symptom; workload and perceptions of climatic conditions of 2030 workers in 24 different occupations were analyzed multi-variately. About one-quarter of the workers related symptoms of the low back and neck-shoulders to climatic factors. No seasonal influence on prevalence rates was reported. An association between low-back and neck-shoulder

symptoms and for sick leave due to neck-shoulder symptoms with climatic factors was found (Hildebrandt *et al*, 2002).

1.7.8 A study conducted in Norway

Heldal, Halstensen, Thorn, Edward and Halstensen conducted a study on 25 organic waste collectors, to examine work-associated lower airway inflammation in waste collectors by induced sputum and correlated with the bioaerosol exposure. Waste collectors underwent induced sputum collection and spirometry before work on Monday and the following Thursday. Personal full shift exposure measurements were performed Monday. The inflammatory response was related to microbial components in the bio-aerosol and was more pronounced for endotoxin than beta (1-3)-glucan exposure, and no associations were found for mould spores or bacteria (Heldal, *et al*, 2003).

1.7.9 A study conducted in Taiwan

In 2001, a study was conducted in Taiwan. The study aimed to assess whether there is an excess of adverse health outcomes among Household Waste Collectors (HWCs) in Taiwan. The subjects were all current employees of the Household Waste Collection Department in the country of Kaohsiung, Taiwan. The questionnaire was completed by 533 HWCs and 320 office workers. The data indicated that household waste collection presents a risk for the development of chronic respiratory symptoms (cough, phlegm, wheezing, and chronic bronchitis), musculoskeletal symptoms (low back pain and elbow/wrist pain), and injuries caused by sharp objects (Yang, *et al*, 2001).

1.7.10 A study conducted in Sweden

Jorgen Thorn, was conducted a study in two household waste collectors handling composting waste. The study aimed to asses exposures to airborne (1→3)-B-D-glucan and endotoxin during different seasons among household waste collectors handling computable waste. The results show that the amounts of airborne endotoxin were low during the study period. The amount of airborne (1→3)-B-D-glucan was higher during the warm summer, and there was a relationship between exposure levels of (1→3)-B-D-glucan and outdoor temperature (Thorn, 2001).

1.8 Objectives of the study

The present study aims to investigate:

1. Types of occupational injuries associated with the process of waste collecting.
2. Types of occupational diseases and symptoms associated with the process of waste collecting.
3. Types of solid wastes collected and their potential hazard to domestic waste collectors (households, commercial, industrial, and biomedical).
4. Ways of collecting wastes.
5. Safety measures taken in collecting waste.
6. To propose solutions to prevent accidents and injuries.

Chapter Two

Methodology

2.1 Research design

A descriptive exploratory design has been used to study, assess and investigate the occupational health and safety hazards among domestic waste collectors in Bethlehem and Hebron districts. The investigation of health and safety has been studied by using a self developed questionnaire.

2.2 Population and sampling

The targeted population was 370 waste collectors, which includes all domestic waste collectors, waste drivers, and their direct supervisors in Bethlehem and Hebron districts. The study sample was 209. Non Probability Sampling Method (convenience sample) was used.

2.3 Setting

The settings used for this study were 3 major municipalities in Bethlehem district; (Bethlehem, Beit-Jala, and Beit-Sahour cities), 2 small municipalities (Al-Douha and Zaatara), 2 villages (Irtas and Husan), and 3 camps (Al-Dheisheh, Al-Azza and Beit Jibreen). In Hebron district, 4 major municipalities were studied; (Hebron, Halhul, Al-Dhahrieh and Ithna), 2 villages (Al-Rihiyeh and Beit-Kahel), and 2 camps (Al-Aroub and Al-Fawar).

2.4 Ethical consideration

A permission letter to conduct this study was sent from An-Najah National University, to municipalities, villages and camps councils and officials (see appendix A). On the other hand, consent of the subjects who were informed of the purposes of the study, and the time needed to complete the questionnaire has been taken (see appendix B). Subjects were

asked personally by the investigator and they were asked to participate voluntarily with a full right to withdraw from the study, and the information they gave was treated in confidentiality and anonymity. No Subject's names were required while filling up the questionnaire.

2.5 Instrument

A questionnaire (Appendix C) was used to collect data. The questionnaire includes the demographic characteristics and the personal information, such as the age of waste collector, marital status, and place of residence, level of education, monthly salary, position and type of work of waste collector. The questionnaire also consists of seven sub scales; the first scale consists of questions related to the type of wastes collected (ten items), such as household, commercial, industrial, and biomedical. Other questions related to the type of trash vehicle, such as tractor, trolley, truck or trash compacter vehicle.

The second scale consists of questions related to protective measures (thirteen items). It includes the use of gloves, rubber boot, overall, face mask, the use of accessories, hand washing and bathing after duty. The third scale related to diseases and injuries the waste collector had in the last twelve months (nine items). It includes questions whether the waste collector have suffered from skin disease, shortness of breath, sore throat, diarrhea, constipation or had suffered from bloody stool, followed by backache. The fourth scale consists of questions related to the cause of the injured part of the body (eight items). It includes whether the waste collector have been stuck with hard object or vehicle, fallen down while pulling or pushing the waste trolley, hit by any hard or sharp objects, lifted more than his capacity, pricked by hypodermic needles, or had been in

contact with harmful chemicals. The fifth scale identifies the types of the injured part of the body (eight items). It includes ankle twisting, joint pain, joint dislocation, lacerated head or arm, muscle tear, scratched, or if ever been fractured. The sixth scale related to technical and organizational (fifteen items). Questions were directed toward identifying whether the waste collector have been sent to hospital, medical center, private clinic, was he seen by specialist? Was he given the right treatment? Was he given sick leave when injured? Was he vaccinated? Does his employer provide him with routine medical check up? The seventh scale related to place of work (seven items). It includes the availability of staff rest room, drinking water, a place to eat, bathroom, shower, and a clothes changing room. A separate question was included to see if he is satisfied with his job. And at the end, two open questions related to waste collector requirements (needs) to be safe and satisfy in his job. The questionnaire has been formulated and distributed in Arabic language.

2.6 Data collection

The target group was interviewed personally. Most of the domestic waste collectors were interviewed while they were on duty in streets; some of them were interviewed in their homes, and others were interviewed in the municipalities after duty and after pre-arrangement with the municipal officials. All have been explained the purpose of the study, the consent form which was attached to the questionnaire was read to participants, each questionnaire was completed within the range of 15 to 20 minutes.

Data collection was started on 1/7/2004 and completed on 23/7/2004. It was done on daily basis, data was carried out in morning and evening for sometimes. The total population of domestic waste collectors in

Bethlehem and Hebron Districts were around 370. of which 209 were non randomly (accidentally) chosen, interviewed and participated in the study, and only 10 waste collectors refused to participate. Data collection was hard and stressful. Waste collectors start their duty at 5.30 a.m., and go back home as soon as they finished cleaning the assigned area. There is no suitable place for them to gather at the end of duty.

Interviewing domestic waste collectors in Bethlehem and Hebron districts means roaming around in the streets until you find your request. Pre arrangement was difficult except in Halhul municipality, where the investigator was able to interview waste collectors.

During data collection, there were difficulties in traveling from Bethlehem to Hebron, due to Israeli check points, siege, and curfew in some areas. Other difficulties were related to some waste collectors who were scared and frightened from their employers. Such collectors were afraid to be fired from job, others were very cooperative and only very few were ignorant and refused to participate. During data collection, waste collectors were on strike in areas like Bethlehem and Beit- Sahour cities. Waste collectors in these cities complained of not being paid for the last three months.

2.7 Data analysis

Descriptive statistical method has been used to describe the demographic characteristics of the sample. The findings were statistically interpreted by using the Statistical Package for Social Science (SPSS). Because most of our questions are at nominal or ordinal levels, we have used non parametric statistics like Chi-Square, to show the difference

between the groups (age, place of residence, place of work, educational level, monthly income and district), in relation to precaution measures, diseases and injuries, the cause of the injured part of the body, professional and managerial action, and work structure.

Chapter Three

Results

3.1 Results

The responsibility for waste collection in the Hebron and Bethlehem districts is divided between the municipalities, town or village councils and UNRWA in the refugee camps. Out of 217 questionnaires distributed, 95% (207 questionnaires) were answered, and only about 5% (10 questionnaires) were not answered. All items on the questionnaires were answered by participants through direct interviews, and suggestions of how to improve their safety at work, and their needs to do a perfect job at work as requested on the questions 111-112, were summarized, analyzed and presented in the recommendations.

3.2 Presentation of results

The findings of the study were presented and classified according to the following characteristics of respondents; demographic characteristics, socio-economic status, working conditions, type of work, type of waste and collection method, use of protective measures, personal hygiene, work related accidents, cause of injury, health care, working conditions, job satisfaction, workers needs to improve health and workers needs.

