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M.Sc. Program in Water and Environmental Science

M.Sc. Thesis

**Environmental Assessment of Household Hazardous Waste Management  
in Hebron City**

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**June, 2014**  
**Birzeit, Palestine**

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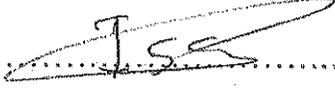
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## List of Abbreviations

CHD	Congenital Heart Disease
CV	Coefficient of Variation
EPA	Environmental Protection Agency
HHP	Household Hazardous Product
HHW	Household Hazardous Waste
HHWM	Household Hazardous Waste Management
HW	Hazardous waste
LQG	Large-Quantity Generator
Max	Maximum
Min	Minimum
MSW	Municipal Solid Waste
PCBC	Palestinian Central Bureau of Statistic
SD	Standard Deviation
SW	Solid Waste
SWM	Solid Waste Management
SWMD	Solid Waste Management District
WB	West Bank
WHO	World Health Organization

## **Dedication**

**Thanks to God, who created me, and enabled me to study and work, and to convey my regards, respect and homage to the nation first and great teacher profit, Mohammed (May God bless and grant him), who taught the humanity how to learn and teach, who taught us, the purpose of science and life,**

**This work is dedicated to my parents who devoted their life to me, my brothers, and my sisters**

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## الملخص

تعالج هذه الأطروحة التقييم البيئي لإدارة النفايات المنزلية الخطرة في مدينة الخليل عن طريق معرفة أنواع النفايات المنزلية الخطرة ونسبها، وأيضاً من خلال معرفة مستوى وعي أرباب الأسر فيما يتعلق بالمخاطر الناتجة عن التعامل مع النفايات المنزلية الخطرة، وكيفية جمع هذه المواد والتخلص منها. وكذلك التعرف على درجة الحوادث والإصابات المتعلقة بالتعامل مع النفايات المنزلية الخطرة.

وقد تم توزيع استبيان بين الأسر، وكانت هناك 385 شملهم الاستطلاع، تم تحليل البيانات لمعرفة مؤشرات مختلفة. أيضاً، تم إجراء تحليل للنفايات الصلبة المتولدة خلال فترة أربعة عشر يوم عمل للكشف عن المكونات المختلفة للنفايات المنزلية الخطرة ومعرفة نسبها. من خلال هذا التحليل تم تحليل 115 عينة تزن 14.56 طن من النفايات الصلبة المنزلية في مدينة الخليل من محطة نقل النفايات الصلبة.

تظهر النتائج وجود خطر كبير مرتبط بإدارة النفايات المنزلية الخطرة، خاصة أن نسبة الأطفال الذين يقومون بنقل النفايات الصلبة من المنزل الى الحاوية قد بلغت 40.2% مع المخاطر المحتملة للحوادث، وبلغت نسبة حاويات جمع النفايات المنزلية التي تبعد عن المنزل مسافة أكثر من 150 متراً 19%؛ مما يزيد من المخاطر المحتملة. يتم زيادة المخاطر من خلال معرفة أن 27.2% من الأطفال يلعبون بالقرب من حاويات النفايات الصلبة. هذه المخاطر المحتملة حقيقية، حيث تبين من النتائج أن 18.5% من المنازل وجد فيها حوادث متعلقة بالنفايات المنزلية الخطرة. وكانت الحوادث إما إصابات (42%)، أو تسمم (36%) أو حروق (22%).

وتتعلق العوامل الاجتماعية والاقتصادية لمواقف وممارسات المواطنين فيما يتعلق بالنفايات الخطرة المنزلية. حيث كان المواطنون المتزوجون أكثر استعداداً لفصل النفايات المنزلية الخطرة عن النفايات الأخرى (73%) مقابل (60%) من غير متزوجين. كذلك تبين أن الأسر الكبيرة (أكثر من 7 أفراد) لديها لديها فرصة أكبر لوقوع حوادث متعلقة بالنفايات المنزلية الخطرة (34%)، مقابل 10% فقط في الأسر الصغيرة (أقل من 5 أعضاء). وكان من المثير للاهتمام أن نجد أن الأطفال من شريحة الدخل المتوسط (الدخل هو 400-600 دينار) لديها أعلى نسبة من اللعب بالقرب من الحاويات (36%)، مقارنة مع شريحة ذوي الدخل المنخفض جداً (أقل من 200 دينار) حيث بلغت نسبتهم 16%. كذلك تبين أن الحاويات المتوفرة بحجم غير كاف للنفايات، بحيث تفيض النفايات حولها أكثر جذب للأطفال للعب حولها (32%)، مقابل 20% للحاويات التي تتوفر بحجم كاف.

تحتوي النفايات المنزلية حوالي 1% من وزنها نفايات منزلية الخطرة. المنتجات المنزلية تشكل النسبة الأكبر من النفايات المنزلية الخطرة (42%)، تليها منتجات السيارات (17.2%)، ومنتجات العناية الشخصية (15.4%)، ومنتجات الرعاية الصحية (12.3%). منتجات العناية الشخصية هي الأكثر فئة من النفايات المنزلية الخطرة يتم طرحها عشوائياً (78.7%)، في حين كانت منتجات السيارات هي الأقل (40.9%).

العكس من ذلك، فئة منتجات السيارات كان يتم الاحتفاظ بمعظمها لعملية الجمع (30.9%) من النفايات المنزلية الخطرة وكذلك لإعادة التدوير (12.1%) مقارنة مع الفئات الأخرى.

لمواجهة تحديات المخاطر والأخطار المرتبطة بالنفايات المنزلية الخطرة ، ينبغي اعتماد استراتيجية الوعي لتنظيمها وتنفيذها من خلال إطار مؤسسي على جميع المستويات وبجميع الوسائل وتوجه إلى جميع أصحاب المصلحة.

ينبغي اعتماد نهج الإدارة المتكاملة لنفايات الصلبة في جميع مراحلها بداية من تولدها، والتعامل معها، وجمعها، ونقلها، والتخلص منها. وينبغي اعتماد التدخل وابتكار الحلول، من بين هذه قد تكون فصل النفايات الخطرة عند المصدر، وفصل النفايات المنزلية الخطرة في مكب النفايات عن النفايات الأخرى، والتعاون مع القطاع الخاص لإعادة الاستخدام أو إعادة المردود الاقتصادي للتدوير من النفايات المنزلية الخطرة. وينبغي إجراء المزيد من الدراسات حول مسألة النفايات المنزلية الخطرة إلى التركيز على هذا الموضوع الذي أهمل في معظم الوقت، وفي معظم الأماكن. وينبغي أن تشمل الدراسات حوادث النفايات المنزلية الخطرة، والتأثير المفصل للعادات والظروف الديموغرافية للمواطنين، والممارسات والسلوكيات تجاه النفايات المنزلية الخطرة ، وللكشف عن الفروق بسبب الاختلافات الجغرافية والتحضر.

## **Abstract**

This thesis handles the Environmental assessment of Household Hazardous Waste Management (HHW) in Hebron city by finding out HHW types and proportions, and also by dedicating the level of awareness of household heads in regard to knowledge of risks and dangers associated with HHW items, knowledge how to handle, collect and dispose these substances, in addition to investigation of the accidents and injuries that are occurring because of these substances.

A questionnaire was distributed among households and there were 385 respondents, data was analyzed to figure out different indicators. Also, analysis of the generated SW was carried out during a fourteen working days period to detect different HHW components and their proportions. Through this analysis 115 samples weighing 14.56 tons of domestic solid waste at Hebron solid waste transfer station were analyzed.

Results show the great risk associated with HHW especially that kids are transferring SW from home to container (40.2%) with the potential risk of accident, containers in some cases are more than 150 m away from home (19%) increasing the potential risk. The risk is increased by knowing that 27.2% of kids are playing near the SW containers. These potential risks are real, as in 18.5% of houses there was an accident related to HHW risks. Accidents were either injuries (42%), or poisoning (36%) or burns (22%).

Socioeconomic factors were related to attitudes and practices of citizens in regard to HHW. Married citizens were more willing (73%) to separate HHW from other waste compared to single (60%). Larger families (more than 7 members) have the highest probability of HHW accident (34%), compared to small families (less than 5 members) where the percentage is only 10%. It was

interesting to find that kids from the medium income level (Income is 400-600 JD) have the highest percentage of playing near the containers 36%, compared with very low income level (less than 200JD) where the percentage is only 16%. Containers which size are insufficient and overflow were attracting kids to play around (32%) more than containers of sufficient size (20%).

Domestic waste contains 1% by weight HHW. Home products constitute the largest percentage of HHW (42.3%), followed by automotive products (17.2%), and personal care products (15.4%), and healthcare products (12.3%).

Personal care products are the most category of HHW that is thrown randomly (78.7%), while automotive products were the least (40.9%). Contrary, the automotive products category was the most kept for HHW collection (30.9%) and also for recycle (12.1%) compared to other categories.

To meet the challenges of the risks and dangers associated with HHW, organized awareness strategy should be adopted and implemented through institutional framework on all levels and through all means and to be directed to all stakeholders.

