



**Deanship of Graduate Studies**

**Al-Quds University**

**Solid Waste Management and Its Effects on Environment and Health:**

**A KAPP Study on Al -Quds University Students**

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**Solid Waste Management and Its Effects on Environment and Health:**

**KAPP Study on Al- Quds University Students**

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**This thesis is submitted in partial fulfilment of the requirements for the degree of master of public health, faculty of graduate studies, Al-Quds University.**

**1435- 2014**



**Al-Quds University**

**Deanship of Graduate Studies**

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### **Declaration**

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

**Student's name: Hanan Majed Abu Illan**

**Signature: .....**

*To my beloved parents, sisters and brothers*

*To my soulmate, my husband.*

*To my son*

*To my faithful friends*

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**Hanan Abu Illan, 2014**

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## List of abbreviations

<b>ARIJ</b>	Applied Research Institute in Jerusalem
<b>MSW</b>	Municipal solid waste
<b>NSTC</b>	National Science and Technology Centre
<b>KAPP</b>	Knowledge, attitude, practice and perception
<b>SW</b>	Solid waste
<b>SWM</b>	Solid waste management
<b>PCBS</b>	Palestinian Centre Bureau of Statistics
<b>UNEP</b>	United Nations Environment Program
<b>UNCED</b>	United Nations Conference on Environment and development
<b>USEPA</b>	United States Environmental Protection Agency
<b>WEEE</b>	Waste from electrical and electronic equipment
<b>WHO</b>	World Health Organization

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## ABSTRACT

**Background:** Universities solid waste, such as papers, containers, scrap metal, ground wastes, books, appliances, toner cartridges, transparencies, diskettes and enveloped, was increasing tremendously in the past 10 years. This is due to the increased number of students and employees. The usual method to manage university solid waste is dumping, but recycling is becoming now more popular as an approach to manage the solid waste, for those recyclable. This study investigated knowledge, attitudes, perceptions and practices (KAPP) of Al-Quds University students towards domestic and university waste and their effect on health and environment.

**Methods:** A cross-sectional study was done on a sample of 509 students, who filled in a structured questionnaire.

Descriptive statistics using frequencies, means and standard deviation was done for the independent variables; i.e. participants' year of study, type of faculty, type of house, place of residency, and region of residency. ANOVA test was used to test the association between the independent variables with each of the KAPP variables. The researcher develop a "positive- negative" scoring system using the Blooms' criteria for the KAPP variables. After scoring of KAPP variables indicators, chi-square test was conducted to test the association between the independent variables and KAPP scores.

**Results:** Most participants (76.6%) had a high level of knowledge about solid waste and its separation; 74.1% had positive attitude, 37.1% had good practices and 82.9% had a positive perception of SWM.

In the analysis of the scoring of KAPP; students' faculty ( $p=0.018$ ), year of study ( $p=0.036$ ) and students' place of residence ( $p=0.023$ ) were significantly associated with the scoring of students' knowledge about solid waste management. But, students' faculty ( $p=0.027$ ) was the only factor that was significantly associated with the scoring of students' attitude towards solid waste management and its effect on health and environment. Students in the science department had much better attitude towards SWM and this could be related to their concern about human health and environment. For the scoring of students' practices, the type of house was the only factor that significantly determined their practices ( $p=0.03$ ). Participant lived in apartment shown higher level of practices of SWM than who lived in their own houses. In addition, students' year of study

was significantly associated with the scoring of students' perception of solid waste management ( $p=0.01$ ). Participants in the third; fourth and fifth year shown more positive perception of SWM than participants who were in the first and second year of study.

**Conclusions:** Waste management is an important issue in Palestine and is a very critical problem in waste disposal. Therefore, working on having good attitude and high level of belief that determined peoples' behavior towards SWM will influence the success of any future separation of solid waste initiative, whether at the university or community level. Therefore, this study results support literature findings on attitude, belief, and behavior model towards solid waste management SWM.

**Recommendations:** Study researches recommend that universities should start solid waste separation and recycling so it can be a model for all communities. Students also should try their best to instil the separation habit among themselves. At the universities policy makers' level, more action-oriented projects should be organized for students, in addition, to providing proper facility for solid waste management. In addition, the role of the community in sharing the responsibility of solid waste management will be an asset to help in controlling such a problem. Finally, future studies on solid waste management at the universities and community levels are still immature and study designs such as intervention studies will help in setting programs to control this problem.

إدارة النفايات الصلبة وأثرها على الصحة والبيئة: دراسة حول معارف, سلوكيات, اتجاهات ومواقف الطلبة في جامعة القدس حول إدارة النفايات الصلبة وأثرها على الصحة والبيئة

بإشراف: د. نهى الشريف

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### ملخص الدراسة

**مقدمة:** في السنوات العشر الاخيرة، تزايدت كميات النفايات الصلبة في الجامعات مثل الورق والكرتون، المعادن والمخلفات العضوية، الكتب والاجهزة، خراطيش الحبر والورق الشفاف، الاقراص المرنة والمغلفات والذي تواكب مع الزيادة المطردة في اعداد الطلبة والموظفين.

ما زالت طرق التخلص من النفايات الصلبة في الجامعات تتم بالطرق التقليدية وذلك بطرحها في مجمع النفايات العام، مع العلم ان الطرق الحديثة تعتمد على فصل النفايات ثم إعادة تدويرها. لذا، تهدف هذه الدراسة إلى تقييم معرفة وتوجهات وسلوكيات ومدى إدراك طلبة جامعة القدس تجاه النفايات الصلبة المنزلية والجامعية وطرق التخلص منها واثراها على الصحة والبيئة.

**منهجية الدراسة:** تم إجراء دراسة مقطعية في جامعة القدس على عينة من 509 طالب والذين قاموا بتعبئة استمارة اعدت لتحقيق اهداف الدراسة.

تم استخدام الإحصاء الوصفي، والانحراف المعياري لوصف متغيرات الديموغرافية للدراسة، المستوى السنه الدراسية للطلاب، نوع الكلية، نوع السكن، مكان الإقامة، ومنطقة الإقامة للطلاب المشاركين في الدراسة. وايضا تم استخدام اختبار تحليل التباين الاحادي ANOVA لوصف العلاقات ما بين المتغيرات الديموغرافية و معرفة وتوجهات وسلوكيات وادراك الطلبة نحو فصل النفايات الصلبة وأثرها على الصحة والبيئة. قامت الباحثة بتطوير نظام "إيجابي-سلبي" باستخدام تصنيف بلوم لعوامل



المعرفة ، والتوجهات، والسلوكيات، والادراك. واخيرا تم استخدام "مربع كاي" لاختبار العلاقات بين المتغيرات المستقلة و غير المستقلة في هذه الدراسة.

**النتائج:** أظهرت نتائج الدراسة بأن معظم الطلاب (76.6%) لديهم مستوى مرتفع من المعرفة حول النفايات الصلبة و فصلها في حين أظهر (74.1%) من المشتركين اتجاهات ايجابية حول عملية الفصل، بينما (37.1%) منهم كانت لديهم سلوكيات جيدة حول عملية الفصل

في حين أظهرت النتائج في تحليل نظام تجميع النقاط بأن كلية الطالب ( $\alpha=0.018$ ) وسنة الدراسة ( $\alpha=0.036$ ) ومكان السكن ( $\alpha=0.023$ ), كان هناك ارتباط بين كل عامل منها مع معارف الطلبة حول عملية فصل النفايات الصلبة. ولكن كلية الطالب ( $\alpha=0.027$ ) كانت العامل الوحيد المرتبط مع مواقف الطلبة تجاه إدارة النفايات الصلبة وأثرها على الصحة والبيئة. حيث أظهر الطلاب في الكليات العلمية والصحية اتجاهات أفضل نحو عملية فصل النفايات الصلبة أكثر ممن هم في الكليات الأدبية. في حين أظهرت النتائج بأن نوع المنزل ( $\alpha=0.03$ ) الذي يقطنه الطلاب كان العامل الوحيد المرتبط مع سلوكيات الطلبة نحو عملية فصل النفايات الصلبة. حيث أظهر الطلاب اللذين يقطنون شقق سكنية مستوى أعلى في سلوكهم نحو عملية فصل النفايات الصلبة ممن هم يقطنوا في بيوت مستقلة. بالإضافة الى ذلك أظهرت النتائج بأن سنة الدراسة ( $\alpha=0.01$ ) كانت مرتبطة مع ادراك الطلبة لعملية فصل النفايات الصلبة. حيث كان الطلبة في السنوات الثالثة والرابعة والخامسة من الدراسة أكثر إدراكا لعملية فصل النفايات الصلبة ممن هم في السنة الأولى والثانية.

**الاستنتاجات:** إن إدارة النفايات الصلبة ذات اهمية في فلسطين وتشكل تحديا في عملية التخلص من النفايات، وبالتالي فإن العمل على إيجاد مستوى مرتفع من المواقف والتصورات التي تحدد سلوكيات الافراد تجاه إدارة النفايات الصلبة تؤثر على نجاح مبادرات مستقبلية لفصل النفايات الصلبة، سواء

في الجامعة أو على مستوى المجتمع. ان نتائج هذه الدراسة تدعم نتائج الدراسات السابقة حول مواقف ومعتقدات وسلوك طلبة الجامعات نحو إدارة النفايات الصلبة .

**التوصيات:** من خلال هذه الدراسة أوصت الباحثة بأن على الجامعات أن تتخذ عملية فصل النفايات طريقة متبعة دائمة لإدارة النفايات الصلبة بحيث تصبح نموذجا دائما في كل المجتمعات . أيضا، يجب على الطلاب أنفسهم بذل قصارى جهدهم لغرس هذه المبادرة فيما بينهم. على مستوى صانعي القرار في الجامعات أوصت الباحثة بحثهم على تنظيم مشاريع أكثر دقة لعملية فصل النفايات الصلبة والتخلص من النفايات وتوفير الامكانيات لإدارة النفايات الصلبة. وبالإضافة إلى ذلك، فإن دور المجتمع في تقاسم مسؤولية إدارة النفايات الصلبة قد يكون الدور الاهم في عملية السيطرة على هذه المشكلة. في النهاية أشارت الباحثة للحاجة إلى مزيد من الدراسات البحثية على مستوى الجامعات والمجتمعات بالإضافة إلى الحاجة إلى دراسات التدخل في إدارة النفايات الصلبة التي قد تساعد في وضع برامج للسيطرة على هذه المشكلة.

## **CHAPTER ONE: INTRODUCTION**

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### **1.1 Introduction**

Solid waste are things which we throw away and which embrace things and commonly describe as garbage, refuse and trash (Davis & conwell,2008). While solid waste is non-liquid waste arising from domestic, trade, or industrial services and activities, it may also be defined as unwanted material disposed by man, which can neither flow into streams nor escape immediately into the atmosphere, thus polluting water, air and soil (Tchobanoglous et.al., 1977).

There are many sources from which the solid waste comes as all living things create waste. In the ecosystem, trees, animals and other organisms contribute to waste. Humans create waste as they alter natural systems through extraction, processing and use of natural resources. Municipal solid waste (MSW), industrial waste, hazardous waste, hospital waste, construction and demolition waste, waste from electrical and electronic equipment (WEEE) and agricultural waste are all types of solid waste (Ying, 2010).

Solid waste management is the process of analysis of waste materials, collection, transport, recovery and recycling of disposal. It usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health and/or the environment. Waste management is also carried out to recover resources from the waste itself. Waste management can involve solid, liquid, gaseous and radioactive substances, with different methods for each one (Tchobanoglous et. al., 1993).

Management of solid waste is a major challenge these days for the administrators, engineers and planners. Huge volumes of solid wastes are generated and need to be collected, transported and finally disposed of. These operations have to be carried out speedily and efficiently without incurring excessive cost or damage to environment. Unfortunately in many developing countries, the system for managing waste is primitive and cannot cope with the huge volumes of wastes being generate (Al-Yousfi, 2004).

In developing countries, it is common to find large heaps of garbage festering all over the city. The problem becomes further complicated due to large population and the obsolete techniques employed for waste management (Mbuligwe, 2012). The solid waste is

considered to be one of the dangerous causes of pollution; therefore this problem has to be treated in a wise manner to protect our environment (Yaqout et. al., 2002).

Different methods are available for solid waste management including, minimization, composition, energy recovery, disposal and recycle or separation (Porta et al., 2009).

Serious health problems arise due to improper collecting and managing of solid waste thus leading to several adverse health effects, including many infectious diseases. In general and according to the National Science and Technology Center (NSTC) report, there are various effects due to exposure to waste. Chemical poisoning through chemical inhalation, increase in hospitalization of diabetic residents living near hazard waste sites; cancer; mercury toxicity from eating fish with high level of mercury; newborn low birth weight; newborn congenital malformation; nausea and vomiting, and many other adverse health effects were seen among individuals exposed to these wastes ( NSTC, 2008).

Chemicals generated from solid waste can enter the body in different ways; ingestion, inhalation and adsorption, which cause adverse health effects including poisoning from toxic substances such as; cadmium, arsenic nickel and dioxins which are also considered to be carcinogenic (Rushton, 2003). In addition, many of these substances can produce toxicity on the central nervous system, liver, kidneys, heart lungs and skin, depending on exposure level and duration. Other health problems associated with solid waste are investigated by different studies, including respiratory problems, irritation of the skin, nose and eyes, gastrointestinal problems, fatigue, headaches, psychological problems and allergies.

The impact of solid waste on environment refers to its effect on land, air and water due to improper disposal and managing of solid waste. The most serious environmental problem of solid waste is the emission of greenhouse gases, especially methane gas. In addition, solid waste causes ground and surface water contamination (Mcmichael, 2002).

Dumping sites in the West Bank are not designed as sanitary landfills. These sites lack ground lining or leachate collection system to protect ground water. These sites are open and management is restricted to frequent burning of waste piles (Al-Khatib et. al., 2006). In general, in developing countries dump sites are managing solid waste by burning, which cause the releasing of heavy metals and chemicals like lead, toxic gases causes air pollution (Medina, 2012). According to the Agency for Toxic Substances and Disease Registry 1998, many chemicals which generated from waste disposal are: Lead (79%),

Trichloroethylene (66%), Benzene (64%), Arsenic (60%), Chromium (57%), Cadmium (52%), Tetrachloroethylene (49%), Toluene (45%), Di-2-ethylexyl Phthalate (43%) (Lewis et. al., 1998) .