3.2.1 Subject characteristics

3.2.1.1 Demographic characteristics of respondents

Table 1. Distribution of the study sample

	Type	Frequency	Percent
Bethlehem district	City	78	73
	Village	5	5
	Camp	23	22
	Total	106	100
Hebron district	City	77	75
	Village	6	6
	Camp	20	19
	Total	103	100

Table (1) shows that 106 were selected from Bethlehem district and 103 from Hebron district.

Table 2. Sample distribution with respect to locality

	Frequency	Percent
City	155	74.2
Village	11	5.3
Camp	43	20.6
Total	209	100

Table (2) shows that 155 of waste collectors were chosen from the cities in Bethlehem and Hebron districts, 11 from villages and 43 from camps.

All surveyed domestic waste collectors in Bethlehem and Hebron districts were male. Age ranged between 20 and more than 51 years. Age group between 31 and 40 years represents 44% (n=92) of respondents, while waste collectors with age group 50 years old and above only represents 7.2% (n=15) (Table 3). The study shows that 47.1% (n=98) of respondents live in cities, 42.8% (n=89) live in camps and only 10.1% (n=21) of respondents live in villages, as shown in (Table 4).

Results also shows that 31.7% (n=66) of respondents had finished primary school, 30.8% (n=64) had finished preparatory school, and only 25 (n=52) of total respondents finished high school as shown in (Table 5).

Table 3. Sample distribution of domestic waste collectors in relation to age categories

Age	Frequency	Percent
20-30	58	27.9
31-40	92	44.2
41-50	43	20.7
51 and above	15	7.2
Total	208	100

Table 4. Sample distribution of domestic waste collectors in relation to place of permanent residence.

Place of permanent residence	Frequency	Percent
City	98	47.1
Camp	89	42.8
Village	21	10.1
Total	208	100

Table 5. Sample distribution of domestic waste in relation education level.

Years of education	Frequency	Percent
Illiterate	19	9.1
Primary	66	31.7
Preparatory	64	30.8
High school	52	25
University	7	3.4
Total	208	100

3.2.1.2 Socio-economic status of respondents

Salaries of domestic waste collectors were put in five categories, in a range of 500 and more than 2000 shekels per month. The result shows that 50% (n=104) of respondents had monthly income of 1301-2000 shekels, and 31.7% (n=66) of respondents had a monthly income of 1101-1300 shekels (table 6).

Table 6. Sample distribution of domestic waste collectors in relation to monthly income.

Monthly income in Shekels	Frequency	Percent
500-900	3	1.4
901-1100	13	6.3
1101-1300	66	31.7
1301-2000	104	50
More than 2000	22	10.6
Total	208	100

Three items were designed to assess sources of water used at home by domestic waste collectors in Bethlehem and Hebron districts. It shows that 85.4% (176) of respondents used piped water as shown in (table 7).

Table 7. Sample distribution of domestic waste collectors in relation to sources of water.

Source of water	Frequency	Percent
Water (piped)	176	85.4
Well	16	7.8
Spring	1	0.5
More than one resources	13	6.3
Total	206	100

3.2.1.3 Working conditions of respondents

The study shows that 78.5% (n=164) of respondents work in cities, and only 15.3% (n=32) of respondents work in camps (Table 8).

Table 8. Sample distribution of domestic waste collectors in relation to place of work.

Place of work	Frequency	Percent
City	164	78.5
Camp	32	15.3
Village	13	6.2
Total	209	100

The study shows that 97.1% (n=203) of domestic waste collectors in both districts were working on morning shift (Table 9), 51.4% (n=107) on daily wages contracts, and 37.5% (n=78) on fulltime contracts (Table 10).

Table 9. Sample distribution of domestic waste collectors in relation to work shift

Work shift	Frequency	Percent
Morning (6 a.m.-2 p.m.)	203	97.1
Evening (2 p.m.-10 p.m.)	4	1.9
At night (10 p.m.-6 a.m.)	1	0.5
Others	1	0.5
Total	209	100.0

Table 10. Sample distribution of domestic waste collectors according to type of contract

Type of contract	Frequency	Percent
Daily wages	107	51.4
Full time	78	37.5
Other	23	11.1
Total	208	100

3.2.1.4 Type of work of respondents

Four items were used to distinguish between types of work performed by domestic waste collectors in both districts. The study showed that 65.1% (n=136) were collecting domestic waste from the streets, and 20.1% (n=42) were caring and lifting waste (Table 11)

Table 11. Sample distribution of domestic waste collectors in relation to type of work.

Type of work	Frequency	Percent
Cleaning the street	136	65.1
Driver	17	8.1
Caring and lifting	42	20.1
Other (central market and bathrooms)	14	6.7
Total	209	100

Table (12) shows that 60.3% (n=126) of domestic waste collectors surveyed in both districts said that they have health insurance, and 39.7% (n=83) have said that they did not have health insurance.

The study also showed that 37.8% (n=79) of respondents have said that they have governmental medical health insurance and 15.8% (n=33) have said that they have been insured by the United Nation Relief Work Agency, while 39.7% (n=83) are not insured by any type of health insurance (Table 12).

Table 12. Sample distribution of domestic waste collectors in relation to type of health insurance.

Type of Health Insurance	Frequency	Percent
Government	79	37.8
U.N	33	15.8
Private	2	1
Other (Al-Aqsa and social services)	12	5.7
Not insured	83	39.7
Total	209	100

3.2.1.5 Type of Waste and collection method

Table (13) shows that 98.1% and 97.1% of respondents respectively said that household and commercial wastes were the most wastes collected in the communities surveyed in this study, followed by biomedical wastes and industrial wastes. It also shows that 73.4% of wastes were collected by trolley, and 26.1% were collected by trash compacter.

Table 13. Sample distribution of domestic waste collectors in relation to type of wastes and collection method

Question	Freq. Yes	Yes %	Freq. No	No %	Total No.	Total %
Household wastes?	203	98.1	4	1.9	207	100
Commercial wastes?	200	97.1	6	2.9	206	100
Industrial wastes?	66	31.9	141	68.1	207	100
Biomedical wastes?	99	47.8	108	52.2	207	100
Collecting waste by tractor?	4	1.9	202	98.1	206	100
Collecting waste by trolley?	152	73.4	55	26.6	207	100
Collecting waste by truck?	8	3.9	199	96.1	207	100
Collecting waste by trash compacter vehicle?	54	26.1	153	73.9	207	100
Collecting waste by vehicle from mobile bin?	27	13	180	87	207	100
Collecting waste by vehicle from immobile bin?	29	14	178	86	207	100

3.2.1.6 Use of protective measures

Table (14) shows that 98.6% of waste collectors don't wear face mask, 96.6% don't use shoe covers, 85.5% don't wear overall, 78.9% don't wear rubber boot, and 45% don't wear gloves.

Table 14. Sample distribution of domestic waste collectors in relation to personal protective measures.

Question	Always Freq.	Always %	Sometimes Freq.	Sometimes %	No. Freq.	No. %	Total No.
Do you wear gloves while on duty?	66	31.6	49	23.4	94	45	209
Do you wear shoe covers?	1	0.5	6	2.9	201	96.6	208
Do you wear rubber boot?	29	13.9	15	7.2	164	78.9	208
Do you wear facemask?	----	----	3	1.4	205	98.6	208
Do you wear overall?	12	5.8	18	8.7	178	85.5	208

3.2.1.7 Personal hygiene

Table (15) shows that 73.6% bathe after work, 36.1% always wash their hands thoroughly with antiseptic (soap) and 33.2% wash hands sometimes. It also shows that 97.6% of waste collectors wash clothes at home, and 93.8% use antiseptic (soap powder) in cloth wash, while 66.7% of waste collectors avoid using accessories (mobile phone, sun glass, wallet, etc..) while on duty.

Table 15. Sample distribution of domestic waste collectors in relation to personal hygiene

Question	Always Freq	Always %	Sometimes Freq	Sometimes %	No Freq	No %	Total No.
Do you wash hands frequently with antiseptics?	74	36.1	68	33.2	63	30.7	205
Do you wash work clothes at home?	203	97.6	2	1	3	1.4	208
Do you use antiseptic in cloth wash?	195	93.8	8	3.8	5	2.4	208
Do you eat at work place?	22	10.6	74	35.7	111	53.6	207
Do you shake hands with relatives while on duty?	72	34.6	92	44.2	44	21.2	208
Do you use accessories while on duty?	42	20.3	27	13	138	66.7	207
Do you bathe after work?	153	73.6	51	24.5	4	1.9	208
Do you share protective clothing with colleagues?	----	----	2	1	206	99	208

3.2.1.8 Work related diseases

Table (16) shows that in the last twelve months, 44.7% of surveyed waste collectors have suffered from sore throat, cough, high temperature and 45.7% of backache. It also shows that 27.9% have suffered from diarrhea or bloody stool, 25% have suffered from shortness of breath, and 20.2% have suffered from skin diseases.

Table 16. Sample distribution of domestic waste collectors in relation to incident of diseases and injuries in the last 12 month.