Integrated solid waste management approach should be adopted to cover all the SW issues from generation, handling and collecting, transfer, and disposal. Intervention and innovation solutions should be adopted, among these may be separation HHW at source, separation of HHW at landfill from other waste, and cooperation with private sector for economical reuse or recycle of HHW. Further studies on the issue of HHW should be carried out to focus on this subject that is neglected most of the time and in most places. Studies should cover the HHW accidents, detailed effect of citizens habits and demographic conditions on their practice and behavior toward HHW, and to detect differences due to geographic and urbanization variations.

# Chapter One

## Introduction

### 1.1 General Background

It is well known that every household contributes to hazardous waste by some mean or another. There is still a many of arguments regarding this issue. How hazardous waste is produced, how it is collected, and what is its destiny still a hot issue and it is under the spot. A lot of legal arguments and discussions were devoted for this miscellaneous subject. It should be bear in mind that all households are contributing to hazardous waste by a way or another. The degree of contribution, the level of hazardous, and the frequency of this distribution is the subject of most studies (Burnley et al., 2007).

The presence of hazardous and toxic materials in the waste should make a challenge for the public. One should make use of that threat in increasing the public awareness regarding the potential effect of these hazardous. By this a better SWMS should be developed that takes into consideration the hazardous and toxic components of SW (Aprilia et al., 2013).

EPA developed a four points system as criteria for classifying SW as hazardous. This system includes the points as listed below:

- If the waste was harmful chemicals, or it contain part of these chemicals. By this it may cause threat to human health and may impose reverse effects on the environment. If special measures are not taken, this waste is dangerous, and known as toxic wastes.
- If the components of waste are dangerous chemicals (or part of it). By that it may cause threat to human health and pose reverse effects on the

environment especially when it is not managed properly. Such wastes are known as acutely hazardous wastes.

- If the waste contains some or all of the four hazardous characteristics of waste which are toxicity, ignitability, reactivity, and corrosivity. By attaining some or all of these characteristics it will be considered hazardous waste.
- The waste will be considered hazardous if the EPA believes for any reason that it falls under the categories developed by congress describing the hazardous waste (EPA, 2005).

According to the EPA Wastes - Hazardous Waste - International Waste Activities, Hazardous household waste (HHW) refers to the type of household waste containing materials, which have one characteristic or more of the following:

1) Ignitable wastes: these include any waste that can burn or catch fire easily and keep burning and sustain combustion. These include several paints, cleaning materials and other industrial wastes that may cause such a hazard of fire. Regarding the liquids, EPA adopted a test called the flash point which is a mean for detecting whether a waste (liquid) is ignitable enough to be taken care of through regulating it as hazardous. A solid waste is considered hazardous if it burns spontaneously under normal conditions of handling and thus burns quickly so it may be a cause of hazard and danger.

2) Corrosive wastes: the materials that flesh or corrode metal or any material that may cause such effect are considered corrosive. Alkaline and acidic wastes are considered under this category. Examples of this type of waste are sulfuric acid that is originated from vehicles batteries. Two criteria are being used by EPA in order to define corrosive HW. If the pH was greater than or

equal to 12.5 - for aqueous wastes - they are considered as alkaline corrosive wastes. If the Ph was lower than or equal to 2 they are considered as acidic corrosive wastes. The third criteria for classifying the waste as corrosive are for the case it can corrode steel through a special experiment adopted by EPA.

3) Reactive waste: If the waste can react violently it will be classified under this category. Some examples of this type are discarded ordnance and or explosive materials. There is no satisfactory method to check the potential possibility of waste to explode or react in a violent way under normal conditions. So it is adopted by EPA to use judgment in order to detect the possible reactivity of these wastes. EPA uses only narrative description to define reactive wastes.

4) Toxicity characteristic: For determining the toxicity characteristics waste a special procedure is carried out. This procedure includes analyzing the leachate coming out from the waste and is called Toxicity Characteristic Leaching Procedure (TCLP). There are 39 chemicals which are classified as toxic, if any of these materials were present in the leachate, and then it is considered as toxic. The origin of the waste and the experience judgment is also an important factor for determining whether the waste is toxic or not.

In some literature, the Household hazardous waste (HHW) is defined as disposed materials generated by households, and because of to its dangerous properties, it may cause presumed adverse effects to the environment or human beings or wildlife. Household Hazardous Waste includes many materials that may be classified under the preceding definition. Examples of that is any material that is ignitable, corrosive, poisonous, toxic, or reactive. Herbicides , pesticides, mercury and mercury tools like thermometers, oil-based paint, different categories of batteries, kerosene, antifreeze, gasoline, motor oil, drain

cleaners, paint thinner, turpentine, pool chemicals, and many different cleaning materials indoor, or outdoor cleaning, and in maintenance of vehicles are all examples of HHW. It is agreed that the disposal of such wastes will harmfully affects the environment, and the danger is that usually household waste is exempted from regulations governing the disposal of hazardous waste. Therefore, these hazardous wastes are generated into the system and in most time no one is paying attention for them (Kies Strategies, 2008).

HHW should be collected in a different stream from other domestic waste. This is to decrease the management difficulties associated with this type of waste. The separation should also be in the landfill, where it is treated before and taken care in a professional manner in order to reduce emissions from the main waste streams (Fjelsted and Christensen, 2007).

HHW is the unused, discarded, component of household wastes that contain chemicals of toxic nature, or labeled poisonous, flammable, reactive, explosive, or corrosive. Such wastes should be disposed in a special procedure, taking care of its hazardous nature. If such wastes are buried it may infiltrate through ground polluting groundwater. Sewerage networks may be destroyed because of the presence of corrosive chemicals. If HW is burned, their hazardous components will be distributed over a larger area polluting the air and atmosphere. If HW of liquid nature were poured over soil, it may poison water, ground, and vegetation (Hassanv and et al., 2011).

In another definition of hazardous waste, it is any disposed material that may impose adverse effects or harms to any living creature or to nature. The generation of these wastes is from a wide category of sources. This includes and not restricted to factories, construction sites, factories, military bases, hospitals and thrown electronic apparatus or parts. The main features of HW

are corrosiveness, ignitability, toxicity, and reactivity (Rosenfeld and Feng, 2011).

The definition of hazardous waste in accordance with what is stated in the Palestinian law of after approval of the Palestinian Legislative Council in its session on 6 / 7 /1999, the following law was enacted, waste generated by the various activities and operations or the ash thereof, which preserve the characteristics of hazardous substance which have no uses, such as atomic waste, medical waste, or refuse emanating from manufacturing of pharmacological products, medicines, organic solvents, dyes, painting, pesticides or any other similar substance (Palestinian Environmental Law,1999)

## **1.2 Description of the Study Area and Characteristics**

### **1.2.1 Hebron location**

Hebron is an old Palestinian city and is located in a governorate carrying its name Hebron. It lies in the southern region of WB, where Bani Na'im bordered it from the east, Halhoul bordered it from the north, and Taffuh bordered it from the west, and Yatta to the south (The Applied Research Institute, 2013). It is thirty six kilometer south of Jerusalem, and its population was projected to be 195,733 in 2013 (PCBS, 2013). Total area of the city is forty five square kilometers, number of households was 32,622 in 2013 (Hebron Municipality, 2013).

In the West Bank, Hebron city is the largest and the second largest over Palestine, after Gaza. One of the most important problems is the presence of nearly eight hundred fanatic Jewish settlers in and around the old quarter. The Israeli occupation authorities had divided the city into two parts. Part H1,

which is under the control of Palestinian Authority and part H2, which constitutes nearly 20% of the city area, and is governed totally by Israeli authorities. Hebron city was traditionally considered as one the four holy cities for Muslims after Mecca, Al Medina, and Jerusalem (Wikipedia, 2013).

Hebron city was the only city in the West Bank and Gaza that Israel refused to hand over full authority of it to Palestinians, in accordance to Oslo agreement. There was a special agreement governing the role of each party in regard to security issues in the city which was not in any other city. By these arrangements, the city was divided into zone H1 which is under the civil and security authority of Palestinians. Zone H2 was under the civil authority of Palestinian, but under the security authority of the Israeli occupation, so all services are provided by Hebron municipality. Municipality is trying its best to keep the city united and to provide services for all parts, despite the difficulties encountered because of this division. Municipality is also trying to enhance settling of citizens inside the city, and especially in the old city. This is because of the difficulties and obstacles that are imposed by the occupation in order to force citizens to immigrate and provide settlers instead of them. (Zakat, 2013).