Waste generation differs according to national income, socioeconomic conditions, social developments and cultural practices. According to the World Bank (1999), solid waste generated is classified into 8 types of wastes. In this study we are very concerned with two major types; the residential waste which is the household waste such as food and fruit peels, rubbish, ashes etc. and the institutional waste which originates in schools, hospitals, research institutions and public buildings (World Bank, 2012).

## **1.2 Problem statement**

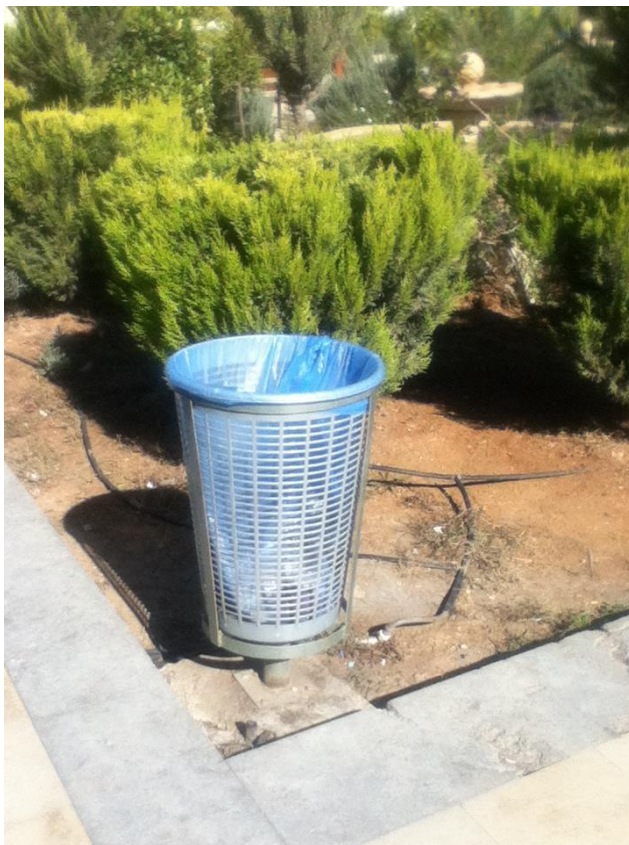
Solid waste separation is one of the most critical issues we face in Palestine due to the rapid development of the country in population and economic. Similar situation is happening at the universities, in which tons of solid wastes been produced by the students which is the case of Al-Quds university.

Most of the solid waste produced at universities contains papers, household waste, glass, plastic materials, in addition to the hazardous wastes that are produced by laboratories.

In December 2012, the university started its first activity for solid waste separation at the University campus of Abu Dis (see picture 1). There are special containers that consist of several containers with different colours and labels. However, if you do a walk through the university you will find the bins empty. At the same time, you can still see the old system of solid waste containers, in which you do not need to separate the waste present in its place as it is (picture 2). The main reason for the non-response among these students might be related to the lack of awareness of sustainable and environmental issue. They are not informed about the benefit of solid waste separation in the university and they are not playing an active role to take initiative to reduce the solid waste and separate it.



Picture 1.1: The new separation method at Abu Dis Campus.



Picture 1.2: The old system of solid waste collection at Abu Dies Campus.

Therefore, this study was initiated to determine the student's knowledge, attitudes, practices and perception about solid waste separation as a baseline to help the university

decision makers to set a program to have a better response by students for solid waste separation at the university.

### **1.3 Objectives and aims**

#### **1.3.1 Overall Objective**

To investigate knowledge, attitudes, perceptions and practices of Al- Quds University students towards domestic and university waste and its effect on health and environment.

#### **1.3.2 Research questions:**

- 1- Do Al-Quds University students have proper level of knowledge of solid waste separation and its effect on health and environment?
- 2- Do Al-Quds University students have acceptable level of attitude towards solid waste separation and its effect on health and environment?
- 3- Do Al-Quds University students have proper level of practices of solid waste separation and its effect on environmental pollution?
- 4- Do Al-Quds University students have acceptable level of perception of solid waste separation and its effect on health?
- 5- Are there associations between the students' demographic factors and their knowledge, attitudes, practices and behavior about solid waste management and its effect on health and environment?

### **1.4 Study justification**

Today, Palestine faces the problem of solid waste which is becoming more and more difficult. This is due to the lack of effective national authority of environmental protection. Moreover, the population size is increasing tremendously with low environmental awareness of these citizens, in addition to the presence of more local industries with no proper services by the local municipalities. As reported by Al-Khatib and Abu Safieh (2003) the Israeli occupation restrict the mobility of Palestinians within limited territories and prevented solid waste from being delivered to disposal sites; Israeli pilfering of land, land confiscation and Annexation Wall that pinches the land. All these have resulted in poor management practices regarding solid waste material and higher potential of pollution.

Solid waste generation was shown to be increased in the past years in Palestine, which makes the process of solid waste management very crucial. In 2009, the average amount of municipal solid waste (MSW) generated was about 4.4 kg/family/ day while it was 4.6kg/family/ day in 2008, but its estimated to increase in the next years (PCBS, 2009).

The amount of household waste produced in the Palestinian territory in 2008 was estimated at about 2861 tons per day. The average production of solid waste by a Palestinian household was estimated at 4.6 kg per day, or an average of approximately 0.7 kg per capita (PCBS, 2008).

In the West Bank, the municipalities or the villages' councils are responsible for the collection of the solid waste. However, in communities with no or few public services, people dump their waste outside their houses randomly and burn it after staying in the streets for many days. The Palestinian Central Bureau of Statistics report on waste disposal showed that 166 local communities (27.8% from the total local communities) are not covered by solid waste collection services (PCBS, 2005). Many environmental and health impact may result due to the random disposal and burning of wastes such as surface and ground water pollution and air pollution (UNEP, 2003).

In Palestine, the common solid waste disposal method that is used in the West Bank is the use of open dumpsites, which contains all kind of waste (Monjed, 1997). The Palestinian municipal solid waste (MSW) includes household, industrial, medical, demolition, agriculture, and all other hazardous wastes. Household waste formed a high percentage at the urban area which is more than 80% of total municipal waste, while this percentage comes to less than 60% in the rural areas (PCBS, 2006).

Rapid economic development, population growth, change in life style in Palestine and other factors makes the management and recycling process of waste one of the most critical environmental issues.

The risk of unhealthy disposal of solid waste is one of the important problems in many societies, and separation is considered as a solution for managing solid wastes. Environmental knowledge, attitude and practice of young people (like students) appears to be crucial as their point of view ultimately plays an important role in providing solution to future environmental problems. Like many developmental countries, Palestine suffers from the problem of solid waste, due to many factors such as people's negative



attitude, lack of knowledge and practice towards the process of solid waste separation (Appraisal of PNGO IV, 2010).

Therefore, this study focused more on the students' knowledge, attitude, practices and perception towards solid waste management and its effect on health and environment in Al-Quds University. This study will be a baseline study to help the university decision makers to set a program to have a better response by students for solid waste separation at the university.

## **CHAPTER TWO: LITERATURE REVIEW**

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### **2.1 Introduction**

Solid waste management is the process of collecting, storing, the treatment and disposal of solid waste in such a way that they are harmless to humans, plants, animals and the environment in general (Kofoworola, 2007). The unhealthy disposal of solid waste is one of the greatest challenges facing developing countries. It is a problem recognized by all nations at the 1992 conference on Environment and Development, and regarded as a major barrier in the path towards sustainability (UNCED, 1992).

The common solid waste disposal method used in the West Bank is the use of unsanitary open dumpsites, where all kinds of wastes, including industrial, agricultural, slaughterhouse waste and medical waste are dumped with the municipal solid waste in open, unlined dumpsites (Monjed, 1997). The first sanitary landfill was constructed in Jenin Governorate to serve the northern West Bank. The waste is dumped there as mixed municipal waste and is covered with soil.

A review to several studies showed that solid waste management is influenced by several personal factors which include: attitude, knowledge practice and demographic variables. Several studies have reported the effects of exposure to waste on health. Many toxic substances can be released into the environment from disposal of solid waste, such as Carbon dioxide, Methane, Cadmium and Benzene (Loredana et al., 2010). These pollutants have been shown to be toxic and harmful for human health. The main health outcomes that have been found to be statistically associated with exposure to waste are cancer and congenital malformation (Griffith et. al., 1989). In addition, hazardous waste has been shown to influence the likelihood of developing cancer in the lung, brain and the bladder (Dolk et. al., 1998).

### **2.2 Sources and types of solid wastes**

Solid waste is generated from various sources. These sources relate to the different land uses in a community. The following classifies the sources of solid waste in a community:

1. Residential: this consists of combustible and non-combustible solid wastes from residential areas. It contains materials such as food waste (garbage), paper, corrugated cardboard, plastics, textiles and rubber, leather, wood, and yard wastes. The non-combustible (inorganic) part consists of items such as glass, crockery, tins, cans,

aluminum, ferrous metals and dirt. A great portion of the residential waste are putrescible, that is wastes which decompose quickly, especially in warm weather. These putrescible wastes come from the handling, preparation, cooking and eating of foods. But, bulky items, consumer electronics, batteries, oil and tires as special residential wastes are collected separately. Also, bulky items include large worn-out or broken down items such as furniture, lamps, bookcases, filing cabinets, and other similar items (Tchobanoglous et. al., 1993).

2. Commercial, wastes from these sources are similar to those from residential sources, except for those related to cooking and eating (Tchobanoglous et. al., 1993).

3. Institutional, the generators of this source of wastes include government offices, schools, hospitals, and prisons. The World Bank report mentioned that most hospitals' medical wastes are handled separately from the rest of the solid wastes stream (World bank, 1999).

4. Other source of waste they mentioned is that produced from demolition and construction activities. This results from the repair of individual residences, commercial buildings, and other structures. It may also include wastes from razed buildings, broken-out streets, sidewalks, and bridges (Hydroplan, 2004).

5. Municipal services constitute other waste from street sweepings, roadside litter, municipal litter containers, landscaping and tree trimmings, catch basin debris, dead animals and abandoned vehicles are categorized as wastes from municipal services (Tchobanoglous et. al., 1993).

6. Another sources of wastes include treatment plant wastes, industrial solid wastes, and agricultural wastes (Tchobanoglous et al., 1993).

### **2.3 Solid waste management and solid waste management process**

Management of solid waste has become a major challenge in most cities in developing countries (Water Aid, 2008). It is believed that if solid waste is properly managed, it can be a valuable resource, otherwise, and if not effectively managed, it can become a source of environmental and human hazards. The term solid waste management has been defined differently by different writers and authorities. For example, the Sanitation Connection (2002) defines it as all activities that seek to minimize the health, environmental and aesthetic impacts of solid wastes.

The main components of the solid waste management process include generation, storage, collection, transfer and transport, processing and final disposal. It is also important to include handling in this process because until the waste are placed in storage containers, the way they are handled; especially hazardous waste, is important (Sari, 2012).

#### **2.4 Early and modern solid waste management practices**

Tchobanoglous et. al. (1993) identified the early practices of solid waste management, perhaps before the proliferation of advance knowledge on best ways of managing waste. These practices include: dumping on land, canyons and mining pits, dumping in water , ploughing into the soil , feeding to hogs and burning. These practices are still practiced in these modern times, when we are supposed to find better and sustainable ways of managing waste. In most of the towns and even cities in Palestine these ways of managing solid waste are clearly evident as the inhabitants dump waste in every available open space and depressions. Burning is also not uncommon in both the urban and rural areas of the country. The recent methods of managing solid waste include source reduction, composting, recycling, incineration and sanitary land filling (Tchobanoglous et. al.,1993).

#### **2.5 Studies conducted about SWM in Palestine**

Al-Khateeb (2009) did a study on municipal solid waste management in Jericho and Ramallah cities in the West Bank where he assessed the technical and economic status of existing system. Two types of questionnaires were used, the first for institutions and the second for household survey. It was found that the solid waste management in the study area was not self-sustaining since the overall cost recovery from actual expenditures is 67% and 15% for Jericho and Ramallah respectively, suffering from lack of coordination, primary collection methodology is different, in Jericho it is the curb side collection, while in Ramallah it is community bin collection. A waste physical composition study was performed at two municipal solid waste disposal sites throughout the province with varying demographic and socioeconomic attributes. The results of the municipal solid waste composition survey showed the following results: the organics was 40.15 % , plastics 20.44% , paper and cardboard 21.12% , glass 4.39% and metals 2.43% and for Jericho the organics was 41.63 % , plastic 30.19% , paper and cardboard 10.58%, glass 2.02% and metals 3.23% .

Al-Sa'di (2009) conducted a study which focused on Reuse-recycling and solid waste separation options for MSW at Zahrat Al-Finjan landfill. The options that the study used are separation at source through curbside collection and drop-off centers, separation at transfer station; and separation at Zahrat Al-Finjan landfill. Composition of solid waste has been examined by a pilot separation and the compositions are organic and food wastes, carton and paper, plastic, glass, metals, textile, and others. The average percentage of the organic fraction from the total waste in the different zones is 53.73%, whereas the percent of the other different components is 46.27%.

A local survey indicate that household waste accounts for 45-50 % of the total solid waste, with the construction and industrial sectors together constituting 20-25%, and remaining types (e.g. commercial, institutional) 25-30 % (Al-Khateeb, 2008).

A study on the current solid waste management system in Nablus district, conducted by Abu Zahra (2006), covers the issue from three aspects; the management system, awareness of citizens, and solid waste composition. Around 97% of the populations in Nablus district are located within areas that have a solid waste collection system. There are great variations in the management system between the city and villages, and among different villages. The collection systems in villages vary from one to another according to type of equipment used. Insufficiency of existing labor and equipment, improper disposal of waste in dumping sites, and low fee collection rates, are the main problems in the existing management system. There is no separation of hazardous and medical waste in all localities. These practices increase threat to citizens and the environment.