Question	Yes Freq.	Yes %	No Freq.	No %	Total No.	Total %
Have you suffered from skin disease?	42	20.2	166	79.8	208	100
Have you suffered from shortness of breath?	52	25	156	75	208	100
Have you suffered from sore throat, cough, and high temperature?	93	44.7	115	55.3	208	100
Have you suffered from diarrhea or bloody stool?	58	27.9	150	72.1	208	100
Have you exposed to a combusting waste?	19	9.1	189	90.9	208	100
Have you suffered from hearing difficulties?	10	4.8	197	95.2	207	100
Does the movement of trash vehicles bother you?	28	13.5	180	86.5	208	100
Have you fallen off trash vehicle while on duty?	12	5.8	195	94.2	207	100
Have you suffered from backache?	95	45.7	113	54.3	208	100

3.2.1.9 Work related accidents

Table (17) shows that 34.1% of waste collectors have suffered from twisted ankle, 22.1% have suffered from muscle tear, 8.7% have suffered of joint pain and 7.7% have lacerated head, arm, and etc.

Table 17. Sample distribution of domestic waste collectors in relation to type of incident.

Question	Yes Freq.	Yes %	No Freq.	No %	Total No.	Total %
Have you ever twisted your ankle?	71	34.1	137	65.9	208	100
Have you joint pain?	18	8.7	188	91.3	206	100
Have you joint dislocation?	8	3.8	200	96.2	208	100
Have you ever lacerated your head, arm, etc.?	16	7.7	192	92.3	208	100
Have you ever suffered of muscle tear?	46	22.1	162	77.9	208	100
Have you ever fractured your teeth?	3	1.4	204	98.6	207	100
Have you ever been scratched?	7	3.4	201	96.6	208	100
Have you ever been fractured?	5	2.4	203	97.6	208	100

3.2.1.10 Cause of injury

Table (18) shows that 61.1% of waste collectors have been hit by any hard or sharp objects, 37.4% have lifted more than their capacity, 35.6% have fallen down while pulling or pushing the waste trolley, 21.6% of waste collectors have been stuck with hard object and 20.2% have been pricked by hypodermic needles.

Table 18. Sample distribution of domestic waste collectors in relation to the cause of the injured part of the body in the last twelve months.

Question	Yes Freq	Yes %	No Freq	No %	Total No.	Total %
Have you been stuck with hard object, vehicle, etc?	45	21.6	163	78.4	208	100
Have you fallen down while pulling or pushing the waste trolley?	74	35.6	134	64.4	208	100
Have you suffered any falls from	3	1.4	205	98.6	208	100

up high?						
Have you been hit by any hard or sharp objects?	127	61.1	81	38.9	208	100
Have you lifted more than your capacity?	77	37.4	129	62.6	206	100
Have you been working in conditions with high\ low temperature?	32	15.4	176	84.6	208	100
Have you been pricked by hypodermic needles?	42	20.2	166	79.8	208	100
Have you been in contact with harmful chemicals?	5	2.4	203	97.6	208	100

3.2.1.11 Health care

Table (19) shows that the majority (94.2%) did not receive routine chest X-ray, 90.3% did not receive routine lab tests such as complete blood count CBC, serum electrolytes, stool, urine and sputum analysis, and, and 93.8% and 85.6% were not vaccinated for tetanus and hepatitis respectively. It also shows that 89.6% did not visit a specialist, 65.7% were not given sick leave when injured or diseased, and 62.2% said that the ministry of health was not informed.

Table 19. Sample distribution of domestic waste collectors in relation to professional and managerial response to accident, in case they are occupationally injured or diseased in the last twelve months.

Question	Yes Freq	Yes %	No Freq.	No %	Total No.	Total %
Was the ministry of health informed?	76	37.8	125	62.2	201	100
Were you sent to a private medical center?	122	60.7	79	39.3	201	100
Were you sent to a private clinic?	47	23.4	154	76.6	201	100
Did you visit a specialist?	21	10.4	180	89.6	201	100
Were you given the right treatment?	165	82.1	36	17.9	201	100
Were you given a sick leave?	69	34.3	132	65.7	201	100
Did you do a lab test (blood,	48	23.9	153	76.1	201	100

urine analysis, stool analysis, or sputum analysis)?						
Did you do a chest x-ray?	46	22.9	155	77.1	201	100
Did you do routine lab test (CBC, urine analysis, stool analysis, serum electrolytes)?	20	9.7	187	90.3	207	100
Did you do a routine chest x-ray?	12	5.8	196	94.2	208	100
Were you been vaccinated for hepatitis?	30	14.4	178	85.6	208	100
Were you been vaccinated for tetanus?	13	6.2	195	93.8	208	100

3.2.1.12 Working conditions

Domestic waste collectors have direct contact with dirty and contagious trash. Waste collectors need a special room to change their clothes before and after duty, a shower to bathe before going back home, a place to rest, eat, and suitable water to drink. Table (20) shows that 90.4% of waste collectors denied the presence of a shower, 87.6% said that there is no suitable place to eat and 86.6% said that there is no changing room.

Table 20. Sample distribution of domestic waste collectors in relation to work structure.

Question	Yes Freq	Yes %	No Freq	No %	Total no.	Total %
Was there a staff rest room?	48	23	160	76.6	209	100
If so, was there a suitable place to eat?	8	3.8	183	87.6	209	100
Was drinking water available?	33	15.8	158	75.6	209	100
Was there a bathroom?	39	18.7	152	72.7	209	100
Was there a shower?	2	1	189	90.4	209	100
Was there a changing room?	10	4.8	181	86.6	209	100

3.2.1.13 Job satisfaction

Work satisfaction is an important parameter to do a perfect job. Table (21) shows that nearly half of the waste collectors from all communities (municipalities, camps, and villages), in both districts (44%) were satisfied

with their job and 21.1% were very satisfied of their work, while 17.7% and 14.8% of domestic waste collectors surveyed were not satisfied to absolutely not satisfied, respectively.

3.2.1.14 Worker's needs to improve health

Table 21. Sample distribution of domestic waste collectors concerning the level of satisfaction during work.

Work Satisfaction	Frequency	Percent
Very satisfied	44	21.1
Satisfied	92	44.0
Not satisfied	37	17.7
Absolutely not satisfied	31	14.8
Total	204	97.6

Domestic waste collectors have expressed high desire and interest in wearing protective measures if available. Table (22) shows that 81.8% of domestic waste collectors ask for availability of overall, face mask, gloves, and rubber boot, 50.2% called for vaccination against hepatitis and tetanus, while 41.1% urged the responsible people for routine medical check up.

Table 22. Sample distribution of domestic waste collectors regarding their requirement to improve their safety at work.

Requirements of domestic waste collectors	Frequency	Percent
Protective measures (overall, mask, gloves..)	171	81.8
Vaccinated against infectious diseases	105	50.2
Routine medical check up every 6 months	86	41.1
Routine lab tests every 6 months	7	3.0
Washing machine in trash vehicle	11	5.3
Monthly vehicle maintenance	16	7.65
Replace collection trolley with small tractor	2	0.9
Worker respect from officials and media	18	8.6
Public awareness	10	4.78
Provide drivers with new collection vehicle	9	1.3
First aid set	4	1.9
Provide collectors with trash instruments whenever needed	5	2.4

3.2.1.15 Worker's needs

Table (23) shows that 81.4% of salaries of domestic waste collectors surveyed in both districts were ranged between 1101-2000 shekels. These salaries were considered below the monthly acceptable standard level. During collection of data, domestic waste collectors were on strike for four days in two cities (Bethlehem and Beit-Sahour) in Bethlehem District, asking for salary increase and to pay them their salaries for more than three months. 67.9% of respondents had urged responsible people to increase salaries, 38.8% had asked for job security, 31.6% had requested responsible to provide the domestic waste collectors and their families with medical insurance, and 27.3 had urged municipal, village and camp councils to pay them their monthly salary on time.

Table 23. Sample distribution of domestic waste collectors regarding their needs to do a perfect job.

Needs of domestic waste collectors	Frequency	Percent
Pay monthly salary on time	57	27.3
Increase salary according to the standard of living	142	67.9
Provide job security	81	38.8
Provide hazard pay	10	4.8
Provide Civil Service Law	21	10
Provide Medical Insurance to worker and his family	66	31.6
Provide Pension Fund	2	1

Chapter Four Discussion

4.1 Discussion of results

Waste collectors face tremendous challenges while they are on duty in Bethlehem and Hebron Districts. Lack of support and interest from their employers regarding health and protective measures, put more load on waste collectors in these districts. There are many factors that affect health and safety of waste collectors. Such factors related to the age of the waste collector, the educational level, and the monthly income. However, some factors proved to be more significant and more influential than others.