The Israeli human rights group B'tselem reports: Hebron city is closed from the east by the settlement of Kiryat Arba, and is blocked from southwest by the Bet Haggai settlement. In the old city of Hebron, and in its center, there are 400 settlers distributed in a number of scattered settlements. Existence of such settlement give the justification for formation of a strip called H2 under the control of Israelian. The settlers in the center of the city are damaging the potential of any development, and annoying original Palestinian citizens. The settlers are exerting a systematic violence against Palestinian citizens residing

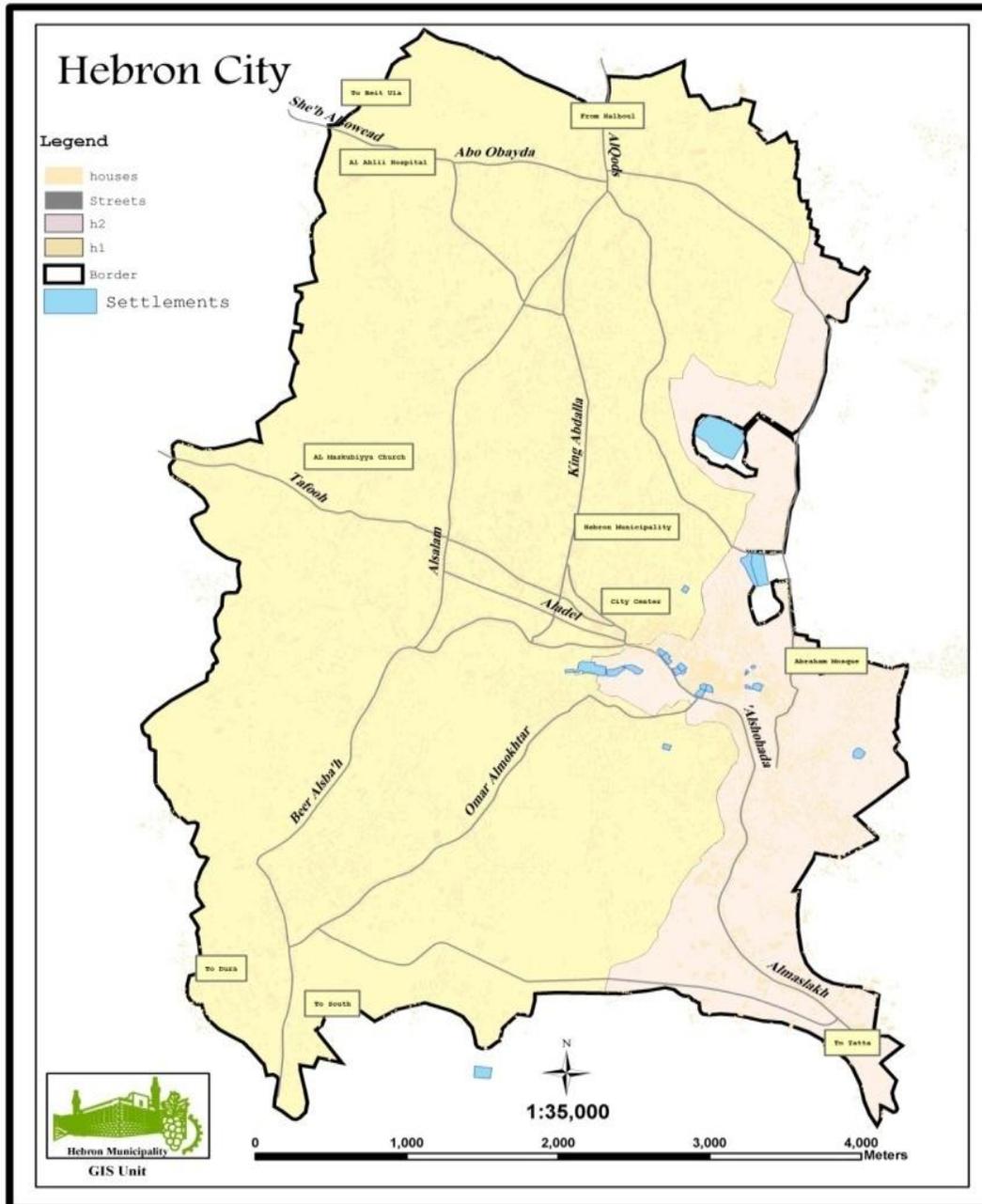
in the neighborhood. Israeli forces continuously imposed curfews prohibiting the three hundred thousand citizens residing in area H2 from mobility. Meanwhile, settlers are living their normal life.

A report that was passed by the Israeli Civil Administration handled the strategy, goals and means carried out by settlers in Hebron (pp. 9-12). B'tselem finds out that the it is clear : the Israeli forces are aware of what is happening" and points out that violence of settlers is well organized with the aim of extending settlements in the city causing original citizens to leave their homes in Area H2 ( Hebron - Settlements in Focus, 2013).

### **1.2.2 Metrological Data**

Hebron has Mediterranean climate characteristics. This implies dry long hot summer, and cool short rainy winters. The rainy season extends from November to April, but for the rest of the year, the weather is very dry (Palestinian Metrological Department, 2010).

Hebron city is located at an elevation of 888 m above mean sea level on a mountainous area, the average annual rainfall is 370 mm, average annual humidity at 61% and an average annual temperature of 16 °C, (ARIJ GIS, 2013).



**Figure 1.1:** Location Map of Hebron city (GIS, Hebron Municipality, 2013)

### **1.2.3 Socio-economic characteristics**

Economy of Hebron depends on agriculture and industry. Hebron is known historically as a center for glass and leather industries. The dry climate and scarce resources of water limited the possibility of further agricultural development. Agriculture is located in the western part while the eastern part is a desert like (ARIJ, 2013).

Major industrial activities in the city include cleaning materials, tanning industry, concrete, stone and aggregate quarrying, shoes making, stone and marble cutting, electrode factory, manufacturing a distinctive type of blue, hand-blown glass, milk products factory, metallic manufacture, factories of spongy mattress, factories for sandpaper, plastic factory, shoes factory, solar Heat factory and a wide range of manufacturing and processing industries (ARIJ, 2013).

Hebron is famous to be trade center on the level of West Bank. This is clear in the municipality statistics that show 50% of the labor force is working in this sector. The agricultural sector comes in the second rank as 15% of the labor force are working in. The industrial sector also covers 15% of the labor force. Employment in governmental and private sector is only 5% of the labor force. Same percentage 5% is also covered through the Israeli market (ARIJ, 2013).

### **1.2.4 Solid waste in Hebron city**

The issue of solid waste collection, transfer and disposal is a under the spot by municipalities and village council. The rising problem of littering, and uncontrolled disposal of garbage in open areas and dumping sites is causing headache to all citizens as well as people in charge of these services. Only 78% of the garbage is collected in the Hebron city, this means that 22% of the

solid waste is thrown randomly without any collection system (ARIJ, 1995).

In Hebron city, the waste is collected by compression trucks owned by municipality and then it is transferred to the dumping site which is located 20 km far from Hebron. The daily generation of solid waste is 4,000 tons which accounts for 1.46 million ton yearly (ARIJ, 2009).

### **1.3 Subject of the study**

It is to face the issue of HHW and the obstacles facing setting up a HHW management system in Hebron city among which are:

- Lack of data on HHW issue and absence of coordination on data if available.
- Lack of political will to state this issue as priority.
- No clear distribution of roles and responsibilities in regard to HHW management among concerned parties.
- Current solid waste regulations do not cover the issue of hazardous waste properly.
- Lack of information about the effect of demographic conditions such as house location and monthly income on HHW generation, collection and disposal.
- Insufficient transparency in waste planning and management processes.
- Lack of community confidence in the waste management system – and there is case of opposition to some activities, for example waste incineration.
- Shortage in funding resources.

## **1.4 Objectives of the Study**

The main goal of this study is to conduct an environmental assessment of HHW management in Hebron city. In order to accomplish this goal, the following steps should be carried out:

- Assess the current HHW management practices in Hebron city.
- Determine quantities and components of hazardous materials generated from Hebron households.
- Determine the knowledge, attitudes, and perception of household heads concerning the handling of HHW .
- Assess extent of HHW accidents and injuries that are taking place.
- Study environmental and health impacts associated with HHW.

## **Chapter Two**

### **Literature Review**

#### **2.1 Household Hazardous wastes characterization**

Household hazardous waste (HHW) is defined as variety of categories of wastes that possess hazardous properties (Slack and Letcher 2011).

According to the Palestinian law issued in 1999, hazardous waste is defined as any waste generated by the various activities and operations or the ash thereof, which preserve the characteristics of hazardous substance which have no uses, such as atomic waste, medical waste, or refuse emanating from manufacturing of pharmacological products, medicines, organic solvents, dyes, painting, pesticides or any other similar substance (Palestinian Environmental Law, 1999)

These hazardous wastes may adversely affect environment when handling, transferring, or disposal. Examples of these wastes are corrosives, oil, solvents, pesticides, and may seriously damage human health and the environment when the disposal is inappropriate. Unfortunately, most regulations do not clearly state the control for the generation, transport, and disposal of household hazardous waste in an efficient way (Kelley et al., 2012).

Some examples of hazardous wastes that may be found in the household solid waste include lawn chemicals, kerosene, insecticides and insect repellent herbicides, flea collars and sprays, fire extinguishers, drain cleaners, contact cement, brake fluid, antifreeze, chlorine bleach, batteries, chemical strippers, and many others (Malandrakis, 2006).

Household hazardous waste is the hazardous ingredients of the discarded products. Hazardous products are classified into five categories that include:

pesticides, paint and its solvents, cleaning and polishing, automotive, and miscellaneous item) . Some examples are batteries, remover fingernail polish, shoe polish and cosmetics. They are regarded hazardous since they may be toxic, corrosive, flammable, or chemically reactive (Agricultural Research and Cooperative Extension, 2014).

One should bear in mind that household hazardous wastes should not be disposed with domestic solid waste stream. This is because it will cause severe pollution and adverse effects to both nature and creatures. Motor oil as an example that has toxic metals and chemicals (lead, arsenic, zinc, hydrocarbons, cadmium and chromium). These chemicals can pollute both surface and ground water, and in turn wildlife biodiversity. Many materials can adversely affect the water supplies and the environment (Slack et al., 2004; 2005).