Different citizens' attitudes toward solid waste management were revealed. Like, readiness of citizens to pay more for better collection system as their income increases, and the readiness of citizens living in separate houses to walk further to containers than citizens living in apartments. There is a good indication about readiness of citizens to separate solid waste into five components for recycling purpose. On the other hand, there is a need to increase citizens' awareness and care about solid waste management issues.

A study in Nablus district shown that the weight composition percentage of the solid waste is 63% organic material, 8% plastics, 3% metals, 3% glass, 10% paper and cardboard, 3% textiles 10% others and inert materials. It is clear that the high portion of solid waste is organic material, as expected in developing countries (Hamadah, 2011).

## **2.6 Solid waste generation in Palestine**

The average Palestinian household produces approximately 4.6 kg/day of solid waste in West Bank and Gaza Strip (PCBS, 2006). The daily generation of solid waste in the Palestinian household is 1,728.2 tons and 1,116 tons in West Bank and Gaza Strip respectively (PCBS, 2006).

According to ARIJ report about the average of solid waste generation per capita in Palestine, it was reported that the average in cities was 0.9 – 1.2 kg / capita/ day, while in towns/ big villages and rural areas such as small villages it was 0.6 – 0.8 kg/capita/ day and 0.4 – 0.6 kg/capita/ day respectively and the average of solid waste generation in the refugee camps were 0.5 – 0.8 kg/ capita/ day (ARIJ, 2009). These results can be related to the fact that citizens lives in cities consume more products than who lives in villages or in camps.

## **2.7 Solid waste characteristics in Palestine**

Several studies over the last decade have included pilot surveys and/or professional estimates of solid waste generation and composition in Palestine. Solid waste in Palestine consists mainly of household waste, building debris, agricultural waste, industrial waste (mainly from workshops), medical wastes, and wastes from car workshops (Al-Sa'di, 2009). Solid waste in Palestine is dumped in the same landfill without separation. Solid waste generation varies between 830 to 894 tons/day in cities and villages and from 276 to 300 tons/day in the refugee camps. Local surveys and estimates indicate that household waste accounts for 45 to 50% of the total solid waste (El- Baba & De Smedt, 2010). It is estimated that more than 65% of the household solid waste consists of organic material. Studies and surveys indicate the composition of solid waste to be as organic materials paper/cardboard plastic glass, metals , and others (Al-Hmaid, 2002). Table (1) shows the characteristics of solid waste in Palestine and three other countries.

**Table 2.1: Characteristics of solid waste stream in four countries**

Country	Organic Materials %	Paper / Cardboard %	Plastic %	Glass %	Metals %	Other
<b>Palestinian Territory</b>	59	15	12	4	4	6
<b>Jordan</b>	50-68	5-10	4-6	2-5	3-6	>5
<b>Israeli Settlements</b>	43	22	14	3	3	15
<b>USA</b>	24	35	11	5	8	11

Source: United nations environment programme (UNEP), (2003). Desk study on the environment in the occupied Palestinian territories.

### **2.8 Responsibility of solid waste management in Palestine:**

After the establishment of the Palestinian National Authority in 1994, many improvements were implemented for solid waste management. Improvements were achieved through projects by donor countries, and legislative and institutional regulations (El-Baba & De Smedt, 2010).

The Palestinian Local Authorities Law No. 1 of 1997 assigns the responsibility of SWM services to local authorities, who are responsible for the collection of waste from streets, houses and public stores as well as for the transportation and disposal of the collected waste. Moreover the law provides for Local authorities to establish Joint Services Councils through which they may collaborate in the delivery of services, including waste management (ARIJ, 2009).

### **2.9 Quantity household waste in Palestine:**

The quantities of waste collection in towns, villages and refugee camps are usually estimated based on the number of people served. The approximate quantity of household waste produced daily was less than 4.0 kg for 74.4% of households in the Palestinian Territory in 2011 and was estimated at more than 7.0 kg for 4.1% of them. The average daily production of household waste in the Palestinian Territory in 2011 was estimated to be 3.0 kg: 3.2 kg in the West Bank and 2.6 kg in the Gaza Strip. The quantity of solid

waste produced daily was 2,152 tons in the Palestinian Territory in 2011 compared with 2,321 tons in 2009 (PCBS, 2011).

**Table 2.2: Quantity of solid waste produced daily and average daily household production of solid waste in the Palestinian territory by region**

<b>Region</b>	<b>Total daily produced quantity (Ton)</b>	<b>Average household daily production (Kg)</b>
<b>Palestinian Territory</b>	<b>2,151.9</b>	<b>3.0</b>
<b>West Bank</b>	<b>1,505.4</b>	<b>3.2</b>
North of West Bank	670.1	3.5
Middle of West Bank	376.0	2.6
South of West Bank	459.3	3.4
<b>Gaza Strip</b>	<b>646.5</b>	<b>2.6</b>

Source: Palestinian Central Bureau of Statistics (2011), Press Release by the Palestinian Central Bureau of Statistics (PCBS) on the Household Environmental Survey. Ramallah, Palestine.

## **2.10 Household waste collection**

Household waste in economically developed countries will generally be left in waste containers or recycling bins prior to collection by a waste collector using a waste collection vehicle (Lyons & Burford, 1993) . In a developing country, the problems of solid waste associated with solid waste management are more acute than developed countries (Zerbock, 2003) . The problem is further complicated by the rapid growth in population and urbanization and lack of environmental education and awareness programs which adds generally to the volume of waste being generated.

Another factor that contributes to the problem of solid waste in developing countries is the lack of proper collection and transportation facilities. In developing countries, the threats posed by improper handling and disposal of solid waste contribute to the high level of mortality and morbidity (Medina, 2002). Human and ecosystem health is also threatened due to the improper handling and disposal of solid waste.

The daily generation of solid waste depends upon several factors such as dietary habits, life style, living standards and the degree of urbanization and industrialization (Park,



2009). The per capita daily solid waste produced ranges between 0.25 to 2.5 kg in different countries (Park, 2009). There is a correlation between improper disposal of solid waste and incidence of vector-borne diseases (Rudresh, 2009).

The improper management and lack of disposal techniques of solid waste pollutes to the environment as it affects water sources; changing the physical, chemical and biological properties of the water. The toxic materials that the solid waste contains contaminate water and it makes the soil infertile and decrease the agricultural productivity (Diaz et. al., 1993).

Due to the improper disposal and lack of solid waste management system drains also get clogged which lead to mosquitoes, which adversely affect human health and cause several diseases such as Malaria, Chichungunya, Viral fever etc (Kaundal & Sharma , 2007).

The problem of solid waste management is continuous due to the growth in the production of waste which is combined with insufficient waste management programmers which poses a serious impact on both environment and health. Across the last decades, waste has become an increasing concern and is recognized as a threat to the sustainability of our environment, and having a negative impact on human health (Manga et. al., 2008).

### **2.11.1 Population knowledge and perception of solid waste and its management**

Knowledge is defined as the understanding of the subject and known information related to it. A person gathers this based on the facts and experiences faced by him and is also passed on to others through various mediums (Collins & Ciesielski, 1994). Knowledge is also a reflection of immediate or general issues, methods, procedures or situations (Bloom et. al, 1971).

In a study, the community's perception and knowledge about household waste and waste management methods showed that the majority of the respondents pointed pesticides, dish water, soap, paints, etc, as hazardous waste. The respondents were not aware of the impact of solid waste on environment (Scudder, 1991).

The participants in a study by Omran et. al. (2009) were asked whether they heard of waste recycling. Race (p-value < 0.004), participants occupation and house type (p-value < 0.001) were significantly associated with awareness of recycling. Also, 82.3% of the respondents got to know about recycling through newspapers with 91% been aware of

ongoing recycling campaign. The second most popular medium is television and radio advertising followed by newsletters and billboards.

A study was conducted to assess peoples' knowledge of solid waste management in selected areas in Metro Manila. A 76% of the respondents claimed they have heard or know of SWM, especially those from Barangay city (Blanda & Constancio, 2000).

Another study was conducted by Arora aimed at investigating knowledge, attitude and practices towards waste Management in selected hostels of students of the University of Rajasthan, Jaipur. It showed that 54% of the respondents could be classified as possessing low knowledge, whilst 46% had a medium level of knowledge regarding waste management (Arora & Agarwal, 2011).

A study in Thailand showed that half of Myanmar migrants was had high knowledge, 36% had moderate knowledge, and 14% had low knowledge about household waste management. However, 83.7% knew that waste is anything without value and one of the environmental problems that need to be solved rapidly (Naing, 2009)

A total of 237 medical science students of the University of Yazd in Iran participated in a survey of KAP study about solid wastes disposal and recycling. The data shows that the knowledge level of 66% of male students was good and moderate, while knowledge of 34% was low. The knowledge of females was lower than males, with a percentage of 51.4% for females. The difference between the knowledge of males and females was significant( $P<0.016$ ) (Ehrampoush & Moghadam, 2005).

According to a study on attitude toward recycling and waste management a survey of marketing students in Sunyani polytechnic, Ghana found that the knowledge level of females was lower than that of males, with 51.4% female's respondent having low level of knowledge. Gender significantly ( $P<0.016$ ) affected knowledge of respondents. Half of the respondents considered recycling as the best means of solid waste disposal with significant majority seeing recycling as economical (Asuamah et. al., 2012).

Knowledge of people on environment in general and waste management in particular has been recognized among the most as crucial factors influencing household recycling (Nixon & Saphores, 2009). It is also recognized as the most determinant of recycling and solid waste management in general though it receives comparatively little attention in academic research (Iyer & Kashyap, 2007). Vicente and Reis (2008) emphasized that the

biggest incentive to foster recycling participation is that participants have sufficient knowledge on recycling which plays a key role in driving people to behave in an appropriate manner. On the contrary, low levels or lack of knowledge would create considerable barriers to action. Furthermore, since increased knowledge leads to substantial changes in individual values and beliefs, behaviour driven by informed knowledge will generate a more sustainable effect on recycling outcomes than behaviour driven by incentives, even after the rewards are withdrawn (Iyer & Kashyap, 2007).

In the university settings, Kelly et al. (2006) found that receiving more information on environmental benefits associated with recycling would make students at Massey University, New Zealand recycle more. A similar study conducted at the Big Ten University (USA) by Kaplowitz et al. (2009) reported contrary findings when students stated that information on how to recycle properly, rather than on how recycling would benefit environment was the key issue to encourage them to recycle more.

Lack of knowledge about what can be recycled and how to recycle poses serious problems to the effectiveness of recycling programs. Being unaware of the types of waste that are recyclable and where to drop recyclables were cited as main reasons for not participating in recycling among students.

### **2.11.2 Population attitude towards solid waste and its management**

According to Gibson et al. (1997) attitude is a mental state of readiness for need arousal. Gibson et al. (1997) states that attitude is a positive or negative feeling or mental state of readiness, learned and organized through experience that exerts specific influence on a person's response to people, objects, and situations.

In a study including hostel students of University of Rajasthan, Jaipur majority of hostel students (64.33%) had less favourable attitude towards waste management and only 6.10% were found to have most favorable attitude (Arora & Agarwal, 2011).

In a survey of marketing among students in Sunyani polytechnic, Ghana, a significant majority of students (85.6%) reported recycling their own waste (Asuamah et. al., 2012).

### **2.11.3 Population practice on household waste management**

It was found that most of the respondents (51.2%) in Muang district had a moderate level of practice towards solid waste management. The cutting point of good practice was higher than 80% of total scores, while it was from 60%-80% of moderate practice of the total scores and that of bad practice was less than 60% of total scores. Researchers found there were a few respondents (16.5%) who had good practice level of household waste management, while (2.2%) had poor practice level. There was a significant difference between knowledge level and practice towards household waste management and there was also highly significant between attitude level and practice toward solid waste management (Naing, 2009).

In the study of the University of Rajasthan students, students who had good practices were assumed to be managing the waste in proper manner and able to protect themselves and the environment from negative impacts of waste. Also, the study findings showed that only 1.33% of the respondents could be classified as having good practices, whilst more than half of the respondents had moderate practices, and nearly half had poor practices towards waste management. The cutting point of good practice was higher than 80% of total scores, while it was from 60%-80% of moderate practice of the total scores and that of bad practice was less than 60% of total scores. This indicates that they need to improve their practices regarding waste management( Arora & Agarwal, 2011).

### **2.11.4 Impact of solid waste on health**

Serious public health problems arise due to uncollected solid waste and waste often leading to many infectious diseases including water borne diseases such as cholera and dysentery. Such incidence of diseases puts additional burden on the scanty health services available in resource poor developing countries. Insect and rodent vectors are attracted to the waste and one may recall that as many as 200,000 people had to flee after the outbreak of pneumonic plague in Surat in Western India (1994) (Pradhan, 2009) . The outbreak is attributed to the uncontrolled fermentation of wastes which created favorable conditions for the breeding and growth of rodents and insects that act as vectors of diseases (Pradhan, 2009). A similar study by WHO (1995) observed in 1994 that 616960 cases of cholera resulting in 4389 deaths were reported in Angola, Malawi, Mozambique and Tanzania (UNCEA, 1996).

In Palestine, the dumping sites are not fenced; adults and children frequently search the garbage there. All kind of collected solid wastes are mixed and dumped together, including hazardous medical wastes generated at the health centers. These wastes are collected and treated in the same way as any other solid waste. The relationship between solid waste and human diseases is intuitively obvious, but difficult to prove. There are many human diseases associated with solid waste. These diseases are supported by the growth of insects and rodents which ultimately transfer these diseases to human beings (Hamadah, 2011).

In the study on the bagging and collection of household solid waste in Brazil, the research was conducted to find out the influence on the three nematodes involving *Ascarislumbricoides*, *Trichuristrichiura* and hookworms in 1893 children from 5 to 14 years of age. The study showed that there was a higher incidence of diarrhea in children living in household with improper collection of solid waste as compared to those in areas with regular collection of solid waste (Moraes, 2007).

In a study for investigated knowledge, perceptions of the risks to health associated with solid waste management, the majority of the respondents believed that allergies (94.7%), cancer (88.9%) and infectious diseases (68.7%) were linked to improper waste management. With regard to attitudes, 94.3% indicated that the number of diseases associated to the environment pollution is increasing and the average perceived risk scores of contracting infectious diseases and cancer due to solid waste management is escalating (Sessa et al., 2009).