In this study, domestic waste collectors with middle age and low level of education, showed more self reported accidents than young, compared to a Danish study, which was carried out by I. Ivens in 1993. The Danish study showed that the number of injuries decreased with increasing age. This is explained by the fact that the majority of waste collectors who was surveyed in this study were in the middle age. This is due to the socio-economic and political condition in Palestine. Unemployment rate among Palestinians 15 years and over was 14% and 29.9% of employed and unemployed ever worked persons were in elementary occupations (Sbieh, 2002). Most of waste collectors have lost their jobs in Israel during the second Intifada. In addition, jobs are limited in Palestinian territories. Waste collectors with middle age (31-40) consist 44.2% of the population sample. In Denmark, waste collectors were on permanent contracts, supported by their employers, and insured medically. They were kept in their jobs for long periods of time. So, old age between Danish waste collectors was considered more senior, and more aware of the health hazards of wastes. The Danish study also suggested that better education of the waste collectors might lower the injury rate. This result is similar to

what this study has found out. This study also showed that waste collectors with higher monthly income have shown a decrease in the number of occupational injuries. This is explained by the fact that good monthly income means better chances of treatment for waste collectors, good nutrition which means better immunity against diseases, and better chances of buying protective measures which helps waste collectors to be less exposure to waste dust and less contact with waste material.

In this study, the most commonly reported accidents for Palestinian's domestic waste collectors in Bethlehem and Hebron districts were backache (45.7%), muscle tear (soft tissue trauma) (22.1%), and twisted ankle (34.1%). This result is close to the study which was conducted in Denmark and carried out by Poulsen in 1995. The Danish study reported that fractures, sprains and soft tissue accidents were the most commonly reported accidents for Danish waste collectors (poulsen *et al*, 1995).

Organic dust is another occupational health hazard which Palestinian domestic waste collectors in Bethlehem and Hebron districts suffer from. This study showed that 44.7% of respondents have experienced sore throat and cough, and 25% have suffered from shortness of breath. This result is higher than that reported in Bombay and carried out by Konnoth in 1991 at 25% regarding sore throat and a similar result regarding the shortness of breath (dyspnea) at 26% (Konnoth N, 1991).

4.2 Age categories

4.2.1 Age and work related diseases

Using cross tabulation showed that age is a significant parameter in relation to skin disease, sore throat, cough and high temperature. It also showed that age is not significant with the use of protective measures,

personal hygiene, and work related accident and health care. The study showed that waste collectors with middle age are statistically significant at a chi-square (9.789), with a degree of freedom (3), and a *P*-value (0.020), in relation to suffer from skin disease. It also showed that it is statistically significant at a chi-square (10.587), with a degree of freedom (3), and a *p*-value (0.014), that waste collectors suffer from sore throat, cough and high temperature (Figure 1). Middle age collectors are more susceptible to work related diseases, such as skin disease, sore throat, cough and high temperature. They have low level of education (the study showed that only 3.4% have finished university), ignorant and careless in collecting waste.

Practically, all waste collectors regardless their age, are prone to work related diseases. They have been seen collecting wastes with their hands, and no protective measures have been taken. Waste collectors are potential to upper airway inflammation due to exposure to concentration of organic dust as proven in a study conducted in Netherlands (Wouers, *et al*, 2002) and by Jorgen Thorn in a study conducted in Sweden (Thorn, 2001).

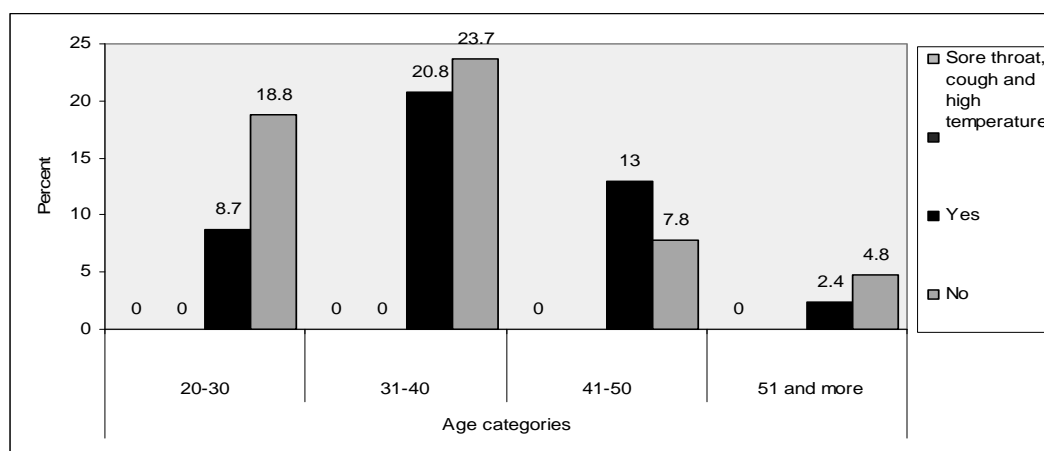


Figure 1. Distribution of age categories in relation to sore throat, cough and high temperature

4.2.2 Age and cause of injury

Statistically, there was only one cause of injury which was significant with age between other causes discussed in this study. Figure (2) showed that lifting overcapacity was the only significant factor found through cross tabulation at a chi-square (8.4333) with a degree of freedom (3) and at a *p*-value (0.038). Waste collectors with middle age; feel that they are strong, with good muscle power, stronger than older ones, and less patience (they want to finish collecting wastes as soon as possible without delay). The majority of waste collectors with middle age start their duty early, so they can finish early. For example, in stead of doing 10 rounds for in collecting waste, they do 3 to 4 rounds by putting more wastes in the trolley than their tolerance, and the incident of lifting over capacity increases.

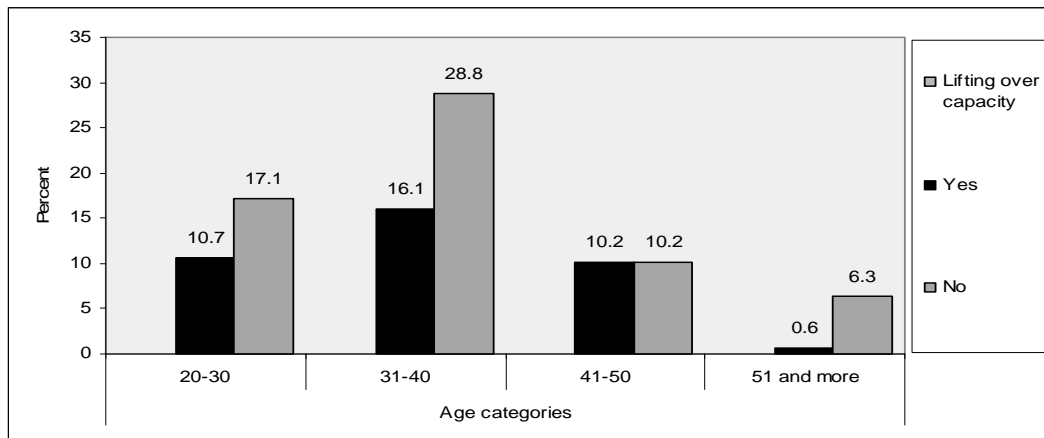


Figure 2. Distribution of age categories in relation to lifting overcapacity

4.3 Monthly income

4.3.1 Monthly income and work related diseases

Monthly income is another parameter which affects domestic waste collector's health and safety. Using cross tabulation with protective

measures, personal hygiene, work related diseases, work related accidents, cause of injury, health care and working conditions. The study showed that monthly income is statistically significant with shortness of breath and joint twisting.

Waste collectors with higher salaries have better chances of buying protective measures. Domestic waste collectors can buy face masks to protect themselves from waste dust, hand gloves, overalls and rubber boots to protect themselves from direct contact with waste material and contagious trash. It also allow them to do routine medical check up, including visiting a specialist and to do lab tests in case they suffer from work related diseases or accidents. They also can have better nutrition and so better immunity. In Palestine, salaries are ranged between 1000-2000 shekels per month. Better salaries mean better chances of treatment and better protection from work related accidents and diseases.

Figure (3) showed that 23.2% and 39.1% of waste collectors with monthly income (1101-1300) and (1301-2000) Israeli shekels respectively, have denied suffering from shortness of breath.

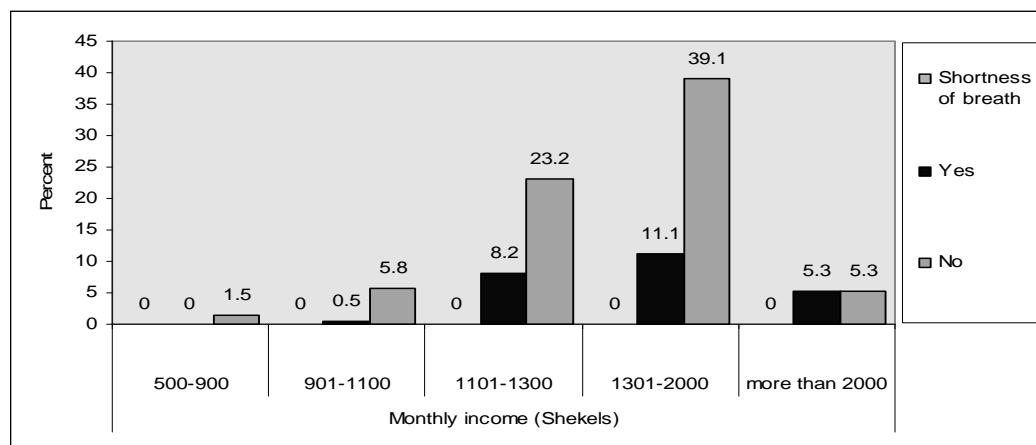


Figure 3. Distribution of monthly income in relation to shortness of breath

4.4 Education levels

Education level is another parameter which was cross tabulated with protective measures, personal hygiene, work related diseases and accidents, cause of injury, health care and working conditions. There was statistical significant relationship between education levels and hit by sharp object, lacerated head or arm, fractured teeth, foot twisting, bathe after work, wash hands with antiseptics, and the use of accessories.