Hazardous Household Waste is the discarded items that are composed of one or more of the items like pesticides, batteries, paints, and many more. It is to confirm that as a result of the rapid increase in population, and the accompanying increase in level of life, the production rate of solid waste has increased to a large extent. This made a large challenge to society, individuals, and institutes to face that problem. What makes this a serious issue is the lack of sufficient infrastructure, administrative capacities, financial resources and necessary equipments. So, the problem is duplicated as the domestic waste is increased and also the quality of that waste had changed. A lot of hazardous wastes that never entered in the domestic stream before are now constituting an essential component that is produced on daily basis and constitutes a regarded part of the total domestic waste. Of course, the problem in urban areas is

clearer than in rural areas due to different styles of lives in the two areas (Ojeda-Benitez, 2013).

It is to mention that a large variety of Household hazardous waste (HHW) includes fluorescent tubes, electrical equipment, batteries containing heavy metals, waste electronic, wood that had been treated with hazardous materials, discarded CFC-containing equipment (Slack et al., 2005).

## **2.2 Collection of Household hazardous waste**

There is agreement among specialist in the field of solid waste management that there should be separation of hazardous waste from other wastes. The separation is for more than one reason. In handling the waste the labor may be injured, or be faced with splashed chemicals, or affected by poisonous fumes. In landfill, poisonous, toxic, leachate may be generated because of the HHW and thus causing extreme pollution and contamination to soil and ground. In case of leachate treatment, larger amounts are generated (If HHW was mixed with domestic) and thus more expensive treatment costs are imposed. In transferring waste, if it contains HHW, larger risks are encountered in terms of ignitability, explosions, or chemical reactions (Kelley et al., 1989).

When certain household chemicals are not consumed, they become HHW. It is to mention that although the regulations pose strict measures on industry regarding the handling, transfer, and disposal of the hazardous wastes. The same wastes, and in most times, are produced in houses and generated to the domestic stream. The quantities of these HW are not large on the individual house level. But if we take into consideration that these quantities are added together it will constitute a non-negligible component that compares to HW from industry (Yasuda and Tanaka 2006).

Many of the pollutants present in the leachate which cause serious impacts to environment are originated from the HHW that is present in the MSW (Slack et al., 2007).

In the case of using incineration as disposal method of waste, the problem is even more and the impact on environment is larger. Ash is the result of combustion, and will constitute 15% of the size of the incoming (original) waste. Combustion will destroy the organic component of the waste. Therefore, heavy metals will be part of the residue with a potential of polluting the environment, Combustion will directly affect the health of neighboring residence (Mohan et al, 2000).

If groundwater is contaminated by leachate, there will be disaster. This may cause the water basin to be polluted, and thus source of life may become threatening life. Cost of repair of defect will be beyond the capability of one generation. Repair will consume a lot of financial resources, time, effort and results are not certain (Ying et al., 2012).

A small but considerable amount of unregulated household hazardous waste is dumped annually into landfills, sinks, and street gutters. This unregulated and largely unmonitored waste stream presents cause for concern. The creation and storage of this waste at such quantities inevitably results in environmental contamination, causing harm to humans and other organisms. To facilitate federal management, hazardous waste emitters are sorted into categories according to the monthly amount of hazardous waste produced. To be designated as a large-quantity generator (LQG), facilities must produce greater than 1,000 kg of HW per month, or greater than or equal to one kilogram of acutely HW (Rosenfeld and Feng, 2011).

The origin of the pollutants is not known. But, for sure, some of these pollutants are generated from the HHW (Reinhart, 1993).

These hazardous wastes are originated from different sectors including residences, health institutes, industry and factories. The danger is that any house could generate such hazardous wastes for example chemical compounds, batteries, oils, detergents, pesticides, and color. To deal with a large part of environmental problems and public health issues, we should interact effectively with this category of wastes. Serious health risks can be associated with these types of HHW. In case they enter the body, they will badly affect health by digestion of toxic materials, for example anti-freeze substances. Acids, resulted from batteries will cause burns. Explosive and other chemical substances may explode due to intensifying or long exposure to sun and cause catastrophic results, examples of this is formaldehyde epoxy resins and insecticides. These will affect directly the nervous system causing various adverse effects like respiratory problems up to congestion of organs. The extent of the environmental problems depend on many factors relating to nature of products such as stability, solubility, degree of dilution, the toxicity to other habitats, seepage potential to underlying layers of landfill sites and its potential of affecting the waste water treatment operations (Slack et al., 2006).

According to EPA there are some measures and actions that enhance management of HHW. These measures can apply to both developed and developing countries. Actions like reuse recycle reduce, for proper disposal are stated. Examples are presented:

- **Permanent collection or exchange.** If there is a system for collecting HHW in a special yard, it can be invested in passing these materials or

wastes to other people that they may use of it. By this HHW is reduced, and resources are kept and better economy is accomplished.

- **Special collection days.** A special day can be specified for collecting HHW in case there is no separate system for collecting such wastes. A well operated site can be specified for proper handling and management of such wastes.
- **Local business collection sites.** One can make use of private sector for some of the products. For example motor oil can be recycled.

### **2.3 Household Hazardous Wastes Disposal**

The household disposal of some wastes like automotive products, cleaners, paint, and pesticides can cause bad effects for public health. In the landfills, or through incinerators, or if disposed into sewerage system these wastes will pollute surface and groundwater supplies (Stanek III, 1987).

It should be bear in mind that hazardous wastes are substances which are very dangerous and their disposal and handling must be carried out with care, so radioactive wastes, chemicals, biological wastes and ignitable materials should not cause danger to labor nor to public (Ziaee et al., 2012).

The disposal of HHW is and will be a vexing issue for solid waste managers and concerned parties (Wagner et al., 2013).

Pharmaceuticals which are part of the medical waste components are also considered to be HHW. Although this type of waste is drawn to MSW from household waste in a small quantity, its effect is enormous. There are witnesses that it affects the aquatic environment. Great concern is increasing after discovery of pharmaceutical wastes in fresh and marine waters. Presence of these wastes had cause harm to aquatic life. It is to be mentioned that most

of this waste comes from household waste, as medical waste from healthcare centers like hospitals is being disposed in a controlled procedure (Bound, 2006).

It is to confirm that most of the HHW (80%) will remain toxic for centuries causing threatening effect and risk of contamination land pollution of soil and ground at any time. So proper disposal of HHW is a necessity for present generation and for future generations (Ortego et al., 1995).

Batteries are another issue. It is estimated that three billion batteries of the dry type are disposed in the MSW stream each year. It is obvious the danger of the batteries and especially its mercury content. The accumulation of mercury and cadmium, and other heavy metals impose a serious health impact on public health. Removal of these batteries from the MSW stream should be carried out, and awareness of public to this issue should be increased in order to separate these HW in the household site (Shapek, 1995).

Some categories of hazardous household wastes can result in physical injury to labor working in the treatment plants; pollute septic tanks or wastewater treatment facilities if disposal was in the sewerage network. Regulations prohibits disposal of these wastes into trash unless collection programs are arranged for these HHW (EPA, 2014).

## **2.4 Household Hazardous Wastes Management**

HHW management is a protocol of actions which include reducing, storing, collecting, transporting, utilizing, processing, and disposing of toxic and hazardous waste (Aprilia et al., 2013).

As solid and hazardous waste generation increases with population growth and industrialization, solid waste management (SWM), which broadly

encompasses both urban solid and hazardous waste streams, must deal with problems of waste alleviation, collection, composting, recycling, combustion, and/or final disposal. One or more of these activities may be used in order that best protection of our environment and society is achieved. This procedure is referred to as integrated solid waste management ISWM (US EPA, 2002), often requires high control at the beginning and during the operation and at the end, high quality of management control, and even planning strategically. Nevertheless, multidisciplinary, and complex nature of integrated solid waste management challenges makes it difficult to generate a systematic solution that can cover all aspects of cost, risk and future challenge in all times that can be applied in all locations (Wei lu et al, 2012).

Even though hazardous household waste is small compared to the total domestic waste, the impacts and risks to public health and environmental conditions are severe. The percentage of HHW varies from country to country and it also varies in the same country depending on many factors. But, as a rule of thumb the percentage will be between 1 to 4% of the domestic waste. In most countries co-disposal of MSW with HHW is taking place with all the risks encountered in the long as well as in the short run. Another source of hazard of the HHW in addition to its properties is its capability to react with MSW and change it in turn into HHW and thus duplicating the problem and increasing the threat to environment. There should be a separation of special items which are classified as HHW from the domestic stream, in order to reduce the adverse effects on the landfill and the out coming leachate. This separation of the HHW should be taken into consideration when planning for the landfill as necessary extra cost that is required for better environment (Slack and Letcher, 2011).

Generation of HHW has grown up more in urban areas which is recognized by high population growth. This increases the difficulties encountered in handling, collecting and final disposal because of the shortage in financial resources, administrative capacities, infrastructure as well as necessary equipment. Alarming increase in MSW with its HHW component associated with the ineffectiveness in SWM accompanied by change in purchasing habits will make a serious problem and risk (Ojeda-Benitez, 2013).