Some of the more commonly reported occupational health and injury issues in SWM include back and joint injuries from lifting heavy waste-filled containers and driving heavy landfill and loading equipment, respiratory illness from ingesting particulates, bio aerosols, and volatile organics during waste collection, and from working in smoky and dusty conditions at open dumps, infections from direct contact with contaminated material, dog and rodent bites, or eating of waste-fed animals, puncture wounds leading to tetanus, hepatitis, and HIV infection, injuries at dumps due to surface subsidence, underground fires, and slides, headaches and nausea from anoxic conditions where disposal sites have high methane, carbon dioxide, and carbon monoxide concentrations; and lead poisoning from burning of materials with lead containing batteries, paints, and solders (Cointreau, 2006).

According to a study that was done in Juba town, the common diseases caused by the improper management and disposal of household waste are: diarrhea, malaria, viral disease, eye diseases and skin diseases. Accordingly, about 26% households suffered from diarrhea, 24% household suffered from malaria, 18% from viral disease, 14% from eye disease, 10% from skin disease and 8% from typhoid (Ladu et. al., 2012).

#### **2.11.5 Impact of solid waste on environment**

Solid waste management and disposal release different toxic substances, especially when this waste is burned to reduce its volume. Burning creates thick smoke that contains carbon monoxide, soot, nitrogen oxide and other toxic substances, all of which are hazardous to human health and degrades air quality (Environmental Guidelines for The USAID Latin America and Caribbean Bureau, 2005).

Only a small amount of waste is disposed of in the landfills, most of it is deposited in open dumps or semi-controlled unlined landfills with no ground water protection, leachate recovery, or treatment system, which causes a bleeding of toxic materials and pathogenic organisms from the solid waste into the leachate of dumps and landfills, which lead to ground and surface water contaminated.

In addition solid waste can creates greenhouse gas emissions and other air pollution. When organic wastes are disposed in deep dumps or landfills; they become a significant source of methane, which is a greenhouse gas that is much more powerful than carbon monoxide (Funmilayo, 2005).

According to the U.S. Environment Protection Agency the impact of solid waste on the environment can be summarized as the following; an increase in mercury levels in fish due to disposal of mercury in the rivers, plastic found in oceans ingested by birds which also lead to degrading of the quality of water and soil. Waste breaks down in landfills to form methane, change in climate and destruction of ozone layer due to waste biodegradable, littering due to waste pollutions, illegal dumping, leaching, which is a process by which solid waste enter soil and ground water and contaminating them (U.S. Environment Protection Agency, 2009).

## **CHAPTER THREE: STUDY CONCEPTUAL FRAMEWORK**

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### **3.1 Introduction**

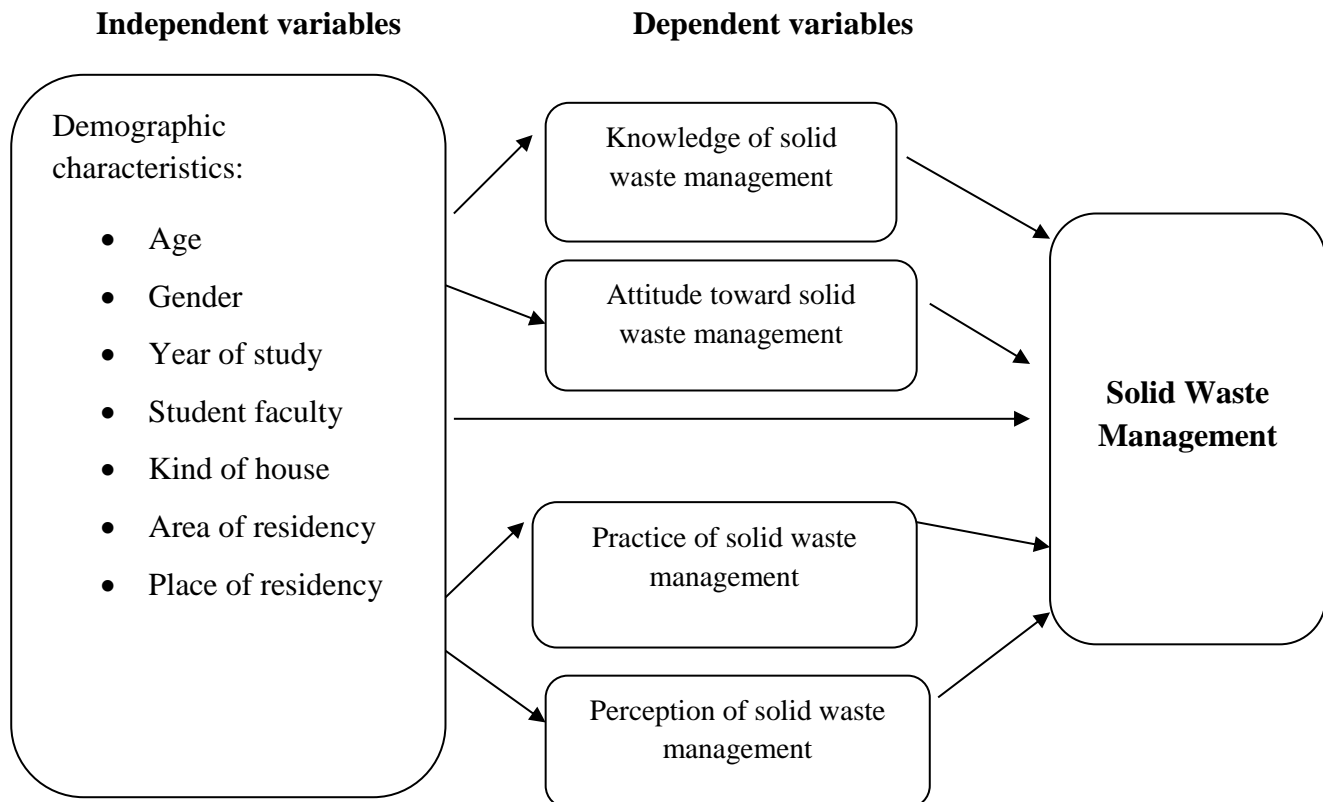
Solid waste management is the process of collecting storing, treatment and disposal of solid waste in such a way that they are harmless to human and environment. Solid waste management is a major responsibility of the local governments. It is a complex operation which depends upon the cooperation between households, communities' private sectors and municipal authorities.

### **3.2 The KAP theory model**

The purpose of this study is to assess students' knowledge, attitude, practice and perception. The study's conceptual framework is derive from theories and models on behavior change that view individuals as active information processors in relation to others and the social environment around them. So, the conceptual framework of this study is based on the KAP theory model. This theory states that people's knowledge, attitude, practice and perception can be improved by education and training (Yun, 2012). The KAP theory model thinking in the field of education is that knowledge effects people attitude directly, and the attitude is transformed into behaviour and practice. Xie (2003) in her study, indicate that when student has a higher level of knowledge, their attitudes will be positive. Therefore this study uses KAPP framework as the base to develop the assessment tool of the study (questionnaire). In this study we adapted the same model used by Rosario et al. (2010), in which they used the Theory of Reasoned Action by Fishbein and Azjen (1975) and behavior change models to set their study conceptual model.

The conceptual framework of this study is presented in figure 3.1. This model is based on the KAPP theory model. The independent variables consisted of the respondents' age, gender, education, and income, which have been shown in past studies to affect the knowledge as well as practice of solid waste management. The dependent variables, on the other hand, included the respondents' knowledge, attitude, practices and perception (KAPP) on solid waste management.

### 3.3 Study conceptual framework



**Figure 3.1 Study Conceptual Framework**

### 3.4 Dependent variables (see annex 1).

In relating to change in habits, behaviour and participation, ‘what do people think about waste’ is a significantly important aspect of solid waste management (Watch, 1999, Maddox et. al., 2011). Therefore, the following dependent variables were investigated.

- Knowledge of solid waste management: refers to information about solid waste management and the student’s ability to answer the questions of solid waste management. These questions are questions 1-15 in the questionnaire.
- Attitude toward solid waste management: refers to the student’s opinion of agreement or disagreement to the statement concerning solid waste management. These questions are question 16 to question 26 in the questionnaire.



- Practice of solid waste management: refers to the behaviours of people to use their knowledge, beliefs and methods of solid waste management. These questions are question 27 to question 33 in the questionnaire
- Perception of solid waste management: refers to the behaviours of students to use their knowledge and understanding of solid waste management. These questions are question 34 to question 37 in the questionnaire

### **3.5 Independent variables** (see annex 1).

It is widely accepted that the success of any program for solid waste management is reliant on public support and participants (Evison & Read, 2001). Also, many studies of solid waste management have found a significant relationship between people's background and their knowledge, attitude and practices toward solid waste management. For instance Raudsepp (2001) reported that gender education and other characteristics influence people attitude. Ando and Gosselin (2005) found that student residence such as single house or apartment in building influence their practices toward solid waste management and recycling. Ying (2010) reported that the year of study, the faculty and the residential colleges of the student has significant study with the knowledge toward solid waste management.

Navez-Bouchaire (1993) stated that the management of household refuse is tied to perceptions and socio-cultural practices which result in modes of appropriation of space which are greatly differenced according to whether the space is private or public. According to Agbola (1993), cultural derivatives, beliefs, perceptions and attitudes are learned response sets. They can therefore be modified or changed through education. This empathises on the fact that people's unconcerned attitudes towards solid waste can be changed for the better through education. According to Pacey (1990), formal education for women is a pre-requisite for change in sanitation behaviour.

These studies are very relevant to our study conceptual framework. University students comes from different areas of the West Bank in Palestine, they live in different type of housing and houses location, and the services provided to solid waste management. Moreover, we assume that the type of education those students exposed to at the

university and the number of years at the university will directly affect their knowledge, attitude, practices and beliefs about solid waste management.

Therefore, the following socio-demographic factors were of concern in this study. These variables constitute part one in the questionnaire (see annex 1).

- Gender
- Year of study: refers to first year, second year, third year, fourth year and fifth year.
- Student faculty: refers to Faculty of Arts, faculty of Da'wa and Religious, faculty of education, faculty of Law, faculty of Science and Technology, faculty of Public health faculty of Dentistry, faculty of Medicine, faculty of Engineering and Graduate Studies.
- Housing: it refers to students' house and it was classified as: separated house, apartment and tent /barks.
- Region of residency: refers to where student live, its classified to North region (Nablus, Tulkarm, Jenin, Qalqelya), South region (Hebron, Bethlehem) and Middle region (Ramallah, Jerusalem, Jericho)
- Place of residency: it refers to students' address and it is classified into city, village and refugee camp.

## CHAPTER FOUR: METHODOLOGY

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### 4.1 Study design

A cross-sectional study was used to select a sample of Al-Quds University students and to assess their knowledge, attitude, practice and perception (KAPP) toward solid waste management (SWM).

### 4.2 Population of the study

All students registered at Al-Quds University in the year 2012.

### 4.3 Sample size

The below formula was used for calculating sample size (Cochran, 1963)

$$n = z^2 pq / d^2$$

$$n = (1.96)^2 * 0.5 * 0.5 / (0.05)^2 = 384$$

Taking the non-responding rate the sample was increased to 500

Where n= minimum sample size

d = error allowance=0.05

p=50% “the estimated prevalence to have the maximum sample size

q=1-p

Therefore, we decided to include about 500 students in this study.

### 4.4 Sampling method

Five hundred and nine students (509 students) were selected from all university students at Abu Dis camps, which presented approximately 5% of the all students. This sample size was divided equally among the three types of faculties present in Abu Dis Camps (table 4.1): the literary faculties (faculty of Administration and Economic Sciences, faculty of Arts, faculty of Da’wa and Religious, faculty of Qur’an and Islamic Studies, faculty of Education and faculty of Law), the science faculties (faculty of Science and Technology, faculty of Engineering, and the Health faculties (Faculty of Public health, faculty of Dentistry, faculty of Medicine, faculty of Allied health professions and faculty of Pharmacy). Then the sample was divided equally by five in each group of faculties,

which is students' year level. The division was done on the assumption that there are differences in knowledge due to student's courses background. Also, it was assumed that students in the first years of university education have less background knowledge than students in the last year of education.

Field workers who participated in data collection were instructed on how to approach students and see if they fit with the specialty, year of study and the faculty the field worker is collecting the data in.

A grab sample of students was taken according to the numbers in table 4.1. So the field workers approached the students regardless of their study year and asked them about their study year and specialty and invited them to participate.

**Table 4.1: Study sample groups**

<b>Groups</b>	<b>Facilities</b>	<b>Total number</b>	<b>Sample size proportional to size</b>
<b>Group 1</b>	Science faculties	2928	142
<b>Group 2</b>	Heath faculties	1806	88
<b>Group 3</b>	Literary faculties	5580	279
<b>Total</b>		10314	509

## **4.5. Study tool**

### **4.5.1 Description of study tool**

The questionnaire was designed by the researcher and thesis supervisor to assess student's; knowledge attitude practice and perception of SW. As well, the information about gender, faculty, year of study, kind of house, place of residency and region of residency were assessed.

The data of this study was collected by a self-administered questionnaire. The questionnaire contains six parts (See Annex 1):

Part 1: Questions to collect information of the socio-demographic characteristics of the students and their levels and types' of education (Questions A-H).

Part 2: Questions related to students' knowledge regarding the effect of solid waste on environment, health and knowledge regarding the importance of solid waste separation at their houses and the university campus (Questions 1-15).

Part 3: Questions related to students' attitude regarding the effect of solid waste on environment, health and knowledge regarding the importance of solid waste separation at their houses and the university campus (Questions 16-26).

Part 4: Questions related to students' practices in solid waste management and its effect on health and environment (Questions 27-33).

Part 5: Questions related to students' perception of the effect of solid waste on environment, health and knowledge regarding the importance of solid waste separation at their houses and the university campus (Questions 34-37).

Part 6: Questions related to access to information about solid waste management (Questions 38-41).

#### **4.5.2 Questionnaire validation and reliability**

The questionnaire was checked by two experts for accuracy, clarity and appropriateness. The questionnaire was modified according to recommendations.