The study showed that waste collectors with primary and preparatory levels of education, have shown more work related accidents than other levels of education.

4.4.1 Education levels and cause of injury

Waste collectors with higher education seem to be less incident sufferings. They are more aware of the potential hazards and the health impacts related to wastes collecting methods. Figure (4) showed that waste collectors with primary and preparatory levels of education; have more injuries relating to sharp objects, while waste collectors with higher education (high school) have shown less contact with sharp objects. Hit by sharp objects was the only significant factor which was found through cross tabulation between education levels and cause of injury (such as stuck with hard objects, fallen down while pulling or pushing the waste trolley, lifted overcapacity, pricked by hypodermic needles and contact with harmful chemicals).

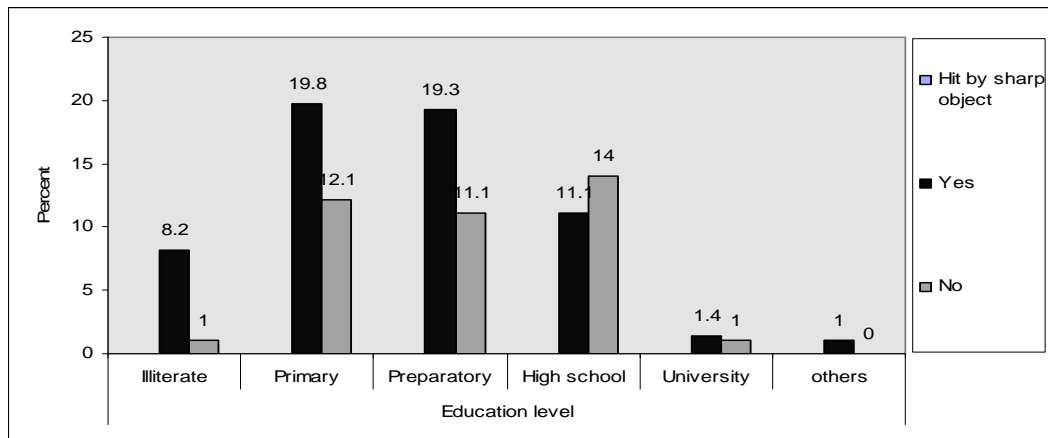


Figure 4. Distribution of education level in relation to hit by sharp objects.

4.4.2 Education levels and work related accidents

Education levels were cross tabulated with work related accidents. It showed that some factors are statistically significant, such as twisted ankle at a chi-square (13.587), with a degree of freedom (5), and at a *P*-value (0.018); lacerated head or arm at a chi-square (34.013), with a degree of freedom (5), and at a *P*-value (0.001) and a fractured teeth at a chi-square (15.665), with a degree of freedom (5) and at a *P*-value (0.008).

Waste collectors spent most of the working hours standing on their feet, walking around collecting wastes, and pulling or pushing the filled trash trolley. Such collectors are potential to slip down, lacerate their hands and hurt themselves.

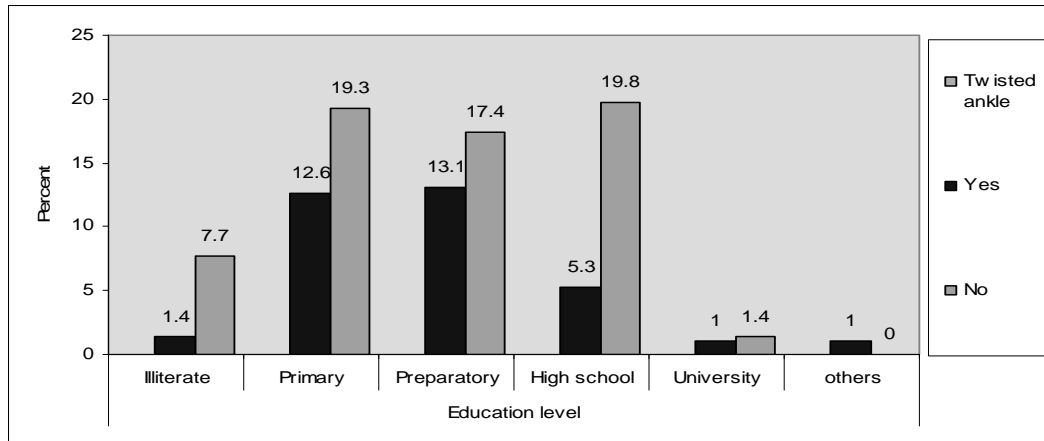


Figure 5. Distribution of education level in relation to twisted ankle

4.4.3 Education levels and health care

Domestic waste collectors with higher education are more aware of the health hazards if no personal hygiene is taken. They can bathe after work; wash their hands thoroughly with antiseptics whenever been in touch with waste material, and less uses of accessories while on duty. These significant factors allow waste collectors to be healthier, more care to their personal hygiene and less transmitting of pathogens and microorganisms to their parents and friends. It is statistically significant at a chi-square (19.553), with a degree of freedom (10), and at a *p*-value (0.034) that waste collectors with higher education showed more interests and more attentions to their hygiene. So, education factor in this regard plays a positive parameter in relation to hand wash with antiseptics. Bathing after work is another important factor in health and safety protocols. It is statistically significant at a chi-square (38.587), with a degree of freedom (10), and at a *p*-value (0.000). This factor decreases the possibilities of transmitting pathogens and microbes from waste collectors to their families, parents and friends.

4.5 Conclusion

Ways of solid waste disposal, isolation, separation, collection and disposal of the waste need to be re-addressed, evaluated, managed properly and further surveys and recommendations to be carried out. In conclusion, the majority of waste collectors in Bethlehem and Hebron districts were careless, ignorant in relation to personal protective measures (face mask, shoe covers, rubber boot or overall), and not adhered to health and safety protocols. The study findings showed that the majority of waste collectors have suffered from different types of injuries, diseases and diseases like symptoms. Work related diseases and accidents were analyzed. It showed that domestic waste collectors in Bethlehem and Hebron districts have more suffering of sore throat, cough, high temperature, backache, diarrhea and bloody stool, shortness of breath, skin diseases, twisted ankle and a muscle tear. It also showed that domestic waste collectors in both districts have higher incidence of falling down while pulling or pushing the waste trolley, stuck with hard objects and pricked by hypodermic needles.

In relation to personal hygiene, work satisfaction and working conditions, the study findings showed that waste collectors have shown interest in their hygiene. In addition, it showed that nearly half of collectors were satisfied in their jobs despite the stressful work conditions (unavailability of rest room, bathrooms, showers, and a place to eat).

Using cross tabulation in analyzing the results of the study, the study findings showed that middle age people are more potential to injuries and diseases. Moreover, the waste collectors with higher salaries and higher education were less suffering of injuries and diseases.

4.6 Recommendations

To ensure health and safety of waste collectors, this study recommends the following:

4.6.1 Safety at work

1. The employer should provide education about personal hygiene; explain to the waste collectors the importance of good hand washing technique, and the importance of showering as soon as possible.
2. Provide waste collectors with protective measures, such as gloves, face masks, overalls, and rubber boots. This was recommended by 81.8% of the surveyed waste collectors.
3. Provide waste collectors with rest area, provided with water for drink, toilets, bathrooms to shower before go back home at the end of duty, cloth changing room, and a suitable place to eat. This option was recommended by 35.9% of waste collectors, who were surveyed in this study.
4. Provide waste collectors with routine medical check up every 6 months. This option was requested by 50.2% of the surveyed waste collectors, and must be reinforced by their employers.
5. Provide waste collectors with routine laboratory investigations and Chest X-Ray exams every 6 months, to ensure collector health and safety.
6. Vaccinate waste collectors for hepatitis A and B and tetanus. This study showed that 60.8% of surveyed waste collectors have being hit by sharp objects and 20.1% by hypodermic needles.
7. Waste collectors should ensure that wastes collected to be lifted manually are as light as possible.
8. The employer should encourage team-lifting techniques to improve lifting of heavy items and decrease over-lifting of wastes by waste

collectors. This study showed that 37.4% of waste collectors have suffered of over- lifting.

9. Development and establishment of registration systems of occupational accidents, diseases and exposures if possible. This study showed that 62.2% of waste collectors have not informed the ministry of health of work related diseases or accidents.

4.6.2. Education and communications

1. The employer should adopt teaching programs among all levels of management, waste collectors, supervisors and trash vehicle drivers; to raise awareness about health and safety.

2. Provide training programs at the onset of hiring, and on an ongoing basis to educate all waste collectors, trash vehicle drivers, and managers about hazards, injuries, and their reduction and prevention.