There should be a firm regulations arranging disposing and enhancing management of the HHW (Banerjee et al., 2013).

One of the challenges is the high variety of waste components which increases the risks to the labor working in the collection and disposal (Otoniel et al., 2008).

Till now there is no strict evidence about the adverse effect of the landfill on the surroundings. Most of the studies carried out did not take into consideration the inherent latency of diseases and socio-economic status. In some cases it was reported that low birth weights was attributed to residence near the landfill. Studies relating to cancer and mortality surrounding landfill sites showed equivocal results. But it was shown that labors working in the landfill are subjected to larger risks of accidents as well as musculoskeletal diseases (Rushton, 2003).

One should start solving the issue of HHW through awareness among all citizens. Society, families, and individuals should know the risks and the treats associated with such waste on the long and short run. Trends and attitudes should be driven to change the habits in order to lower consumption of goods containing these HHW. Factories and industry should adopt this attitude by choosing materials that has lower HHW and substances that has lower effects

on environment. This change is necessary, although it will not be instantaneous, but it has to begin (Ojeda-Benitez, 2013).

According to EPA, resources conservation is one of the advantages of proper hazardous household waste management are:

- Making better use of resources and energy through reducing and recycling of hazardous household waste.
- Decreasing the cost by reusing HHW products and thus reducing the need for producing hazardous materials.
- Appropriate disposal prevents polluting the environment that will cause serious risks to human health and nature.

According to the text of Article (12) of Law No. (7) for the year 1999 on the environment in Palestine, No person shall be authorized to manufacture, store, distribute, use; treat, or dispose any hazardous substance or waste whether it was solid, liquid, or gas, unless such a process is in compliance with the regulations, instructions and norms specified by the Ministry, in coordination with the specialized agencies (Palestinian Environmental Law, 1999).

## **2.5 Health Effect of Household Hazardous Waste**

Specialist advice to make a long time follow up and monitoring of health conditions for inhabitants surrounding landfill sites. Till now, there is no confirming evident about the effect of the landfill site on human health. Further, detailed, and long term studies should deduct these effects confidently. These studies should take into consideration the demographic characteristics, and the socio-economic factors, so as to detect any difference in health indicators resulting from the landfill site. It is known that many of the impact could not appear except on the long run (Whiteman et al., 2010).

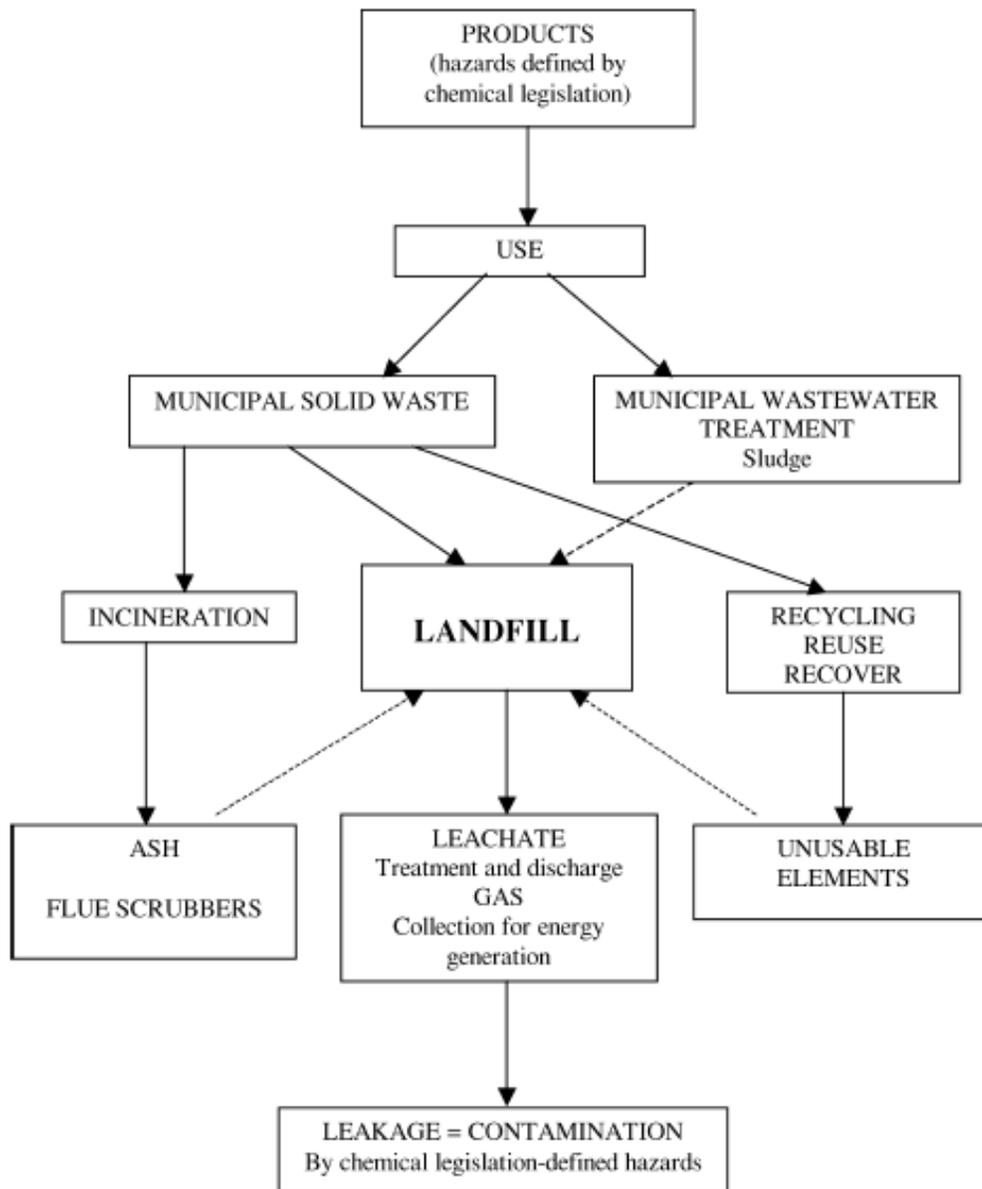
A survey was done to detect the effect of household waste incinerator on surrounding inhabitants, showed that the surrounding inhabitants are subjected to more respiratory problems and diseases than others living far away. The extent of emissions from such incinerators should be deeply investigated, to detect the percentages of pollutants and the byproducts. Even though some of these pollutants are in very small proportions that in many times it is difficult to detect, they will have serious adverse effect on the long run (Marty 1993). The current practice of precise measurement of the magnitude of pollutants emitted from incinerators should be improved in order to account for the health impacts of small magnitude and/or long time exposures (Ostry et al. 1993). the effect of incinerator and their presence on the health of human being is still a subjective matter that needs many studies to confirm its adverse effect or to deny such relation (Mohan et al, 2000).

It is agreed that MSW to some extent have HHW in its components. These HHW comes from different parties like apartments, shops, light industry and others. If incineration were used as disposal method, many of the metals will either end in the atmosphere or in the slash. These metals are mainly nickel, lead, mercury, cadmium, and arsenic. These metals are carcinogenic and about 35% of their quantity are emitted to atmosphere during incineration (Fishbone, 1988).

It is believed that some chemicals emitted in the atmosphere will increase the risk of CHD (Congenital Heart Disease). These chemicals usually start their effect in the early stages of life, when cardiac development is evolved (Mali et al, 2010).

Recently, there are a lot of efforts to investigate how the hazardous components are affecting soil and water and polluting them. Incinerators and

their emissions are another story with their residue, and their effect on health and safety of labor (Kelley et al., 2012). Previous works showed that citizens residing near household waste sanitary landfills have a higher risk for defective births (Malik et al, 2010). HHW usually ended in the landfill, a different methods of disposal, like incineration, sewer, or recycling, will participate some constituents of waste to landfill in Figure 2.1 (Slack et al., 2010).



**Figure 2.1:** Hazardous household waste disposal to landfill (Slack et al., 2010).

## Chapter Three

### Methodology

This chapter includes a description of the study criteria, characteristics of population of the study, in addition to presentation of statistical analysis and HHW components analysis.

#### 3.1 Household Survey

It was to figure out knowledge, interest, attitudes, trends, perceptions, and practices of citizens in regard to HHW issues. This includes the awareness, concerns, satisfaction and interest. Socioeconomic parameters are included in the questionnaire such as average monthly income, employment type, level of education family principal, age, gender to find out the relationship with HHW practices and trends like willingness to separate HHW, storage mean, disposal way, home accidents and injuries related to HHW,... etc. The sample size was calculated by Steven equation Thompson:

$$n = \frac{N \times p(1-p)}{\left[ \left[ N-1 \times (d^2 \div z^2) \right] + p(1-p) \right]}$$

N: Size of the community

z: Z-score corresponding to the level of significance equal to 0.95 and 1.96

d: The error rate is equal to 0.05

p: Success rate , taken as 0.50

The size of community equal 195,733 and after substituting in this equation the number of household questioners needed are 383 and the questionnaire was distributed to 450 households and there were 385 respondents. The percentage

of resonance was 85.6% which is good percentage indicating citizens concern and interest about this issue. Analysis of data was performed by the use of Statistical Package for Social Sciences (SPSS) computer program version 18. Appropriate tests of significance using Chi-square test were performed to find out the presence of relationships between socio-economic variables and other dependent variables in addition to other statistical parameters.