Cronbach's Alpha coefficient was analyzed to assess the reliability of the questionnaire to knowledge, attitude, practice and perception of solid waste management and its effect on health and environment. As shown in table (4.2), KAPP reliability coefficients, questions for knowledge and practices had strong reliability, practices had moderate reliability, but attitude questions had low reliability. This could affect study result, since attitude reliability is low.

**Table 4.2: Reliability test**

<b>KAPP</b>	No. of questions	Reliability analysis (Cronbach's A)
Knowledge	15	0.871
Attitude	11	0.528
Practice	7	0.901
Perception	4	0.693

#### **4.5.3 Questionnaire pilot study**

Questionnaire pilots were carried out on 21 students at Al-Quds University; these students were not included in the final study questionnaires. From the comments of pilot participants, changes in wording and question order had been done, the final questionnaire was then produced.

#### **4.6 Ethical considerations**

The study proposal was approved by the research committee of the School of Public health and the university research committee.

Consent form was prepared. All participants who accepted to participate signed the form before participation after being informed of the study background, aim and objectives.

#### **4.7 Statistical analysis**

Data was entered, cleaned and analyzed using the statistical software package SPSS version 16. Data analysis was conducted to address the specific objectives of the study. About 3% of those approached refused to participate for no known reason.

The questionnaire was filled by 512 students, but 509 were included in the analysis. Three students were excluded because they only filled one page of the questionnaire.

Descriptive statistics using frequency, mean and standard deviation were used to describe the demographic characteristics of the participants. While relationships between the other variables (year of study, faculties, housing, place of residency and region of residency)

and students' knowledge, attitude, practices and perception was done using ANOVA test. The significant level  $p=0.05$  was used.

After scoring of knowledge, attitudes, practices and perceptions indicators questions, Chi-Square test was used to test the relationship between the independent variables on each of the dependent indicators. Scoring of these indicators was done as follows:

- **Knowledge scores:** Knowledge that indicated students' knowledge were questions 1-15: the "Yes" answers get "1" score, while the "No" answer get "0". The sum of each student answers was calculated.

As there were 15 questions, the possible scores ranged from 0-15 and participant's knowledge were classified into three levels. The cut-point for high knowledge was greater than (26.4); for moderate knowledge was from (19.8-26.4) and less than (19.8) for low knowledge (Bloom, 1956).

- **Attitude scores:** Attitude questions are question 16 - 26 in the questionnaire. The "Yes" answers get "1" score, while the "No" answer get "0". The sum of each student answers was calculated.

As there were 10 questions, the possible scores ranged from 0-10 and participant's attitude were classified into two levels. The cut-point for positive attitude was greater than (19.8); for negative attitude was (19.8) or less.

- **Practices scores:** Practices questions are questions 27-33 in the questionnaire. The "Yes" answers get "1" score, while the "No" answer get "0". The sum of each student answers was calculated.

As there were 6 questions, the possible scores ranged from 0-6 and participant's practice were classified into three levels. The cut-point for high practice was greater than (26.4) of total scores; for moderate practice was from (19.8-26.4) of total scores and less than (19.8) for low practice (Bloom, 1956).

- **Perception scores:** Perception questions are question 34-37 in the questionnaire. The "Yes" answers get "1" score, while the "No" answer get "0". The sum of each student answers was calculated.

As there were 4 questions, the possible scores ranged from 0-4 and participant's perception were classified into three levels. The cut-point for positive perception was greater than (19.8); for negative perception was (19.8) or less.

## **CHAPTER FIVE: RESULTS**

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### **5.1 Introduction**

This chapter is divided into three parts. Part one includes the descriptive demographic information of the participants, knowledge; attitude; practice; and perception of participants towards SWM and its effects on health and environment. In part two scoring of knowledge, attitude, practices and perception towards SWM are shown. Part three shows the association between knowledge, attitude, practice and perception of students towards SWM with the various demographic characteristics.

### **5.2 Demographic characteristics of study population**

Table (5.1) shows that 49.2% percent of the participants were females, while 50.2 were males. The distribution by year of study was almost 20% except for 5<sup>th</sup> year participants who were only 6.2%. About 55% were from literary faculties, 27.7% were from science faculties and 17.3% were from health faculties. The sample was distributed evenly between South, North and Middle region of the West Bank. Of participants, 58% were living in villages, and 82% were living in separated houses.

### **5.3 Participants' knowledge of SWM**

According to table (5.2) most participants reported having knowledge about solid waste and its separation. But, 66% believed that burning does not affect the environment and 70% believed it contaminates water and air.

### **5.4: Participant knowledge of the effect of SW on health and environment**

Table (5.3) shows that 19.1% of participants think that SW can cause diseases and environmental pollution. But few knew that it can cause bad odors and attracts insects and rodents which make it a big problem for people living around. Twenty two point nine percent of participants reported that SW cause health problems. Also, contamination to soil was reported by 14% of the participants.



**Table 5.1: Demographic of study population and their residency characteristics**

	Number	Percent (%)
<b>Gender</b>		
Male	257	50.2
Female	251	49.2
<b>Year of study</b>		
First year	145	25.6
Second year	122	21.5
Third year	113	19.9
Fourth year	92	16.6
Fifth-year	37	6.2
<b>Faculties *</b>		
Science faculties	141	27.7
Heath faculties	88	17.3
Literary faculties	279	54.8
<b>Variable (Housing)</b>		
Separated house	418	82.1
Apartment	88	17.4
Tent/barks	1	.2
<b>Region of residency ***</b>		
North	153	30.5
South	162	31.8
Middle	192	37.7
<b>Place of residency</b>		
City	181	35.6
Village	297	58.3
Camps	30	5.9

\*Science faculties :( faculty of science and Technology and Engineering faculty), heath faculties:( faculty of dentistry, faculty of medicine, faculty of pharmacy and faculty of public health); literary faculties: (faculty of arts, faculty of education, faculty of law, faculty of Qur'an and Islamic studies, faculty of Da'wa and religions and faculty of economics)

\*\*North region (Nablus, Tulkarm, Jenin, Qalqelya), South region (Hebron, Bethlehem), Middle region (Ramallah, Jerusalem, Jericho).

**Table 5.2: Participants' knowledge of SWM**

<b>Statements</b>	<b>N</b>	<b>Percent (%)</b>
<b>Knowing the definition of SW</b>		
Yes	498	97.8
No	11	2.2
<b>Knowing that SW can be separated</b>		
Yes	486	95.5
No	22	4.5
<b>Knowing the definition of SW recycling</b>		
Yes	461	90.6
No	47	9.2
<b>Best way to SWM is separation</b>		
Yes	427	83.9
No	81	15.9
<b>SW can cause contamination to air and water</b>		
Yes	439	86.2
No	70	13.8
<b>Burning SW does not cause problems</b>		
Yes	66	13
No	443	87
<b>SW affects health</b>		
Yes	470	92.3
No	39	7.7
<b>SW affects environment</b>		
Yes	492	96.7
No	17	3.3

### **5.5 Participants knowledge of SW types and separation content**

Table (5.4) shows the participant's knowledge about hazardous waste content. Fifteen point seven percent of participants reported that car tires are a hazardous waste while 10.6% reported that medical waste is a hazardous type of waste. Also, 23.8% of participants seen that paper and carton are items that can be recycled. Thirty nine point nine percent of the participants knew that organic waste is the main waste that present in household waste, and 30% knew that paper and cartoons are the main content of university SW.

**Table 5.3: Participants knowledge of the effect of SW on health and environment**

	Number	Percent (%)
<b>Problems caused by solid waste</b>		
Spread of diseases	97	19.1
Environmental pollution	98	19.3
Increased insects	39	7.7
Increased rodents	17	3.3
Bad odours	52	10.2
<b>Effects of SW</b>		
Health problems	116	22.9
Environmental problems	77	15.2
Soil contamination	29	14.0
Ground water contamination	71	5.7
Air contamination	11	2.2
<b>Health effects caused by hazardous waste</b>		
Gastroenteritis	52	10.2
Diarrhea	16	3.1
Hepatitis	25	4.9
Eczema	47	9.2
Skin diseases	74	14.5
Respiratory disease	110	21.6
Cancer	39	7.7
Lung cancer	2	0.4

**Table 5.4.a: Participant knowledge of SW types and separation content**

Statements	Number	Percent(%)
<b>Type of hazardous waste</b>		
Car batteries	63	12.4
Industrial oils	73	14.3
Car tires	80	15.7
Medical waste	54	10.6
Organic waste	66	13.0
Household waste	11	2.2
Metals	2	0.4
All of them	100	19.6
<b>Items to be recycled</b>		
Paper + cartoon	121	23.8
Plastic	101	19.8
Organic	44	8.6
Metals	90	17.7
Others(wood, electronic equipment,...)	73	14.5
<b>Solid waste composition at household</b>		
Paper + cartoon	54	10.6
Plastic	50	9.8
Organic	203	39.9
Metals	7	1.4
Clothes	55	10.8
Organic + clothes	63	12.4
Organic+ plastic	66	13
<b>Solid waste composition at university</b>		
Paper + cartoon	157	30.8
Plastic	110	21.6
Organic	75	14.7
Metals	16	3.1
Laboratory wastes	77	15.1

**Table 5.4.b: Participant knowledge of SW types and separation content(cont.)**

Statements	Number	Percent
Paper + cartoon +plastic	14	2.8
Organic +Paper + cartoon	23	4.5
Organic + Laboratory wastes	10	2

### 5.6 Level of knowledge of solid waste management (research question 1).

In order to summarize knowledge of SWM, level of knowledge of SWM among Al-Quds university students was shown in table (5.5). More than two thirds of participants (76.6%) had high level of knowledge about solid waste management, while 21% had moderate level of knowledge about SWM, only 2.3% had low level of knowledge.

**Table 5.5: level of knowledge of SWM**

Level of knowledge	Frequency	%
High knowledge (>26.4)	390	76.6
Moderate knowledge(19.8-26.4)	107	21
Low knowledge(<19.8)	12	2.3

### 5.7 Participant's attitude towards SWM

Table (5.6) shows that most participants (87%) agree that SW should be separated in the university; such as metals, glass, paper and carton, medical wastes and organic substances. In addition half of the study participants care about SWM such as reducing or recycling it. However, 16% believed it's not feasible and 10% believed there are no enough resources to do it. High percentage (76.8%) knew that SW is a practice without a value. Education about SMM was believed by the majority to be started at schools and should be government's responsibility, however, 55.8% of the participants said they will commit themselves for waste separation if it is set in the university and 60.3% will commit themselves for waste separation at household if it was supported.

**Table 5.6: Participant’s attitude toward SWM and its effect on health and environment**

<b>Statement</b>	<b>No.</b>	<b>Percent (%)</b>
Should SW be separated?		
<b>Yes</b>	443	87.0
<b>No</b>	65	12.8
Participants who care about SWM such as reducing or recycling		
<b>Yes</b>	298	58.5
<b>No</b>	208	40.9
Know about a project of SW separation		
<b>Yes</b>	221	43.4
<b>No</b>	288	56.6
Recognizes SW separation containers		
<b>Yes</b>	441	86.6
<b>No</b>	66	13
Agree to separate SW in the university		
<b>Yes</b>	298	58
<b>No</b>	208	41.8
<b>Reason for not using the system</b>		
Lack of resources	60	11.8
High cost of equipment	13	2.6
Difficulty of separation	84	16.5
I do not want benefit any one	29	5.7
SW is anything without value		
<b>Yes</b>	391	76.8
<b>No</b>	114	22.8
Education about SWM should be started at schools		
<b>Yes</b>	463	91
<b>No</b>	45	8.8
Governments should activate SWM		
<b>Yes</b>	443	87
<b>No</b>	65	12.8
Commit self for household SW separation if a project is present		
<b>Yes</b>	284	55.8
<b>No</b>	217	42.6
Commit self to separate SW out of the house if it was supported		
<b>Yes</b>	307	60.3
<b>No</b>	201	39.5

### **5.8 Level of attitude toward solid waste management (research question 2)**

In order to summarize the attitude toward solid waste management, the distribution of attitude toward solid waste management was shown in table (5.7). There were 74.1% of the participants shown a positive attitude toward SWM, while 25.9% had a negative attitude toward SWM.

**Table 5.7: level of attitude toward SWM**

<b>Level of attitude</b>	<b>Frequency</b>	<b>%</b>
Positive attitude (>19.8)	377	74.1
Negative attitude( $\leq$ 19.8)	132	25.9

### **5.9 Participant's practice of SWM**

Table (5.8) shows that most participants (67%) reported that they collect household waste in a bag inside closed containers. On the other hand, the majority remove their household waste by placing in municipality containers, and few (4.7%) reported burning it. Similarly, many participants (61.7%) reported removing university waste by placing it in traditional containers. Results show consistency of participant's behaviours in university and household, since the majority of them behave in the same way, they use municipality containers to getting rid of household waste and using the traditional containers to getting rid of university waste.

### **5.10 Level of practice of solid waste management (research question 3)**

In order to summarize participant's level of practice of solid waste management, the distribution of level of practice was shown in table (5.9). Forty five point five percent of the participants shown a moderate level of practice of solid waste management, while 17.4% of them shown a low level of waste management.

**Table 5.8: Participant's practice of SWM**

<b>Statements</b>	<b>No.</b>	<b>Percent (%)</b>
Presence of public SW containers in your neighbourhood		
<b>Yes</b>	448	88
<b>No</b>	60	11.8
Using public containers in your neighbourhood		
<b>Yes</b>	435	85.5
<b>No</b>	70	13.8
<b>Collecting household waste</b>		
In a bag inside closed container	341	67
In a bag inside open container	117	23
In a closed container	29	5.7
In an open container	20	3.9
<b>Getting rid of household SW</b>		
Place it in municipality containers	373	73.3
Place it outside door when collectors pass	103	20.2
Burning it	24	4.7
<b>Getting rid of university waste</b>		
Place it in traditionally containers	314	61.7
Place it in separation containers	191	37.5
<b>Reuse of SW</b>		
Put the remaining of vegetables as agriculture fertilizers for plant	194	39.1
Offer the remaining of food for domestic animals	293	57.6
<b>Waste that can be separated from other wastes</b>		
Metals	96	18.9
Glass	157	30.8
Paper and cartons	69	13.6
Medical waste	81	15.9
Organic substances	105	20.6



**Table 5.9: level of practice of SWM**

Level of practice	Frequency	%
Good practice (>26.4)	189	37.1
Moderate practice(19.9-26.4)	231	45.5
Poor practice(≤19.8)	89	17.4

### 5.11 Participant's perception of SWM

Table (5.10) shows that 59.7% of participant had good perception of SWM and 72% are ready to make separation. Students perceived SWM to have a positive effect on health and environment. But less than half of them perceived burning these waste as a hazard on health and environment.