3. Educate Health and Environmental Management Sector in the municipalities, villages and camps about their responsibilities to ensure worker health and safety.

4. Increase public awareness by using video films, health and safety programs, and public health advertisement in participation with private and governmental radios and televisions. This would ensure proper disposal technique, and encourage public commitment in securing wastes in suitable plastic bags.

5. Encourage participation between governmental health institutions, NGO's, and academic sectors, to do further researches focusing on health and safety among domestic waste collectors.

4.6.3. Equipment maintenance

1. The employer should maintain regular maintenance schedule to trash vehicles, e.g. on monthly basis.
2. Apply mechanical washing equipment at each trash vehicle. This allows washing the trash vehicle after each use, and prevents the necessity of direct contact with cleaning chemicals.
3. Provide the wheeled trolleys with regular maintenance. This would decrease the potential hazard of fallen down while pulling or pushing the waste trolley. This study showed that 35.4% of surveyed collectors have suffered from fallen down while pulling and pushing the waste trolley.

4.6.4. Recommendations to do a perfect job

Waste collectors should feel secure financially. The following recommendations were made by the surveyed waste collectors in their response to Q112 in the questionnaire

1. Pay monthly salary on time
2. Increase salary according to the standard of living
3. Provide job security
4. Provide hazard pay
5. Provide Civil Service Law
6. Provide Medical Insurance to worker and his family
7. Provide Pension Fund

References

- Lehtinen L. ed. (2002). Occupational Health and Safety. *African Newsletter on Occupational Health and Safety, Vol. 12*: 32-34.
- Applied Research Institute- Jerusalem (1995). **Environmental Profile for the West Bank**, Volume 1; Bethlehem District, June.
- Applied Research Institute- Jerusalem (1995). **Environmental Profile for the West Bank**, Volume 3; Hebron District, October.
- Atlas of Israel**. Cartas, Jerusalem, 1985.
- Awad, H. (2002). **Bethlehem Governorate, Dissemination and Analysis of Census Finding**. Palestinian Central Bureau of Statistics, Ramallah, Palestine, January.
- Benvenisit, M. (1986). **The West Bank Data Base Project- Report on demographic, economic, legal, social and political development in the West Bank**. Report, WBDBP, Jerusalem.
- Bhide A D, Sundaresan B B. (1984). **Street Cleansing and Waste Storage and Collection in India**, In: Holmes J R, editor, **Managing Solid Wastes in Developing Countries**, John Wiley and Sons, Ltd.
- Cimino J A. **Health and Safety in the Solid Waste Industry**, American Journal of Public Health, January, 1975.
- Cointreau-Levine S. (2004). **Occupational and Environmental Health Issues of Solid Waste Management**. Adopted from World Wide Web: <http://www.ilsr.org/recycling/other/dctransfer/ochealth>.
- Direct Initiative for Social and Health Action, Calcutta; Center for Occupational and Environmental Health Society for Participatory Research in Asia and Center for Study in Man and Environment, Calcutta (1996). **A Rapid Assessment Survey of the Health and Environmental Impacts of Solid Waste Recycling**.
- Garg R. K. (2002). Hazardous Waste Management Policy and implementation: The Indian Experience. *NSWAI Newsletter, Vol. 6*, pp. 1.

- Gellin GA. (1985), **Dermatoses acquired by solid- waste handlers.** *American Journal of Industrial Medicine* 13. 469-499.
- Ghanayem M., Qattosh N., Filkin B. (2001). **Israelis double standard towards environmental protection.** Applied Research Institute- Jerusalem.
- Hack T. G. (1967). **Solid waste/ disease relationships**, US department of health, Education and Welfare Solid Wastes Program, Publication SW- 1 c. Cincinnati, OH.
- Heldal KK, Halstensen AS, Thorn J, Eduard W, Halstensen TS. (2003). Airway inflammation in waste handlers exposed to bioaerosols assessed by induced sputum. *Eur. Respiratory J, April*, 3456-51.
- Hildebrandt VH, Bongers PM, van Dijk, Kemper HC, Dul J. (2002). The influence of climatic factors on non-specific back and neck- shoulder disease. *Ergonomics; January*, 456-75.
- Huisman M. (1994). **The position of Waste Pickers in Solid Waste Management.** In: Baud I, Schenk H. Solid Waste Management: Modes, Assessment, Appraisals, and Linkages in Bangalore, Manohar, New Delhi.
- Imseih H, K. (2003). **Local Authorities Related Data**, Ministry of Local Government, Ramallah, Palestine, July.
- Ivens U, Lassen J.H., Kaltoft B.S., and Skov T. (1998). **Injuries among Domestic Waste Collectors**, *American Journal of Industrial Medicine.*
- Kantiz S, Franco Y, Roveta M, Patroone V, Raffo E. (1991). **Sanitary Land filling:** Occupational and Health Hazards, Proceeding of Sardinia 91, Third International Landfill Symposium.
- Kessler, Y. (1994). **Climatic Characteristics of Judea and Samaria.** Report from Civil Administration of Judea and Samaria.
- Konnoth N. (1991). The Forum for Environmental Concern, **Your Clean City at Whose Cost:** A Study on the Working Conditions and Occupation Hazards at the Dumping Sites of Bombay. Pluses annexes.

- Meinel J. (1994). **A comparison Review of Solid Waste Workers and Construction Workers**. Unpublished information of the accra, Ghana Waste Management Department, Health Statistics.
- Ministry of Environment and Forests. **Notification on "Municipal Solid Wastes (Management and Handling) Rules"**. India, 2000.
- Ministry of Labor, 2002, **Palestinian Labor Law, No.7**, Official handout, Year 2000.
- National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, US Coast Guard and US Environmental Protection Agency (1985). **Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities**. October, 1985.
- Palestinian Central Bureau of Statistics (1999). **Population, Housing and Establishment, Cencus-1997**, Final Results, Population Report-Hebron Governrate, First Part, Ramallah, Palestine.
- Palestinian Central Bureau of Statistics (PCBS), **Population, Housing and Establishment, Cencus-1997**, Final Results, Population Report-Bethlehem Governrate, First Part, Ramallah, Palestine, 1999.
- Palestinian Central Bureau of Statistics (2004), **Press Release for the Palestinian National Accounts (2001-2002)**, Ramallah, Palestine.
- Palnitkar S. (2000). **Manual on Solid Waste Management**. AILSG, Mumbai.
- Poulsen OM, Breum NO, Ebbehoj N, Hansein AM, Ivens UI, van Lelieveld D, malmros P, M atthiasen L, Nielsen BH, Schibye B, Skov T, Stenbaek EL, Wilkins KC. (1995). **Collection of domestic waste**. Review of occupational health and their possible causes. *Sci Tot Environ* 170:1-19.
- Sbeih, M. (2002). **Bethlehem Governorate, Dissemination and Analysis of Census Finding**. Palestinian Central Bureau of Statistics. Ramallah, Palestine.

- Sims C. (1996). **Fear of a Virus, and Fear Itself, Stunt a Resort Town.** The New York Times.
- Tchobanoglous G., Theisen H. and Vigil S., (1993). **Integrated Solid Waste Management.** McGraw Hill Inc., New York.
- Thorn J. (2001). **Seasonal Variations in Exposure to Microbial Cell Wall Components among Household Waste Collectors.** Ann. Occupational Hygiene. British Occupational Hygiene Society.
- Van Eerd M. (1995). **Gender Related Labor Market Fragmentation in Informal Recycling Sector,** A study in Bangalore, India. Mcs, Thesis. University of Amsterdam.
- Wilhelm V. (1989). **Occupational Safety at Landfills, Proceeding of Sardinia 89,** Second International Landfill Symposium.
- World Bank (1993). **Developing the Occupied Territories, an Investment in peace. Volume 1: Overview.** The World Bank, Washington D.C.
- World Health Organization (1996). Draft book on Hospital Waste Management.
- Wouters IM, Hilhorst SKM, Kleppe P, Douwes J, Peretz C, Heederik D. (2002). Upper airway inflammation and respiratory symptoms in domestic waste collectors. *Occp. Environ Med*; 59:106-112.
- Yang Chun-Yuh, Chang Wen-Tzong, Chuang Hung-Yi, Tsai Shang-Shyue, Sung Trong-Neng and Fung-Chang (2001). **Adverse Health Effects among Household Waste Collectors in Taiwan.** Environmental Research.

Appendices

Appendix A

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

An-Najah
National University
 Water and Environmental Studies Institute



جامعة
النجاح الوطنية
 معهد الدراسات المائية والبيئية

إلى من يهمه الأمر

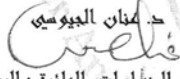
الموضوع: مساعدة الطالب أحمد ملحم في أطروحة الماجستير

تحية طيبة وبعد،،

أن الطالب أحمد خليل ملحم طالب في جامعة النجاح الوطنية، قسم العلوم البيئية وأطروحة الماجستير التي يعمل على دراستها تتعلق بمحاولة البحث ودراسة إصابات العمل وطرق الوقاية بين عمال النظافة في محافظتي بيت لحم والخليل.