### **3.2 Data Collection**

Data was collected through a questionnaire that consisted of three basic parts: first part was about demographic and socioeconomic (dependent) variables and diagnostic questions, second part was about general conditions of SW and HHW collection system and practices and trends of citizens in this area, and the third part deal with type HHW items generated and the way they are disposed from houses.

The first part, which is demographic and socioeconomic questions resembles the independent variables such as the type of house (separated or apartment), marital status of respondent, age of housewife, educational level of housewife, type of work housewife, the number of family members residing in the home, monthly income for the family, presence of children of age range between 8 months to 10 years, average monthly income.

The second part of questions deals with general SW issues as condition of nearby container, sufficiency of container size, possibility that house contain hazardous materials related to the work of the father, location of storing hazardous materials, responsibility of transferring solid waste from home to the container, frequency of waste disposal done from the home to container, distance of the nearest solid waste container from home, behavior of children

near the solid waste container, accidents due to hazardous wastes and the nature and effect of such accidents.

Third part deals specifically with HHW items to figure out what items are generated at houses, and if generated to see how they are disposed from houses (with domestic waste, kept for HHW collection, recycle, or thrown randomly).

### **3.3 HHW components and proportions**

The second component of this research is related to HHW constituents and proportions. A solid waste component analysis was carried out during fourteen working days period at Hebron solid waste transfer station that serves Hebron city during November and December 2013.

Random representative samples of the disposed household waste at the transfer station were analyzed. On each day 6-10 samples of 0.5 m<sup>3</sup> household wastes were emptied in a shallow tray band where the solid waste components were categorized manually by placing them in a pre –weighted and appropriately labeled trays (once each part has been categorized it was weighted to record its percentage from the total household solid waste). This step was repeated for 14 days for a total of 115 samples and then followed by data analysis. The procedure to manually sort individual components is adapted according to the classification proposed by Delgado et.al (Delgado et. al., 2007). HHW was classified according to eight categories, as shown in Table 3.1

**Table 3.1** Household hazardous waste categories (Delgado et.al, 2007)

1	<b>Automotive Products</b> (Brake Fluid, Transmission Fluid, Auto Battery, Antifreeze, Windshield Washer So, lotion , Motor Oil, Oil Filters, Metal Polish with Solvent , Fuel Oil , Diesel , Degreasers , Kerosene, Carburetor, Cleaner (Fuel Injectors), and Car Wax with Solvent.
2	<b>Home Products</b> (Batteries -Button, Rechargeable, Shoe Polish, Bleach, Aerosol Products, Thermometers and Thermostats, Air Fresheners, Upholstery, Cleaners, Fluorescent Lights, Ammonia based cleaners, Spot Removers/Carpet, Bleach based cleaners, Disinfectants, Window/Glass Cleaner, Drain Cleaner, Floor Care materials, Metallic Polish, Cleaners for furniture, Furniture Polish with Solvents, Toilet Bowl Cleaner, Smoke Detector, with Solvents, (wax/stripper), cleaners of the oven, Pet products, Abrasive Cleaners or Scouring Powder.
3	<b>Personal Care Products</b> Isopropyl Alcohol (rubbing alcohol), Nail Polish, Hair Spray, Hair Permanent Lotion, Hydrogen Peroxide, Nail Polish Remover.
4	<b>Home Improvements</b> Latex Paint and Primer, Adhesives and Glues (solvent-based), Stain and Varnish, Furniture Stripper, paint and primer, thinner for paint, cleaner from paint on brush, Wood Preservative, remover of the paint.
5	<b>Healthcare Waste</b> Medical Home Products.
6	<b>Indoor Pesticides</b> Rodent Poisons and Bait, Ant/Cockroach Spray and Bait.
7	<b>Garden and Lawn</b> Insecticide, Fertilizers including Weed Killer, Fungicides, Herbicides, Used Pesticide Containers.
8	<b>Miscellaneous</b> Pool Chemicals, Photographic Chemicals (diluted/undiluted), Art Supplies, and Ammunition.

**Automotive Products** such as Antifreeze is toxic to humans and animals. Waste antifreeze contains heavy metals such as lead, cadmium, and chromium in high enough levels to potentially make it a regulated hazardous waste, so most states strictly regulate antifreeze disposal. Antifreeze generators and state and local programs should not dump spent antifreeze on land or discharge it into a sanitary sewer, storm drain, ditch, dry well, or septic system; dumping antifreeze can cause serious water quality problems and might harm people, pets, or wildlife (EPA, 2014).

**Home Products** such as Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which can contaminate the environment when batteries are improperly disposed of. When incinerated, certain metals might be released into the air or can concentrate in the ash produced by the combustion process (EPA, 2014).

**Personal Care Products** such as isopropyl alcohol (IPA) poisoning occurs when the liver is no longer able to manage the amount of IPA in the body. Ingestion may be accidental or deliberate. IPA is inexpensive and causes rapid intoxication. It can be found in rubbing alcohol, alcohol swabs, many cleaning products, and personal hygiene products such as hand sanitizers. People sometimes ingest these products to get drunk. Others use them to attempt suicide. IPA absorbed through the skin can also cause poisoning (Krause, 2012).

**Home Improvements** such as synthetic adhesives and certain natural adhesives are composed of polymers, which are giant molecules, or macromolecules, formed by the linking of thousands of simpler molecules known as monomers. The formation of the polymer (a chemical reaction known as polymerization) can occur during a “cure” step, in which

polymerization takes place simultaneously with adhesive-bond formation (as is the case with epoxy resins and cyanoacrylates), or the polymer may be formed before the material is applied as an adhesive, as with thermoplastic elastomers such as styrene-isoprene-styrene block copolymers. Polymers impart strength, flexibility, and the ability to spread and interact on an adhered surface—properties that are required for the formation of acceptable adhesion levels (Pike , 2013)

## Chapter Four

### Results and Discussion

#### 4.1 Sample distribution

Table 4.1 shows the demographic and socioeconomic characteristics of the surveyed sample based on type of the house, house ownership, marital status of respondent, educational level of housewife, gender, age of housewife, type of work of housewife, the number of individuals residing in the home, Presence of children of age range between 8 months to 10 years, and monthly income for the family. About 69.1% of respondents were living in independent house and 30.9% were living in apartment. In terms of the house ownership, the highest percentage of respondents was living in their own house (86.5%), while the rest percentage was living in a rented house (13.5%).

In terms of marital status, the largest slice of respondents were single (62.3%), while divorced slice constitute the lowest slice (1%). About 56.1% of respondents were males and 43.9% were females.

The age distribution of housewife was 40.2 % in the group 36 to 45 years old group, 26.0% in the 26 to the 35 year old group, 21.0% in the group older than 45 group, 12.9% in the group less than 25 years old. In general our society is considered to be young. As this statistics shows that only 21% are older than 45 years. This should be a privilege for educating and awareness and also for good response of this category that are young and can contribute in changing to better conditions.

The highest percentages of respondents (57.0%) in terms of level of education were those who have a Secondary Certificate, while the lowest percentage was of those who were illiteracy (0.8%). This is a good indicator about the level of

education of the society. Percentage of illiteracy is very low and approximates to zero. Education, awareness campaign is possible and can give good results. Leaflets and bulletin can be read as most of the citizens are educated and good percentage of them has at least secondary education 57%.

The highest percentage of respondents (59.0%) in terms of presence of children of age range between 8 months to 10 years were those who have a YES, while the lowest percentage was of those who were NO (41.0%). This is an indicator of the high risk associated with the potential of children being injured as a result of HHW. Again our society has a high percentage of very young citizens (children) compared to other developed countries. If presence of children is associated with shortage in awareness regarding the HHW and its danger, this will increase possibility of accidents because of HHW. If this is accomplished by the shortage of playgrounds and kids club, then kids may play in surrounding areas, and near containers, then HHW accidents become more and more potential.

Regarding the level of income, the largest percentage (32.4%) consisted of those whose family has a monthly income of 400-600 JD, and the lowest percentage (31.6%) was of those whose monthly family income exceeds 600JD. As the figures shows only one third of sample has income more than 600JD. This shows that two third of population can be considered as low income. Wherever poverty there, less knowledge, vulnerability to risks, and insufficient follow up of lids are expected to be there. It is to give more concentration on this slice of community, whose kids will not have the opportunity for after school activities and thus may be playing in or near the SW containers in the neighborhood.