**Table 5.10: Participant's perception of SWM**

Statement	No.	Percent(%)
Have positive perception of SWM		
<b>Yes</b>	304	59.7
<b>No</b>	205	40.3
Ready to separate SW		
<b>Yes</b>	368	72.3
<b>No</b>	138	27.1
Opinion on SWM		
Benefit for health and environment	455	89.4
Separation is insufficient	26	5.1
Do not care about separation of SW	20	3.9
Disposal of SW by burning		
Believe that SW affected health	244	47.9
Believe that SW affected environment	156	30.6

### 5.12 Level of perception of solid waste management (research question 4)

In order to shown participants' perception of solid waste management, the distribution of level of perception of SWM was shown in table (5.11). Eighty two point nine percent of the participants shown a positive perception of SWM, while only 16.8% shown a negative perception of SWM.

**Table 5.11: level of perception of SWM**

Level of perception	Frequency	%
Positive perception (>19.8)	422	82.9
Negative perception(≤19.8)	86	16.8

**5.13 Access to information about SWM**

Table (5.12) shows that 71.9% of the participant got information about SWM and were mostly having it at schools (44%). But, 79.8% still wanted to receive more information about waste management especially SW disposal

**Table 5.12: Access to information about solid waste management**

Statement	No.	Percent
Have you ever get information concerning SWM		
<b>Yes</b>	366	71.9
<b>No</b>	141	27.7
<b>Who provide the information on SWM</b>		
School	226	44.4
University	65	12.8
Learnt by self	40	7.9
NGOs	18	3.5
TV shows	25	4.9
Do you want SWM information		
<b>Yes</b>	406	79.8
<b>No</b>	102	20
<b>Which topic about SWM do you want to know about?</b>		
SW separation	75	14.7
SW collecting	16	3.1
SW disposal	209	41.4
All mentioned	110	21.6

#### **5.14 Relationship between demographic characteristics and knowledge, attitude, practice and perception of solid waste Management (research question 5):**

Table (5.13) shows that there was no significant difference in knowledge, attitude, practice and perception of males and females ( $p=0.631, 0.062, 0.551, 0.627$  respectively). This also applies for their housing type and place of residence.

However, results show that there were significant differences in knowledge of SWM among students by their year of study ( $p=0.013$ ). Participants from the third and fourth year of study shown higher level of knowledge of SWM than who were in first and second year of study, but not in their attitudes, practices and perception of SWM. In addition, there were significant differences in knowledge and attitude among students in the various faculties ( $p=0.001, 0.004$  respectively). Moreover, knowledge of SWM was different among students coming from different areas in the West Bank ( $p=0.028$ ). Participant came from North and South of West Bank shown higher level of knowledge of SWM than who came from Middle of West Bank, but not in their attitudes, perception and practices ( $p=0.602, 0.686, 0.970$  respectively).

##### **5.14.1 Relationship between demographic characteristics and levels of knowledge about solid waste management.**

Results in table (5.14) showed that the participants' faculty ( $p=0.018$ ), year of study ( $p=0.036$ ) and place of residency ( $p=0.023$ ) were significantly associated with their knowledge about solid waste management, participants in the third (87.6%) and fourth (86.9%) year of study shown a higher level of knowledge of solid waste management than who were in the first and second year of study (53.1%, 68% respectively), also participants in the science (86.5%) and health faculties (68.1%) showed a higher level of knowledge than who were in the literary faculties (34.4%). In addition participants cited in a city (73.3%) shown a higher level of knowledge about solid waste management than who lived in villages (39.3). On the other hand gender, housing and region of residency were insignificant associated with their knowledge toward solid waste management ( $p=0.551, 0.130, 0.893$  respectively).

**Table 5.13: Relationships between demographic characteristics and knowledge, attitude, practice and perception toward solid waste management**

		Knowledge		Attitude		Practice		Perception	
		Mean±SD	P value	Mean SD	P value	Mean SD	P value	Mean SD	P value
Gender	Male	31.7±4.79	0.631	7.6±1.74	0.062	9.0±1.66	0.551	5.0±1.00	0.627
	Female	32.3 ±4.69		7.7±1.51		9.1±1.70		5.1±1.00	
Year of study	First	31.4±4.96	0.013	7.4±1.61	0.360	8.8±1.57	0.066	4.8±0.95	0.037
	Second	31.4±4.14		7.7±1.63		9.1±1.79		5.1±1.04	
	Third	32.0±4.67		7.8±1.52		9.1±1.65		5.1±1.05	
	Fourth	33.0±4.80		7.7±1.65		9.0±1.76		4.8±0.99	
	Fifth	33.6±5.23		7.5±1.92		9.4±1.51		5.1±0.790	
Faculties	Science	34.4±4.63	0.001	7.8±1.65	0.004	9.2±1.71	0.066	5.1±0.93	0.537
	Heath	33.7±5.39		7.1±1.50		8.7±1.43		5.0±0.99	
	Literary	32.7±4.47		7.7±1.61		9.0±1.72		4.9±1.05	
Housing	Detache d house	32.0±4.77	0.750	7.6±1.63	0.412	9.0±1.66	0.050	5.0±1.00	0.269
	Apartme nt	36.8±4.88		7.9±1.64		9.0±1.68		5.1±1.00	
	Tent/bar kes	29.±0.		8.±0.		5.0±.		5.0.	
Region of residency	North	32.5±4.48	0.028	7.7±1.49	0.602	9.1±1.63	0.970	4.9±1.00	0.686
	South	32.2±5.08		7.5±1.67		9.0±1.78		5.0±0.96	
	Middle	31.1±4.61		7.7±1.75		9.0±1.63		5.0±1.02	
Place of residency	City	31.5±5.28	0.215	7.8±1.54	0.023	9.0±1.70	0.693	5.0±1.01	0.801
	Village	32.3±4.50		7.5±1.64		9.0±1.65		5.0±1.00	
	Refugee campus	32.1±3.43		8.2±1.85		9.3±1.68		4.9±0.94	

**Table 5.14: Relationship between demographic characteristics and levels of knowledge about solid waste management.**

		Knowledge levels N(%)			X <sup>2</sup>	P value
		High level	Moderate level	Low level		
Gender	Male	111(43.1%)	66(25.6%)	45(17.5%)	2.833	0.551
	Female	190(75.6%)	50(19.9%)	11(4.3%)		
Year of study	First	77(53.1%)	55(37.9%)	13(8.9%)	0.484	0.036
	Second	83(68%)	30(24.55)	9(7.3%)		
	Third	99(87.6%)	12(10.6%)	2(1.7%)		
	Fourth	80(86.9%)	9(9.7%)	3(3.2%)		
	Fifth	19(51.3%)	11(11.9%)	7(7.6%)		
Faculties	Science	122(86.5%)	13(9.2%)	6(4.2%)	3.553	0.018
	Heath	60(68.1%)	23(26.1%)	5(5.6%)		
	Literary	96(34.4%)	111(39.7%)	73(26.1%)		
Housing	Detached house	189(45%)	163(38.9%)	66(15.7%)	3.471	0.130
	Apartment	68(77.2%)	17(19.3%)	3(3.4%)		
Region of residency	North	104(67.9%)	31(20.2%)	19(12.4%)	0.940	0.893
	South	89(54.9%)	47(29%)	32(19.7%)		
	Middle	73(38%)	69(35.9%)	50(26%)		
Place of residency	City	133(73.3%)	89(49.1%)	44(24.3%)	3.077	0.023
	Village	117(39.3%)	113(38%)	67(22.5%)		
	Refugee camps	11(36.6%)	9(30%)	10(33.3%)		

**5.14.2 Relationship between demographic characteristics and levels of attitude toward solid waste management.**

Results in table (5.15) shown that there was a significant association between participants' attitude toward solid waste management and there faculties (p=0.027). Participants in the science and health faculties (79.4%, 73.8% respectively) shown more positive attitude than who were in the literary faculties (37.6%). But, students' gender,

year of study, housing, region of residency and place of residency were insignificantly associated with their attitude ( $p>0.05$ ).

**Table 5.15: Relationship between demographic characteristics and levels of attitude toward solid waste management.**

		Attitude levels N (%)		X <sup>2</sup>	P value
		Positive attitude	Negative attitude		
Gender	Male	178(69.2%)	79(30.7%)	0.113	0.897
	Female	203(80.5%)	48(19%)		
Year of study	First	103(71%)	42(28.9%)	2.689	0.354
	Second	98(80.3%)	24(19.6%)		
	Third	79(69.9%)	34(30%)		
	Fourth	66(71.7%)	26(28.2%)		
	Fifth	22(59.4%)	15(40.5%)		
Faculties	Science	112(79.4%)	29(20.5%)	1.140	0.027
	Heath	65(73.8%)	23(26.1)		
	Literary	105(37.6%)	174(62.3%)		
Housing	Detached house	312(74.6%)	106(25.3)	0.002	0.931
	Apartment	72(81.8%)	16(18.1%)		
Region of residency	North	114(74.5%)	39(25.4%)	0.028	0.943
	South	131(80.8%)	61(37.6%)		
	Middle	99(51.5%)	93(45.4%)		
Place of residency	City	92(50.8%)	89(49.1%)	1.613	0.143
	Village	121(40.7%)	176(59.2%)		
	Refugee camps	9(30%)	21(70%)		

### 5.14.3 Relationship between demographic characteristics and levels of practice of solid waste management.

Results in table (5.16) shown that there was a significant association between participant kind of house and there practices of solid waste management ( $p=0.030$ ). Participants lived in an apartment (81.8%) shown more good practice than who lived in their own houses (42.8%). But gender, year of study, faculty, region of residency and place of residency were insignificant associated with participants attitude ( $p>0.05$ ).

**Table 5.16: Relationship between demographic characteristics and levels of practice of solid waste management.**

		Practice level N(%)			X <sup>2</sup>	P value
		Good practice	Moderate practice	Poor level		
Gender	Male	123(47.8%)	56(21.7%)	78(30.3%)	0.805	0.527
	Female	193(76.6%)	48(19%)	10(3.9%)		
Year of study	First	69(47.5%)	60(41.3%)	16(11%)	2.250	0.354
	Second	70(57.3%)	33(27%)	19(15.5%)		
	Third	101(89.3%)	10(8.8%)	2(1.7%)		
	Fourth	79(85.8%)	9(9.7%)	4(4.3%)		
	Fifth	19(51.3%)	7(7.6%)	11(11.9%)		
Faculties	Science	113(80.1%)	17(12%)	11(7.8%)	2.180	0.427
	Heath	63(71.5%)	21(23.6%)	7(7.9%)		
	Literary	86(30.8%)	121(43.3%)	73(26.1%)		
Housing	Detached house	179(42.8%)	168(40.1%)	71(16.9%)	6.674	0.030
	Apartment	72(81.8%)	13(14.7%)	3(3.4%)		
Region of residency	North	97(63.3%)	34(22.2%)	22(14.3%)	0.544	0.723
	South	107(66%)	23(14.1%)	32(19.7%)		
	Middle	81(42.1%)	69(35.9%)	42(21.8%)		
Place of residency	City	123(67.9%)	94(51.9%)	49(27%)	1.376	0.343
	Village	101(34%)	127(42.7%)	69(23.2%)		
	Refugee camps	9(30%)	9(30%)	12(40%0		

**5.14.4 Relationship between demographic characteristics and levels of perception of solid waste management.**

Results in table (5.17) shown that there was a significant differences between students' year of study and their perception of solid waste management (p=0.010), since participants in the fourth and third year of study (78.2%, 72.5% respectively), shown more positive perception of solid waste management than who were in the first (54.4%) and second (56.5%) year of study. On the other hand, gender, kind of house, faculty, region of residency and place of residency were insignificant associated with participants perception of solid waste management and its effect on health and environment (p>0.05).

**Table 5.17: Relationship between demographic characteristics and levels of perception of solid waste management.**

		Perception levels N (%)		X <sup>2</sup>	P value
		Positive attitude	Negative attitude		
Gender	Male	188(73.1%)	69(26.8%)	3.317	0.201
	Female	198(78.5%)	54(21.4%)		
Year of study	First	79(54.4%)	66(45.5%)	0.324	0.010
	Second	69(56.5%)	53(43.4%)		
	Third	82(72.5%)	31(27.4%)		
	Fourth	72(78.2%)	20(21.7%)		
	Fifth	22(59.4%)	15(40.5%)		
Faculties	Science	99(70.2%)	42(29.7%)	0.043	0.502
	Heath	62(70.4%)	26(29.5%)		
	Literary	97(34.7%)	182(65.2%)		
Housing	Detached house	238(56.9%)	180(43.1%)	1.009	0.531
	Apartment	81(92%)	7(7.9%)		
Region of residency	North	102(66.6%)	51(33.3%)	0.005	0.743
	South	111(68.5%)	81(50%)		
	Middle	89(46.3%)	103(53.6%)		
Place of residency	City	91(50.2%)	90(49.7%)	3.941	0.563
	Village	101(34%)	196(65.9%)		
	Refugee camps	9(30%)	21(70%)		



## **CHAPTER SIX: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

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The main purpose of this study is to assess the level of knowledge, attitude, practices and perception of Al-Quds university students of solid waste management and its effect on health and environment. In this chapter, the researcher will discuss the main findings of this study and compare it to other studies results worldwide. At the end of the chapter the conclusion of the study and recommendation are presented.

### **6.1 Knowledge indicators and its determinants.**

In this study the researcher found that 71.9% of the respondents got information about SWM. The most common source of this information is schools (44%), and 91% believed that this knowledge should begin at the schools. This opinion is of great importance since educating children at early age about solid waste management affects their commitment to this process when they are older. The results are consistent with a Malaysian study that conducted to investigate householders' attitudes to the recycling of solid wastes in Malaysia which showed that a majority (91%) got information about solid waste, but, their source of information was television (82.8%) (Omran et.al, 2009). However, integrated use of all media can increase public participation; increasing household participation in the process of solid waste management must be carried-out using all available media, such as radio networks and television, as well as newspapers, to increase public awareness about the importance of solid waste management and disposal.