أرجو من حضرتكم مساعدته في دراسته وتسهيل مهمته.

ولكم جزيل الشكر


 د. أنان الجيوسي
 مدير معهد الدراسات المائية والبيئية

Appendix B

استمارة حول الأمن والسلامة المهنية لدى عمال النظافة

في محافظتي بيت لحم والخليل

المواطن العزيز:

أنا الطالب أحمد ملحم، طالب ماجستير في العلوم البيئية، في السنة الأخيرة في جامعة النجاح الوطنية، وأطروحة الماجستير التي أعمل على دراستها تتعلق بمحاولة البحث ودراسة إصابات العمل وطرق الوقاية بين عمال النظافة في محافظتي بيت لحم والخليل.

إن الهدف من هذه الدراسة، هو تحري ما تتعرضون له من مخاطر، والبحث في أسبابها، ومعرفة أنسب وأفضل الطرق في تسجيلها، والعمل على تجنبها، وسوف تساعد هذه المعلومات في توجيهكم لوضع صحي وعملي أفضل، كما أن استجابتك ستجعل التقرير نهائياً ودقيقاً إلى الحد الأقصى.

إن هذا المسح تطوعي، ولكن تستطيع المساعدة كثيراً بالمشاركة في خبراتك المهنية، كما أن أي معلومات تقدمها، سوف تبقى سرا ولن يكشف عنها لأي شخص آخر.

سوف أكون شاكراً جداً لك إن تلتفت بإرجاع هذه الإستبانة في موعد أقصاه / /، وإذا كانت لديك أية استفسارات حول هذه الدراسة، فأرجو الاتصال على هاتف جوال رقم ٥٩٨٨٧٦٥٤.

شكراً لك لمساعدتي في هذا البحث الهام، وأتطلع إلى استلام إجاباتك في الوقت المناسب.

مع الاحترام

أحمد ملحم

Appendix C

"استبانته"

V001	التاريخ: / / ٢٠٠٤
V002	المحافظة: _____
V003	مكان التجمع السكاني: _____
V004	نوع التجمع السكاني: ١- مدينة ٢- قرية ٣- مخيم
V005	عمر العامل: _____
V006	الجنس: ١- ذكر ٢- أنثى
V007	مكان الإقامة الدائم: ١- مدينة ٢- مخيم ٣- قرية
V008	التحصيل العلمي: ١- غير متعلم ٢- ابتدائي ٣- إعدادي ٤- ثانوي ٥- جامعي ٦- غير ذلك، حدد
	الوضع الاجتماعي والاقتصادي للأسرة:
V009	دخل العامل الشهري: ١- ٥٠٠-٧٠٠ ٢- ٧٠٠-٩٠٠ ٣- ٩٠٠-١١٠٠ ٤- ١١٠٠-١٣٠٠ ٥- غير ذلك، حدد
V010	مصدر المياه التي تستخدمها في البيت: ١- مياه حنفية ٢- بئر ماء ٣- مياه نبع ٤- غير ذلك، حدد
	ظروف العمل:
V011	مكان العمل: ١- مدينة ٢- مخيم ٣- قرية
V012	وقت الدوام: ١- صباحا ٢- مساء ٣- ليلا ٤- غير ذلك، حدد
V013	كيفية الدوام: ١- مياومة ٢- دوام جزئي ٣- دوام كامل ٤- غير ذلك، حدد
V014	نوع العمل: ١- نظافة في الطرقات ٢- سائق سيارة ٣- تحميل وتنزيل ٤- غير ذلك، حدد
V015	هل لديك تأمين صحي؟ ١- نعم ٢- لا
V016	إذا كانت الإجابة نعم، حدد نوع التأمين: ١- حكومي ٢- وكالة غوث ٣- تأمين خاص ٤- غير ذلك، حدد
V017	هل القمامة التي تجمعها قمامة بيتيه (ورق، محارم، بقايا طعام، قناني، مواد تنظيف، --- الخ) ١- نعم ٢- لا
V018	هل القمامة التي تجمعها قمامة تجارية (ورق، كرتون، مواد تغليف، معلبات، مواد كيميائية، بقايا لحوم، --- الخ) ١- نعم ٢- لا
V019	هل القمامة التي تجمعها قمامة صناعية (بلاستيك، مواد كيميائية، أصباغ، أخشاب، كرتون)؟ ١- نعم ٢- لا
V020	هل القمامة التي تجمعها قمامة طبية (إبر، حقن طبية، فحوصات مخبرية، أدوية)؟ ١- نعم ٢- لا
V021	هل تستخدم تراكتور في جمع القمامة؟ ١- نعم ٢- لا

V022	هل تستخدم في جمع القمامة عربة جر صغيرة ؟	1- نعم 2- لا
V023	هل تستخدم في جمع القمامة ترك (Truk) ؟	1- نعم 2- لا
V024	هل تستخدم في جمع القمامة سيارة ضاغطة ؟	1- نعم 2- لا
V025	هل تستخدم في جمع القمامة سيارة ذات حاوية متحركة ؟	1- نعم 2- لا
V026	هل تستخدم في جمع القمامة سيارة ذات حاوية ثابتة ؟	1- نعم 2- لا
	أسئلة تتعلق بوسائل الوقاية:	
V027	هل تلبس قفازات واقية أثناء العمل ؟	1- دائما 2- أحيانا 3- لا
V028	هل تلبس غطاء خاص بالقدم أثناء العمل ؟	1- دائما 2- أحيانا 3- لا
V029	هل تلبس حذاء خاص أثناء العمل ؟	1- دائما 2- أحيانا 3- لا
V030	هل تلبس قناع واق للحم والأف أثناء التعامل مع القمامة ؟	1- دائما 2- أحيانا 3- لا
V031	هل تلبس مر بول واق أثناء التعامل مع القمامة ؟	1- دائما 2- أحيانا 3- لا
V032	هل تغسل يديك بمواد مطهرة عدة مرات أثناء التعامل مع القمامة ؟	1- دائما 2- أحيانا 3- لا
V033	هل تغسل ملابس العمل في البيت ؟	1- دائما 2- أحيانا 3- لا
V034	هل يتم استخدام مواد مطهرة في تنظيف ملابس العمل ؟	1- دائما 2- أحيانا 3- لا
V035	هل تتناول طعامك في مكان عملك ؟	1- دائما 2- أحيانا 3- لا
V036	هل إذا رأيت شخصا قريبا أو عزيزا عليك أثناء العمل، تصافحه ؟	1- دائما 2- أحيانا 3- لا
V037	هل تستخدم أغراضك الشخصية أثناء العمل (بلفون، نظارة، شنطة) ؟	1- دائما 2- أحيانا 3- لا
V038	هل تستحم بعد الانتهاء من العمل ؟	1- دائما 2- أحيانا 3- لا
V039	هل تتشارك مع زملائك في العمل في استخدام الأغراض الوقائية (القناع الواقي، الجزمة، المر بول) ؟	1- دائما 2- أحيانا 3- لا
	أسئلة تتعلق بالإصابة إن وجدت:	
V041	إذا كان الجواب نعم , فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V042	هل شكيت من صعوبة في التنفس خلال الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V043	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V044	هل شكيت من التهاب في الحلق, سعال, ارتفاع في درجة الحرارة خلال الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V045	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V046	هل شكيت من أمراض معوية (إسهال, إمساك, دم مع البراز), خلال الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V047	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V048	هل تعرضت لدخان المحارق أثناء عملك في الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V049	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V050	هل شكيت من صعوبة في السمع أثناء عملك في الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V051	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V052	هل تزعجك الاهتزازات الناتجة عن حركة السيارة أثناء نقل القمامة ؟	1- نعم 2- لا
V053	هل سقطت من السيارة أثناء جمع ونقل القمامة خلال الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V054	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	
V055	هل شكيت من آلام في العمود الفقري (الظهر) خلال الـ 12 شهرا الماضية ؟	1- نعم 2- لا
V056	إذا كان الجواب نعم, فكم مرة حدث معك ذلك خلال الـ 12 شهرا الماضية ؟ _____	

سبب الإصابة:

V057	هل حدث معك ارتطام(الاصطدام) (بجسم صلب، سيارة، الخ---) خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V058	إذا كان الجواب نعم، فكم حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V059	هل حدث معك تعثر أو الوقوع أثناء العمل خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V060	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V061	هل حدث معك الوقوع من أعلى خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V062	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V063	هل حدث معك جرح نتيجة الاتصال بجسم حاد خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V064	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V065	هل حملت أكثر مما تحتمل أثناء عملك خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V066	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V067	هل تعرضت لدرجة حرارة عالية/منخفضة خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V068	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V069	هل حدث ووخزتك إبرة طبية خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V070	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V071	هل حدث معك احتكاك/تلامس مع مواد كيميائية مضرّة خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V072	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟

نوع الإصابة:

V073	هل حدث معك التواء في القدم خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V074	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V075	هل حدث معك ألم شديد في المفصل خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V076	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V077	هل حدث معك خلع/انزلاق في المفصل خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V078	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V079	هل حدث معك جرح قطعي(قي الرأس، اليد، الخ---) خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V080	إذا كان الجواب نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V081	هل حدث معك تمزق عضلي خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V082	إذا كانت الإجابة نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V083	هل حدث معك كسر في الأسنان خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V084	إذا كانت الإجابة نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V085	هل حدث معك خدش(خدش) خلال الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V086	إذا كانت الإجابة نعم، فكم مرة حدث معك ذلك خلال الـ12 شهرا الماضية ؟
V087	هل حدثت لك كسور في الـ12 شهرا الماضية ؟ 1- نعم 2- لا
V088	إذا كانت الإجابة نعم، فكم مرة حدثت معك خلال الـ12 شهرا الماضية ؟

أسئلة تتعلق بالأمور الفنية والإدارية:

	في حالة أنك تعرضت لحادث أو مرض أثناء عملك, خلال الـ 12 شهرا الماضية, كما ورد في الأسئلة من ٥٧-٨٧, أرجو الإجابة على الأسئلة التالية:
V089	هل تم إبلاغ وزارة الصحة بذلك, من خلال تعبئة استمارة خاصة ؟ ١- نعم ٢- لا
V090	هل تم إرسالك للعلاج في مركز طبي خاص ؟ ١- نعم ٢- لا
V091	هل تم إرسالك للعلاج في عيادة خاصة ؟ ١- نعم ٢- لا
V092	هل تم إرسالك للعلاج لدى طبيب مختص ؟ ١- نعم ٢- لا
V093	هل تم إعطائك العلاج اللازم ؟ ١- نعم ٢- لا
V094	هل تم إعطائك إجازة مرضية ؟ ١- نعم ٢- لا
V095	هل تم عمل فحوصات مخبرية لك ؟ ١- نعم ٢- لا
V096	هل تم عمل صور أشعة لك؟ ١- نعم ٢- لا
V097	هل يتم عمل فحوصات مخبرية روتينية لك؟ ١- نعم ٢- لا
V098	إذا كانت الإجابة نعم, فكل كم سنة يتم عملها لك؟ ١- كل سنة ٢- كل سنتين ٣- غير ذلك: حدد
V099	هل يتم عمل صور إشعاعية روتينية لك؟ ١- نعم ٢- لا
V100	إذا كانت الإجابة نعم, فكم كل سنة يتم عملها لك؟ ١- كل سنة ٢- كل سنتين غير ذلك: حدد
V101	هل يتم تطعيمك ضد مرض التهاب الكبد الفيروسي؟ ١- نعم ٢- لا
V102	إذا كانت الإجابة نعم, فكم جرعة تم إعطاؤها لك؟ ١- جرعة واحدة ٢- جرعتين ٣- ثلاث جرعات ٤- أربع جرعات
103	هل يتم تطعيمك ضد مرض القزاز؟ ١- نعم ٢- لا

أسئلة تتعلق ببيئة العمل:

V104	هل يتوفر مكان لاستراحة العمال أثناء العمل ؟ ١- نعم ٢- لا
V105	هل يتوفر في مكان الأستراحة مكان خاص للأكل ؟ ١- نعم ٢- لا
V106	هل يتوفر في مكان الأستراحة مياه للشرب ؟ ١- نعم ٢- لا
V107	هل يتوفر في مكان الأستراحة مراحيض ؟ ١- نعم ٢- لا
V108	هل يتوفر في مكان الأستراحة مكان خاص للاستحمام قبل العودة إلى البيت؟ ١- نعم ٢- لا
V109	هل يتوفر في مكان الأستراحة مكان خاص لتغيير الملابس قبل وبعد الانتهاء من العمل؟ ١- نعم ٢- لا
V110	هل أنت راض عن عملك ؟ ١- راض جدا ٢- راض ٣- غير راض ٤- غير راض على الإطلاق

V111 : ماهي أهم احتياجاتك لتحسين وضع سلامتك أثناء عملك ؟

.....

V112 : ماهي أهم احتياجاتك لتقوم بعملك على أحسن وجه ؟

جامعة النجاح الوطنية

كلية الدراسات العليا

المخاطر الصحية والسلامة المهنية لدى عمال النظافة

في محافظتي بيت لحم والخليل

إعداد

احمد خليل منجد ملحم

إشراف

ا. د. محمد السبوع

د. عصام الخطيب

قدمت هذه الأطروحة استكمالاً لمتطلبات درجة الماجستير في العلوم البيئية بكلية الدراسات العليا في جامعة النجاح الوطنية في نابلس، فلسطين.

ب

المخاطر الصحية والسلامة المهنية لدى عمال النظافة في محافظتي بيت لحم والخليل

إعداد

احمد خليل منجد ملحم

إشراف

ا. د. محمد السبوع

د. عصام الخطيب

الملخص

هدفت هذه الدراسة إلى فحص أنواع النفايات سواء كانت بيتية، تجارية، صناعية أو طبية، ومعرفة مدى تأثيرها على صحة عامل النظافة في محافظتي بيت لحم والخليل، كما هدفت إلى معرفة الطرق التي يتم استخدامها في جمع القمامة، وطرق الوقاية من الإصابات والأمراض المهنية التي تصاحب العامل أثناء عمله، كما هدفت إلى معرفة أنواع الإصابات والأمراض المهنية، ووضع الحلول والتوصيات المناسبة لتجنبها. وقد تم استخدام نموذج الاستكشاف الوصفي في تقييم وبحث الإصابات والسلامة المهنية بين عمال النظافة في محافظتي بيت لحم والخليل، وذلك باستخدام استمارة (استطلاع للرأي)، تم تطويرها، ومن ثم تم استخدام نظام التحليل الإحصائي في تحليل النتائج. لقد كانت الفئة المستهدفة من السكان في هذه الدراسة، هي جميع عمال النظافة والمشرفين عليهم أثناء العمل، وتم استطلاع آراء 219 عامل في محافظتي بيت لحم والخليل، وذلك من خلال استخدام طريقة العينة الاحتمالية، وتم اختيارهم بشكل غير عشوائي، وقد رفض 10 عمال الإجابة على الأسئلة المستطلعة.

ولقد أظهرت نتائج الاستطلاع أن ما نسبته 98.6% من عمال النظافة لا يلبسون القناع الواقي، وأن ما نسبته 85.5% لا يلبسون الأفرهول، و 78.9% لا يلبسون الحذاء الواقي، وأن ما نسبته 45% لا يلبسون القفازات. كذلك أظهرت نتائج الدراسة أن عمال النظافة معرضون للإصابة بأمراض وأعراض مختلفة، فقد أظهرت النتائج أن ما نسبته 55.3% من عمال النظافة يعانون من التهاب في الحلق، والسعال وارتفاع في درجات الحرارة، وأن ما نسبته 27.9% يعانون من الإسهال أو وجود دم في البراز، وأن 25% من عمال النظافة يعانون من ضيق في التنفس، وأن ما نسبته 20.2% يعانون من أمراض جلدية. كما أثبتت الدراسة أن عمال النظافة معرضون لإصابات مختلفة، فأثبتت الدراسة أن ما نسبته 61.1% قد تعرضوا للإصابة بجروح

حادة نتيجة الاتصال بجسم حاد، وأن 37.4% يحملون أكثر مما يحتمل الجسم في جمع ونقل النفايات، وأن 35.6% قد تعرضوا للوقوع والتعثر أثناء العمل، وأن 21.6% تعرضوا للارتطام أو الاصطدام بجسم صلب، وأن 20.2% تعرضوا للوخز بإبر طبية ، و 34.1% تعرضوا لالتواء في القدم، و 22.1% تعرضوا للإصابة بتمزق عضلي أثناء العمل. كما تبين أن 93.8% من عمال النظافة لم يتم تطعيمهم ضد مرض القزاز، وأن 85.6% لم يتم تطعيمهم ضد مرض التهاب الكبد الفيروسي.

مما تقدم، فإنه يتبين أن عمال النظافة يواجهون تحديات صحية كثيرة، فهم معرضون لأخطار بيولوجية، وكيميائية، وعضوية، إذا لم يلتزموا بوسائل السلامة أثناء جمع القمامة. فقد أظهرت الدراسة أن عمال النظافة ذوو الأعمار المتوسطة في السن، والذين يتمتعوا بمستويات تعليمية منخفضة، هم أكثر عرضة لهذه الأخطار، وأن أكثر الإصابات بين عمال النظافة في محافظتي بيت لحم و الخليل كانت تتلخص في آلام في الظهر، تمزق في العضلات، التواء في القدم، التهاب في الحلق، سعال، و ضيق في التنفس. لذا فإنه من الضروري تزويد عمال النظافة بوسائل الوقاية الضرورية، والقيام بعمل برامج تعليمية وتدريبية لكل عمال النظافة تتعلق بالصحة والسلامة المهنية، والعمل على إيجاد نظام فحص طبي روتيني لهم، وذلك من أجل حمايتهم من الأمراض والإصابات المهنية.