**Table 4.1:** Surveyed sample distribution (numbers and percentages).

Independent Group	Number of respondents (percentage in parentheses)			
<b>Type of the house</b>	House independent	Apartment		
	69.1%	30.9%		
<b>Ownership of the house</b>	Rented	Owned		
	13.5%	86.5%		
<b>Marital status</b>	Single	Married	Divorced	
	62.3%	36.6%	1.0%	
<b>Educational level of respondent</b>	Illiteracy	Preliminary	Preparatory Certificate	Secondary Certificate
	0.8%	13.0%	32.4%	57.0%
<b>Gender</b>	Male	Female		
	56.1%	43.9%		
<b>Age of housewife</b>	Less than 25	26-35	36-45	more than 45
	12.9%	26.0%	40.2%	21.0%
<b>Type of work housewife</b>	Housewife only	working in the government sector	working in the private sector	
	77.0%	7.4%	15.6%	
<b>The number of individuals residing in the home</b>	Less than 5	5-7	more than 7	
	23.0%	49.5%	27.5%	
<b>Presence of children of age range between 8 months to 10 years</b>	Yes	No		
	59.0%	41.0%		
<b>Monthly income for the family</b>	less than 200JD	200-400 JD	400-600JD	more than 600JD
	9.8%	26.1%	32.4%	31.6%

In Malaysia, the higher income group had the larger generation rate of municipal solid waste. This is a result of the higher affordability of purchasing and thus consuming more ready-made goods. Alternatively, the lower income group also had larger amount of generated municipal solid waste, this is because this group tends to produce their own needs, causing production of

by-products and wastes. The average hazardous household waste for was 1.76%, which is more than the case of Hebron (1%). Table 4.2 shows the percentages generated by the household from the three income categories (Fauzia, 2013).

**Table 4.2:** Generation of MSW and hazardous waste in household In Malaysia.

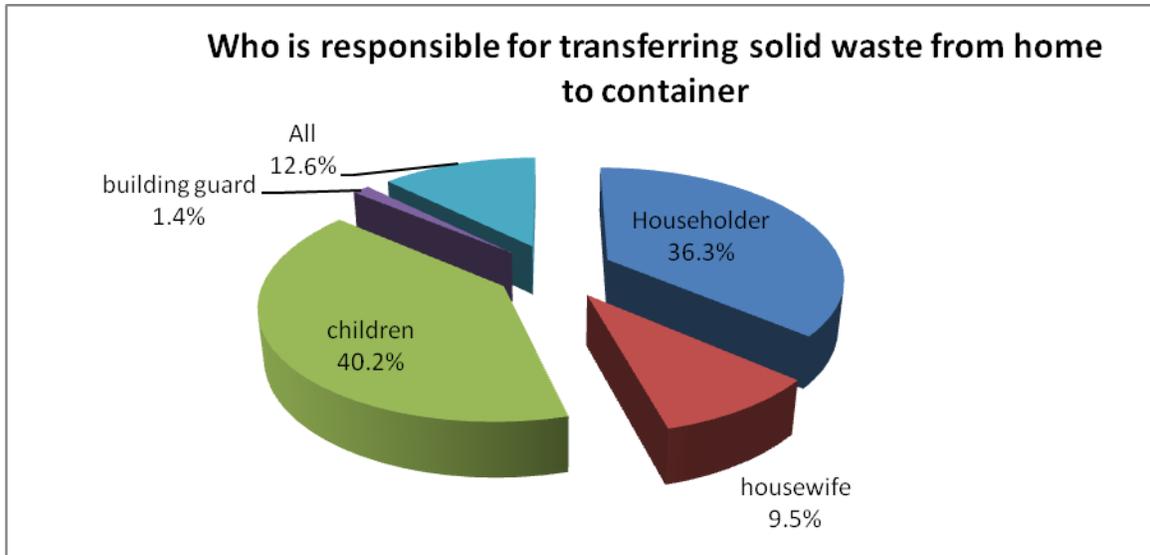
<b>Generation per Household\ per day</b>	<b>High income</b>	<b>Middle income</b>	<b>Low income</b>
MSW	7.02 kg	3.51 kg	5.94 kg
HW	1.8%	2.03%	1.46%

\*(Fauzia and Agamuthu, 2013)

Although medium income category produces the lowest amount of MSW, the existence of hazardous component was in the range of 2% which is 0.07 kg /household/day. The high and low income groups were generating 0.13 kg and 0.09 kg/ household/day, respectively. This generation rate is larger than that of the medium income category. No significant differences in the amount of HW was detected. (Fauzia and Agamuthu, 2013).

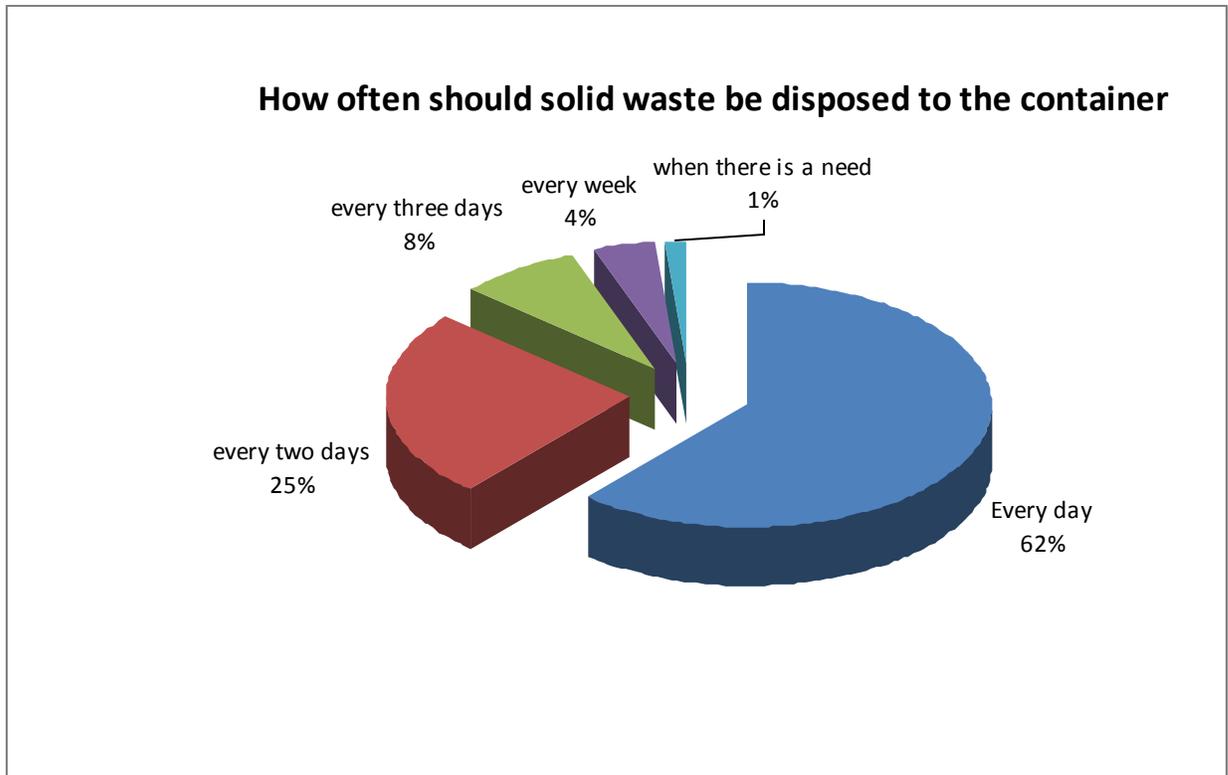
#### **4.2 Solid Waste Management in Hebron City**

The results of Figure 4.1 shows that the responsibility of transfer of solid waste from home to the container is 36.3% by householder, compared with 40.2% the responsibility is by the children and 9.5% of the housewife. If these children are not aware enough how to deal with the garbage in case of tear of the sack or the garbage in the container, they may be exposed to accidents that may affect their health. For example injuries by needles, exposure to chemicals, hauling toxic materials....etc. So again, there is a need for directing and guiding these children to the HHW associated in order to take care.



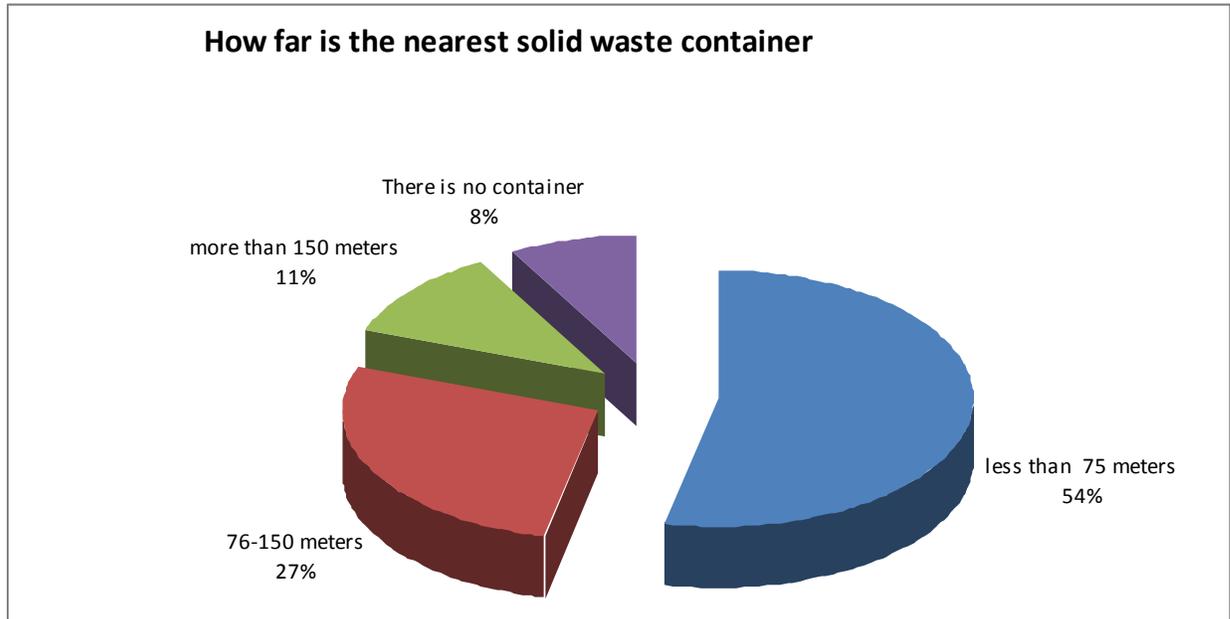
**Figure 4.1** Responsible person for transferring garbage from home to container

Figure 4.2 shows that 61.4% of the households in Hebron city are disposing their garbage every day, and 24.9% of the households are disposing garbage every two days. So, in 86% of the cases SW are being thrown within 2 days. This is a good percentage, as in most cases the SW are being disposed regularly, and thus decreasing the possibility of accumulation in home, and decreasing the risks associated with HHW. But, it should be bear in mind that in 14% of the cases the garbage is there in the home, and lasting for more than two days, and the potential risks associated with it increase, in the case that waste contains any HHW.