Results shown that 97% of respondents in this study had knowledge about solid waste management, and around 95% of them had knowledge about solid waste separation and solid waste recycling. While in assessing participant's level of knowledge about SWM, 76.6% of the participants shown a high level of knowledge, while 21% of them had a moderate level of knowledge. These results are in agreement with Mesgarof et.al study (2001). Therefore, in this study participants had the good level of knowledge of solid waste management, but they haven't got the proper facilities to practice this knowledge. This indicates that students at Al-Quds University are ready, by their knowledge, to start separation of solid waste if the university starts a project of SW separation at the university.

This study showed that the participants (84%) reported that separation is the best way to manage solid waste, and 87% of participants believed that burning solid waste may cause problem to both health and environment. Moreover, analysis found that 92% of the respondents believed that solid waste can adversely affect human health, and 97% believed that solid waste can affect environment. Around 22% thought that respiratory diseases were a possible kind of health effect that is caused by hazardous waste, while 10% seen that gastroenteritis might be caused by exposure to hazardous waste. These results are in agreement with Karout and Al-Tuwaijri study (2012) which shows that around 4% of respondents believe that gastroenteritis is caused by hazardous waste. Based on the above facts, personal experience in day to day life many people are unaware of the proper solid waste disposal and its harmful effects on health and environment, so it will increase the possibility of occurring of such mentioned health problems caused by exposure to hazardous waste.

This study showed that the most produced household solid waste was organic materials (40%), but paper and cartons were the mostly produced from university solid waste (31%). We also found that industrial oils (14.3%) and car tires (15.7%) were reported to be the most produced hazardous waste. In a study by Ky (2010), the most produced household solid waste was also organic materials (79.1%), and this could be related to the population growth and the increased demand on food and other organic materials.

The study results showed that there was a significant difference between students' year of study and their knowledge towards solid waste management ( $p=0.013$ ). In addition there was a significant difference between students' faculty and their knowledge towards solid waste management ( $p=0.001$ ). These findings disagrees with Ying study (2010) which indicates that there is no significant differences between students year of study and their knowledge ( $p=0.484$ ) and students faculty and their knowledge toward solid waste management ( $p=0.265$ ). This could be related to the fact that students in first year of study may be less diligent in their habits and behaviors than older students, in addition participants who were in the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> years of study may got more information about solid waste management and its effect on health and environment and may they be more concern about solid waste separation than participant who were in the 1<sup>st</sup> and 2<sup>nd</sup> year of study.

In assessing the relationship between demographic characteristics and levels of knowledge about solid waste management, results shown that there were a significant association between students' knowledge about solid waste management and its effect on health and environment and there year of study ( $p=0.030$ ), there faculties ( $p=0.018$ ) and there place of residency ( $p=0.023$ ). Results found that participants in the third (87.6%) and fourth (86.9%) year of study shown a higher level of knowledge of solid waste management than who were in the first and second year of study (53.1%, 68% respectively), also results found that participants in the science (86.5%) and students in the health faculties (68.1%) showed a higher level of knowledge than who were in the literary faculties (34.4%). In addition participants came from North West bank (67.9%) showed a higher level of knowledge about solid waste management than who came from South of Middle areas of the West bank (54.9%, 38% respectively). These results contributed to the fact that science and health participants might have courses on the effect of solid waste on health and environment and on environmental pollution or other similar subjects. In addition people who reside in cities possess more information about solid waste management and they know this information possibly by using networks and reading newspaper. While people who reside in villages have less information about solid waste management and they possibly receive their information from television and radios. Moreover, participants from villages or camps may not be aware about solid waste management, because most of services or programs concern solid waste management always conducted in cities not in villages or camps. Moreover, in villages peoples get rid of their waste by themselves due to lack of programs and services for solid waste disposal, while In the refugee camps, most solid waste collection and transport is carried out by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) which uses disposal sites operated by local authorities and it didn't have any programs for solid waste management.

## **6.2 Attitudes indicators and its determinants**

In assessing respondent attitudes toward solid waste management this study analysis shown that most participants (87%) agree that solid waste should be separated and 74.1% of them shown a positive attitude toward SWM. The findings of this study was consistent with the results in Hamadah (2011) study in Tulkarem governorate that investigated residence opinion on solid waste which showed that 81.8% of the respondents agree to

start solid waste management through separation. These results are inconsistent with Ifegbesan (2010) in his study exploring secondary school students' understanding and practices of waste management in Ogun State in Nigeria, showed that significant majority (85.6%) agree with recycling as a method of solid waste management and disposal. Also in assessing university students attitudes towards solid waste management in Iran authors showed that 59% of student seen that recycling is the best way of solid waste management (Amini & Ramazani, 2001). However, peoples' attitude toward solid waste management can be improved by conducting a complete system for solid waste management in the whole society and by educating the public about such procedure.

The participants of this study were ready and were committed to separate solid waste management (60.3%) in the household. University students in Iran were shown to believe more in solid waste separation with a rate of (87%), which is much higher than the results (Amini & Ramazani, 2001), and results of Tulkarem governorate residents (81.8%) (Hamadah, 2011). But, the findings of the current study are similar to the Malaysian householders which indicate that 59.9% are ready to separate solid waste (Omran et. al., 2009). This means that students are ready to separate, and this was supported by their beliefs that the government should have an active role in solid waste management (87%). They know the importance of the process of solid waste separation and they commit to separate solid waste, which emphasise the relationship between knowledge, attitude and practices (Saphansithi, 2000)

In the scoring of attitude indicators there was no significant difference between gender and attitudes towards solid waste management ( $p=0.062$ ). The findings of this study are similar to the finding of a study on Nigerian householders which showed no significant difference between gender with attitude towards solid waste management (Momoh & Oladebeye, 2010). But they are inconstant with the findings if a study on Hebron district which showed that there was a significant differences between males and females ( $p<0.05$ ) (Al-Khatib et. al., 2014). However, a study in Ghana reported that males shows negative attitude towards solid waste management than in Sunyani polytechnic towards solid waste management ( $p=0.037$ ) (Asuamah et. al., 2012). Also, a study in Philippines reported a significant difference between males and females attitudes toward solid waste management ( $p<0.05$ ), females shown more positive attitudes toward solid waste management than males (Rosario et. al., 2010). Another study in Tonga showed no

significant association between gender and place of residency with attitude toward solid waste management ( $p>0.05$ ). Lutui justified these results that females got less information about solid waste management than males (Lutui, 2001). However, these results can be related to the fact that in many countries of the developing countries such as Ghana, Tonga and others, the current practices of handling household waste is mainly the responsibility of women, inconsistent with Palestine, men share of the waste management responsibility with women, this situation may cause the differences in attitudes toward solid waste management between males and females.

The current study showed that scores of attitudes was significantly associated with students' faculty ( $p=0.004$ ). Participants in the science and health faculties had much better attitude towards SWM than participants in literary faculties and this could be related to their concern about human health and environment. In addition, science and health participants might have courses on environmental pollution or other similar subjects. The students in the Iranian study who believed that the best method for disposal was segregation at home were students in the fields of medicine, dentistry and public health (Ehrampoush & Moghadam, 2005).

In assessing the relationship between demographic characteristics and attitude levels toward solid waste management, results shown that there was a significant association between participants' attitude toward solid waste management and their faculties ( $p=0.027$ ). Participants in the science and health faculties (79.4%, 73.8% respectively) shown more positive attitude than those who were in the literary faculties (37.6%). These results can be contributed to the fact that science and health participants might have courses on the effect of solid waste on health and environment and on environmental pollution or other similar subjects.

### **6.3 Practices indicators and its determinants**

About 88% of the study participants had home collection services around neighbourhoods, which are of higher than those seen in other countries like Ghana where the coverage was 80% (Boadi & Kuitunen, 2005). Also participants reported that they dispose waste mainly in a bag inside closed containers (67%) and 23% were disposed in closed ones. This finding is consistent with a study in Myanmar where about 62% of

waste was disposed in open containers, while 37.8% were disposed in closed ones (Ky, 2010).

The participants of the current study reported that it is difficult to separate solid waste (16.5%) and 41% refused to do it. Another reason for refusal was lack of resources (11.8%). This result was inconsistent with a study conducted among householders in Tulkarem governorate, where 65% reject to separate solid waste because participants believed they lack time (20.4%) and absence of place for separation (15.8%) (Hamadah, 2010). In assessing participant's level of perception of SWM, 84% of the participants shown a positive perception of SWM, while 15.9% had a negative perception of SWM.

However, peoples' practices of solid waste can be improved by several method such as; programs for training children about solid waste management practices can be incorporated into the primary school, where they could be trained to handle wastes wisely from early ages. Also, training parents to train their children may be considered, in consultation with government and/or non-government organization. Organizations such as Ministries of Education and Health should be requested for resources and people to conduct and assist such programs. Moreover, these results lead to the importance of integrated solid waste management which has been defined by Tchobanoglous et al. (1993) as the selection and application of appropriate techniques, technologies, and management programs to achieve specific waste management objectives and goals. Integrated solid waste management considers how to manage solid waste in a way that prevents harm to humans and the environment. In addition problems can be solved more easily in combination with other aspects of the waste system than individually; public, private, and informal sectors can be included in the waste management plan.

The scoring of practices indicators showed that participants' type of housing was significantly associated with student's practice of solid waste management ( $p=0.050$ ). Participant's lived in apartments shown higher level of practices of solid waste management than who lived in their own houses. However, this was not associated with participants' knowledge, attitude and perception of solid waste management. These results disagree with Ky (2010) study in which type of housing was not associated with people practices of solid waste management ( $p>0.05$ ). In this study, about 82% of participants had their own houses, 17% lived in apartments.

In assessing the relationship between demographic characteristics and levels of practice of solid waste management, the main factor that determined those participants' practices was type of house ( $p=0.30$ ) of participants. This result disagrees with Ky's (2010) study in which they showed that there were no significant differences between types of houses and practices toward solid waste management ( $p=0.461$ ). Participants' lived in an apartment (81.8%) shown more good practice than who lived in their own houses (42.8%). These results lead to consider that problems of the environment and of domestic hygiene are always related to poverty of population and the sanitation of settlements. Most cities and towns in developing countries are characterized by over-crowding, congestion, inadequate water supply and inadequate facilities of disposal of human excreta, waste water and solid wastes. Inadequacy of housing for most urban poor invariably leads to poor home hygiene. Personal and domestic hygiene practices cannot be improved without improving basic amenities, such as water supply, waste water disposal, solid waste management and the problems of human settlements.

#### **6.4 Perception indicators and its determinants**

Among the participants, 82.9% had positive perception of solid waste management and 72% are ready to separate waste. Despite this result which indicates positive perception of the participants of SWM, it was not consistent with their practices toward SWM, which indicate the inability to transfer knowledge of what needs to be done into action or behaviour. Around 90% of participants viewed solid waste management such as separation and recycling as a benefit for health and environment. These results are higher than a study in Nablus district in which 40% perceived recycling of SW to have a benefit on environment (Hamadah, 2011). However, the more important aspect is the ability of the individuals to assimilate and interpret the information gain from education, building knowledge through a process of learning, which would give them the ability to act. In order to transfer the knowledge into practice or good environmental behaviour the students' perceptions and attitude have to be change. It is hope that the knowledge gain from the education and awareness programmes given should at least improve the way in which waste is managed within the university.

In the scoring of perception indicators, students' year of study was significantly associated with students' perception of SWM ( $p=0.037$ ). In addition in assessing the relationship between demographic characteristics and perception levels of solid waste

management, results shown that there was a significant differences between students' year of study and their perception of solid waste management ( $p=0.010$ ), since participants in the fourth and third year of study (78.2%, 72.5 respectively), shown more positive perception of solid waste management than who were in the first (54.4%) and second (56.5%) year of study. Participants in the advanced years (3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> years) reported more positive perception of solid waste management than participants in the first, second or third year of study. This can be related to the fact that students were in the first and second year of study did not understand their roles and responsibilities in health and environment protection. Moreover, participants were in the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> year of study may get more information about solid waste management and disposal, so the shown more positive perception of solid waste management than participant in the first and second year of study. This study agree with a case study of a university in Malaysia by Asmawati (2009), which indicate that students' year of study was significantly associated with students perception of SWM ( $P<0.05$ ).

## **6.5 Conclusions**

As a conclusion, the six objectives of this study are achieved. Respondent's knowledge of solid waste management and its effect on health and environment was good. They understand the definitions of solid waste management separation and recycling. They also believe in the effect of solid waste on health and environment. In term of attitudes toward SWM, half of the respondents' cared about SWM such as reducing or recycling it. Regarding student's practice, the majority of participants using the public SW containers in their neighbourhood. Students perceived SWM to have a positive effect on health and environment. Regarding the accessibility to the solid waste management information and services, the majority of the respondents got this information from schools.

Many factors such as gender, student' faculty, student's year of study, student's kind of house, place of residency and region of residency have significant differences or association with one or more of student's knowledge, attitude, practice and perception toward solid waste management and its effect on health and environment.

Regarding the factors influencing students' knowledge, attitude practices and perception toward SWM, there was significant difference between student's faculty and their attitude toward solid waste management and its effect on health and environment. While student's



kind of house was significantly associated with student's practice toward solid waste management, also there is a significant difference between students region of residency (north, south or middle) and their knowledge towards solid waste management. Analysis showed that there is a significant difference between students' year of study and their knowledge of solid waste management, and student's year of study was significantly associated with student's perception of solid waste management and its effect on health and environment. The variable student's faculty was significantly associated with student's knowledge and attitude toward solid waste management and its effect on health and environment.

knowledge of students is good but still not as desired since the scores of its indicators showed that the majority of student got information about solid waste management and they have good level of knowledge and scores of indicators also shown that students' perception toward solid waste management was positive but it did not help to transfer this knowledge and their perception into actions since their practices toward solid waste management was not good. This means we need to work on such parameters at the schools or at university level.

Regarding the accessibility to the household waste management information and services, almost all respondents got information about solid waste management from schools, university, TV shows or other sources, which highlights the importance of these resources in changing behavior and attitudes toward SWM.

## **6.6 Recommendations**

There are several suggestions and recommendation that are based on the analysis of the results of study. These recommendations are classified into four areas.

### **6.6.1 Recommendations for universities and university students**

- Universities should start solid waste separation and recycling so it can be a model for all communities.
- Awareness campaigns should start from universities to involve the community for SWM.

- Besides authority enforcement, students' willingness to participate plays a very important role. Students should bear the responsibility to take the action to separate solid waste as well.
- Students who have knowledge about the importance of solid waste management, such as those of science colleges and those in advanced years (3<sup>rd</sup> and 4<sup>th</sup>) are encouraged to have a part in increasing the awareness of their colleagues about this demanding topic. Also, students themselves should try their best to instil the separation habit among themselves, after the facilities are prepared, for the students to use.

### **6.6.2 Recommendations for university policy makers**

- **More action oriented projects:** More action oriented projects should be organized for students. These projects should focus on increasing student's practices toward solid waste management and its effect on health and environment. Through these projects on solid waste management, student can have more in-depth insight of solid waste management, and could start to take action in solid waste separation or recycling.
- **Provide facility for solid waste management:** It is recommended to increase the number of separation bins in the university, to include all the area at the university. The existence of the separation bins would encourage the students think twice when they discard their waste. They will choose the separation bins instead of the traditional rubbish bins.

### **6.6.3 Recommendations for community leaders**

- Advocacy campaign should be initiated by the community to enforce the governmental sector to work on solid waste management, in particular the hazardous waste.
- Provision of proper facilities for collection, storage and disposal of hazardous waste (including exporting such waste to other countries for treatment) are recommended.
- Public awareness campaigns should seek to inform the public about proper waste management, change consumption patterns and lifestyles, and encourage participation in the management of wastes (such as sorting and recycling).

#### **6.6.4 Recommendations for future research**

- This study was done on university students. Community studies have been done in studies that were concerned with household waste but did not concentrate on the health effects. Therefore, we recommend to carry out a study at the community that assesses KAPP of SWM and its effect on health
- A KAPP study on school children need to be conducted since it is the age when attitudes and behaviour change are more sustainable for any interventions afterwards.
- Also, we need a study of the community level, since separation of SW is very important at the household level, schools, and health agencies, governmental and non-governmental organization.
- Intervention studies should be done to see the gaps in implementing the solid waste separation. And since there is a student initiation project for solid waste separation, this project should be evaluated.
- There should be comparative studies between Al-Quds university and other universities and colleges to compare the students' knowledge, attitude, practice and perception about solid waste management.

#### **6.7 Study limitations**

There are certain limitations to this study which include:-

- This study was done at Al-Quds University only and so the findings could not be generalized to the whole Palestinian population.
- This study showed the knowledge, attitude practice and perception toward SWM in general. The findings might not be exactly the same with assessing KAPP of management of specific waste disposal.
- Other limit is that this survey developed its analysis based mainly on respondent's self-reported behaviour which may yield reporting bias. Qualitative studies using focus group, discussions or face-to-face interviews may provide additional information which we might lose using structured questionnaires as done in this study.

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## Annex 1

### CONXENT FORM

بسم الله الرحمن الرحيم

تحية طيبة وبعد

تقوم الباحثة حنان ماجد محمد ابو علان بعمل دراسة بعنوان ادارة النفايات الصلبة وتأثيرها على الصحة والبيئة: تقييم المعارف والمواقف والسلوك والادراك لدى طلاب جامعة القدس. يطلب منك التطوع بالمشاركة في البحث الذي تجريه الباحثة وكمشارك في هذه الدراسة ستكون هويتك ومعلوماتك الشخصية سرية في جميع المنشورات المتعلقة بنتائج الدراسة. ان تعبئتك الاستمارة بصدق وموضوعية سيكون له الاثر الكبير على دقة هذه الدراسة المقدمة للحصول على درجة الماجستير في الصحة العامة من جامعة القدس.

شاكرين لكم حسن تعاونكم ومشاركتكم.

الباحثة: حنان ابو علان

## Questionnaire

دراسة حول فصل النفايات الصلبة وتأثيرها على الصحة والبيئة

القسم الاول : معلومات عامة

الجنس: 1-ذكر 2-أنثى

رقم المتسلسل للطالب/ة:		العنوان:	
رقم الجوال	رقم الجوال	1- مدينة	2- قرية
3- مخيم	3- خيمة/ بيت شعر/ باركس	1- بيت مستقل	2- شقة في مبنى او عمارة
الكلية	الكلية	1- كلية الاداب	2- كلية الدعوة واصول الدين
3- كلية الحقوق	3- كلية الحقوق	4- كلية الصحة العامة	5- كلية العلوم التربوية
6- كلية العلوم والتكنولوجيا	6- كلية العلوم والتكنولوجيا	7- كلية الهندسة	8- كلية طب الاسنان
9- كلية الطب البشري	9- كلية الطب البشري	1- اولى	2- ثانية
1- مستوى الدراسة	1- مستوى الدراسة	3- اولى	4- ثانية
2- ما هو تخصصك؟	2- ما هو تخصصك؟	5- اولى	6- ثانية
		7- اولى	8- ثانية
		9- اولى	10- ثانية
		11- اولى	12- ثانية
		13- اولى	14- ثانية
		15- اولى	16- ثانية
		17- اولى	18- ثانية
		19- اولى	20- ثانية
		21- اولى	22- ثانية
		23- اولى	24- ثانية
		25- اولى	26- ثانية
		27- اولى	28- ثانية
		29- اولى	30- ثانية
		31- اولى	32- ثانية
		33- اولى	34- ثانية
		35- اولى	36- ثانية
		37- اولى	38- ثانية
		39- اولى	40- ثانية
		41- اولى	42- ثانية
		43- اولى	44- ثانية
		45- اولى	46- ثانية
		47- اولى	48- ثانية
		49- اولى	50- ثانية
		51- اولى	52- ثانية
		53- اولى	54- ثانية
		55- اولى	56- ثانية
		57- اولى	58- ثانية
		59- اولى	60- ثانية
		61- اولى	62- ثانية
		63- اولى	64- ثانية
		65- اولى	66- ثانية
		67- اولى	68- ثانية
		69- اولى	70- ثانية
		71- اولى	72- ثانية
		73- اولى	74- ثانية
		75- اولى	76- ثانية
		77- اولى	78- ثانية
		79- اولى	80- ثانية
		81- اولى	82- ثانية
		83- اولى	84- ثانية
		85- اولى	86- ثانية
		87- اولى	88- ثانية
		89- اولى	90- ثانية
		91- اولى	92- ثانية
		93- اولى	94- ثانية
		95- اولى	96- ثانية
		97- اولى	98- ثانية
		99- اولى	100- ثانية

القسم الثاني : اسئلة المعرفة knowledge

1-	هل تعلم ما المقصود بالنفايات الصلبة؟	نعم	لا
2-	هل تعلم انه يمكن فصل النفايات الصلبة؟	نعم	لا
3-	هل تعلم ما هو تدوير النفايات الصلبة؟	نعم	لا
4-	هل تعتقد بأن الحل الامثل لإدارة النفايات الصلبة في المنزل هو فصلها؟	نعم	لا
5-	النفايات الصلبة هي واحدة من المشاكل التي تسبب تلوث الهواء والماء	نعم	لا
6-	جميع انواع النفايات يمكن التخلص منها عن طريق الحرق دون ترك أي أثر على البيئة	نعم	لا
7-	هل تعتقد أن للنفايات الصلبة أثر على صحتك	نعم	لا

8-	هل تعتقد أن للنفايات أثر على البيئة؟	نعم	-لا
9-	برأيك ما هي المشاكل الناتجة عن تراكم النفايات الصلبة؟ (متعدد الاجابات)	انتشار الامراض	تلوث البيئة
		زيادة أعداد الحشرات	زيادة أعداد القوارض
		الروائح الكريهة	
		غيرها	حدد:
10-	برأيك ما هي الأمراض التي قد تنتج عن تراكم النفايات الصلبة؟ (متعدد الاجابات)	أمراض معوية (التهاب المعدة والامعاء)	الاسهال
		التهاب الكبد	الحساسيات مثل الاكزيما
		امراض جلدية	امراض الجهاز التنفسي مثل الربو
		السرطان	
		غيرها	حدد:
11-	ما هي النفايات الخطرة؟ (متعدد الاجابات)	بطاريات السيارات	الزيوت الصناعية
		اطارات السيارات	المخلفات الطبية
		المخلفات العضوية	النفايات المنزلية
		غيرها	حدد:
12	برأيك ما هي المشاكل التي قد تنتج عن النفايات الخطرة؟ (متعدد الاجابات)	مشاكل صحية	تلوث التربة
		تلوث المياه الجوفية	
		غيرها	حدد:
13	ما هي النفايات التي تعتقد أنه يمكن إعادة استخدامها (تدويرها)؟ (متعدد الاجابات)	الورق والكرتون	البلاستيك
		المواد العضوية	المعادن
		الزجاج	الاجهزه الالكترونية
		الاجهزه الكهربائية	الاخشاب
		غيرها	حدد:
14	بتقديرك ما هي النفايات الأكثر انتاجا في المنزل؟ (متعدد الاجابات)	المواد العضوية (الطعام)	-ورق وكرتون
		بلاستيك	خشب
		معادن	-زجاج



	اقمشة وملابس		
حدد:	غيرها		
	المواد العضوية	بنقدريك ما هي النفايات الاكثر انتاجا في الجامعة؟ (متعدد الاجابات)	15
-ورق وكرتون	بلاستيك		
خشب	معادن		
-زجاج	مخلفات المختبرات		
المواد الكيماوية	غيرها		
حدد:			

### الجزء الثالث : اراء واتجاهات Attitude

لا-	نعم	هل تعتقد بوجوب تدوير النفايات الصلبة في الجامعة؟	16
لا-	نعم	هل لديك علم باي مشروع لفصل النفايات في الجامعة؟	17
لا-	نعم	هل لاحظت وجود حاويات خاصة لفصل النفايات الصلبة في الجامعة؟	18
لا-	نعم	هل أنت ممن قد تلتزم بفصل النفايات الصلبة في المنزل؟	19
لا-	نعم	هل أنت ممن قد تلتزم بفصل النفايات الصلبة خارج المنزل؟	20
لا-	نعم	النفايات هي كل ما هو غير مفيد وتعتبر واحدة من المشاكل البيئية	21
لا-	نعم	هل تهتم بإدارة النفايات الصلبة(مثل تقليلها او اعادة استخدامها)؟	22

لا-	نعم	إذا تم اقامة مشروع لفصل النفايات في الجامعة هل ستشارك فيه؟	23
تكلفة لوازم الفصل مرتفعة	عدم توفر الامكانيات اللازمة للفصل.	إذا كانت اجابتك لا, لماذا؟	24
لا أريد افادة أحد من الفصل	صعوبة الفصل		
	غيرها, حدد:		

25	تعليم كيفية فصل النفايات الصلبة وطرق التخلص منها يجب أن تبدأ من المدرسة؟	نعم	-لا
26	هل تعتقد بأن للحكومة دور مهم في تفعيل عملية فصل وإدارة النفايات الصلبة ؟	نعم	-لا

القسم الرابع

Practice سلوكيات

27	هل يوجد في محيطك حاويات عامة للتخلص من النفايات المنزلية؟	- نعم	- لا
28	هل تستخدم تلك الحاويات للتخلص من النفايات المنزلية؟	- نعم	- لا
29	كيف تقوم بجمع النفايات في المنزل؟	-جمعها في أكياس داخل حاوية مغلقة	-جمعها في اكياس داخل حاوية مكشوفة
		-جمعها في حاوية مغلقة	-جمعها في حاوية مكشوفة
30	كيف تتخلص من النفايات الصلبة في منزلك؟	-وضعها في حاوية البلدية.	-وضعها امام المنزل ليتم جمعها لاحقا من قبل عمال البلدية
		-حرقها	-غيرها, حدد.....
31	كيف تتخلص من النفايات الصلبة في الجامعة؟	-وضعها في الحاويات التقليدية.	-وضعها في الحاويات المخصصة لفصل النفايات
		3-غيرها, حدد.....	
32	إذا أردت إعادة استخدام بعض النفايات الصلبة, فكيف يمكنك ذلك؟	-استخدام بقايا الطعام كسماد للتربة	-استخدام بقايا الطعام لإطعام الحيوانات المنزلية.
		-غيرها, حدد.....	
33	ما هي النفايات التي قد تقوم بفصلها عن باقي النفايات؟	-المعادن	-الزجاج
		-الورق والكرتون	-المخلفات الطبية
		-المخلفات العضوية	-
			غيرها, حدد.....

القسم الخامس: الادراك

### PERCEPTION

34	لدي الادراك الكافي لعملية فصل النفايات الصلبة؟	-نعم	-لا
35	أنا على استعداد للمشاركة بعملية فصل النفايات؟	-نعم	-لا
36	ما هي نظرتك لعملية فصل النفايات الصلبة؟	-تفيد الانسان والبيئة	-غير مجدية
		-لا اهتم بها	-غيرها, حدد.....
37	ما هي نظرتك لعملية التخلص من النفايات عن طريق حرقها؟	-ملوثة للبيئة	-مضرة بالصحة
		-غيرها, حدد.....	

القسم السادس : الوصول الى المعلومات الخاصة بالنفايات الصلبة وإدارتها :

38	هل حصلت من قبل على أي معلومات حول ادارة النفايات الصلبة؟	-نعم	-لا(إذا لا جاب السؤال الثالث)
39	كيف حصلت على تلك المعلومات؟	-المدرسة	-الجامعة
		مؤسسات خاصة	بحثت عنها بنفسي
		غيرها, حدد.....	
40	هل تريد الحصول على معلومات حول إدارة النفايات الصلبة؟	-نعم	-لا

-جميع النفايات	-فصل النفايات	41 ما هي المعلومات التي ترغب بالحصول عليها.	
غيرها حدد.....	-طرق التخلص من النفايات		