**Figure 4.2:** The disposal of solid waste from home to container

Figure 4.3 shows that 53% of the households in Hebron city are at a distance of less than 75 m from the nearest solid waste container, compared with 28% of the homes at a distance from 76 to 150 meters and 8% there is no container nearest to the household. It is to fact that 8% have no container, and thus are carrying their garbage to very far site away from their home, or burning their waste, or throwing it randomly on the street shoulders. This will harmfully affects environment, in addition to the other dangers associated with HHW.



**Figure 4.3:** The distance of the nearest solid container form house

### 4.3 Risk Assessment of Household Hazardous Waste

To investigate the risks of HHW, the anticipated health and environmental problem, the relationship between HHW and citizens practices in this field, residents were asked related questions as shown in Table 4.3.

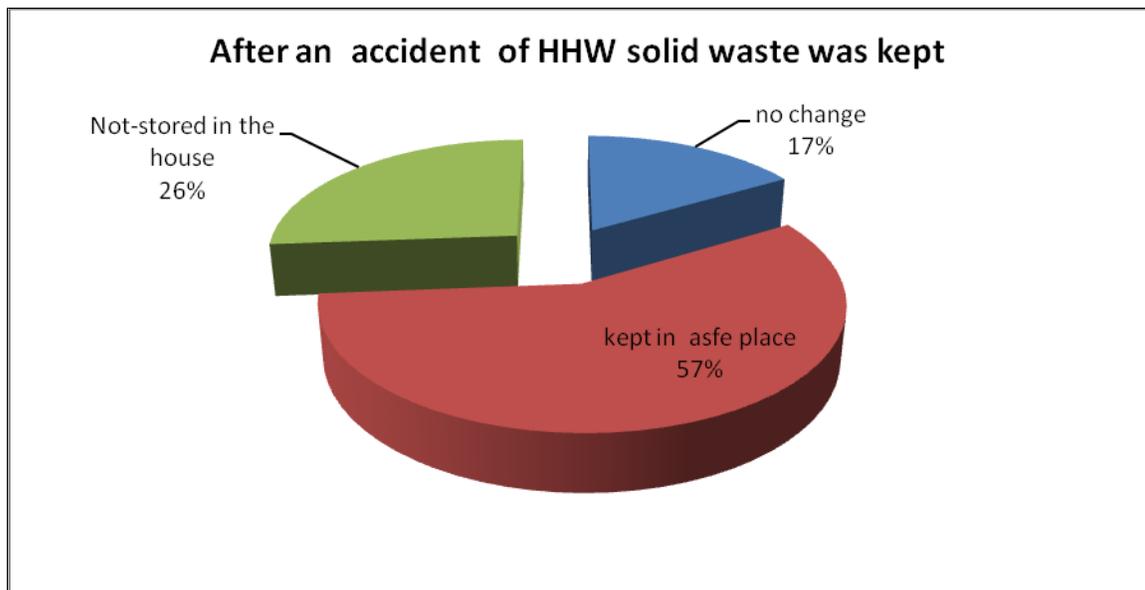
**Table 4.3:** Diagnostic results for risk assessment

Risk factor	Percentage %
The house contains hazardous materials related to the work of the father	8.8
Children play with solid waste in nearby containers	27.2
One of the family members had suffered from accident because of hazardous household waste	18.5
Presence of children of age range between 8 months to 10 years in the house	59.0
There is negative psychological effect on infected person from HHW	35.6

In Hebron city nearly 8.8% of the houses contain hazardous materials which are related to the work of the father. This is a non-negligible percentage that one should take care of, if the house always contains such materials, at any time there is possibility of an accident, especially by small kids. Again, awareness should be there in keeping these materials away from kids, in handling these materials, and in disposing them, in addition to that parents should teach their kids about the danger of these materials. Another risk is there from kids playing around the container 27.2% where the HHW are there. Any waste may be infectious, explosive, etc threatening the health of kids playing around. It is no note the large percentage that one of the family members had suffered from a HHW accident (18.5%). Ideally this percentage should be zero if the citizens are well aware of the hazardous effects and are encouraged to follow safety measures as a rule in their life. The high percentage of existence of at least one kid in a family (59.0%) is also a motive factor for giving this issue the needed attention. in 35.6% of the cases where one member of the family has been affected by HHW accident, there were a negative psychological effect that last with the person for a long period of time. The cost of applying preventive measures to prohibit HHW accidents is less than cost of treating the effects of the anticipated accidents on the long and short run.

In case that a HHW accident had occurred Figure 4.4 show that 57% of the households kept hazardous material in safe place after the accident, compared to a percentage of 26% who are no longer storing hazardous material in their homes. A remarkable percentage of 17% who did not take any action after the accident. This category of citizens who suffered from a HHW accident, and are still keeping the hazardous substances as if nothing had happened. This

category should be awaked to be aware of the potential real danger that they and their kids are exposed to if they did not deal with these issues seriously.



**Figure 4.4:** Keeping and storage of hazardous waste materials

The dangers of HHW may not be immediately clear, but many types of HHW can cause injuries, burns, and poisoning.

Figure 4.5 shows type of accidents associated with hazardous waste in Hebron city, 42% of the accidents were injuries, 36% were poison and 22% were burning. The highest percentage are due to sharp items that causes injuries, and the danger will be doubles if there is infectious items that may cause diseases like HIV.



**Figure 4.5:** The major risks associated with HHW

#### **4.4 Effect of demographic factors on HHW citizens trends and attitudes toward HHW**

In order to see the effect of different demographic factors on the trend, behavior, and attitude of citizens toward HHW cross tabulation was carried out between dependent (practice and behavior) and independent (demographic) parameters. If the p-value of the test was less than 0.05, then there is a statistically significant relationship between the parameters.

##### **4.4.1 Relationship between marital statuses on willing to separate HHW**

As shown in Table 4.4 there is a statistically significant relationship regarding willing to separate HHW into different components to be placed into colored sacks between single and married citizens. The overall percentage of citizens willing to separate is 64%, for the single it was less (60%), and for the married it was higher (73%). It is clear that a married person had more commitment

and awareness more than a single person, as he is showing some commitment to his society represented by willingness to separate. This commitment is also clear for the citizen who is not willing to separate at all. In the case of single it was 24%, while for the married it was only 19%. This will give indication to make more efforts in awareness for the single a little bit more than married.

**Table 4.4:** Cross tabulation between marital status and willing to separate HHW

Marital status		Are you willing to separate HHW into different components to be placed into colored sacks		
		Yes for free	Yes for a small payment	No
Single	Count	142	37	58
	% within Marital status	60%	16%	24%
Married	Count	101	12	26
	% within Marital status	73%	9%	19%
Divorced	Count	0	1	3
	% within Marital status	0%	25%	75%
Total	Count	243	50	87
	% within Marital status	64%	13%	23%

(Chi-square =14.552, df = 4, p-value = 0.006)

**4.4.2:** Relationship between the number of family members and whether anyone had a HHW accident

It is interesting to note the strong statistical relationship between the number of family members and the possibility of HHW accident. The overall percentage of occurrence of HHW accident is 18%. Only 10% for five members, when the family members are 5-7 the percentage will increase to 26%. Dramatically, this percentage will increase to 34% for more than 7 persons. This will guide

us to exert more efforts in awareness campaigns on larger families. This is because the vulnerability to HHW will be more.

**Table 4.5:** Cross tabulation between the number of family members and occurrence of HHW accident

number of family members		Occurrence of HHW	
		yes	no
Less than 5	Count	9	79
	%	10%	90%
5-7	Count	26	161
	%	14%	86%
more than 7	Count	35	69
	%	34%	66%
Total	Count	70	309
	%	18%	82%

(Chi-square = 22.483, df = 2, p-value = 0.000 )

#### 4.4.3 Relationship between the monthly income of the family and weather the kids are playing in the nearby container

The overall percentage of kids playing in the nearby container is 27%, Table 4.6. This percentage is highest for the income category 400-600JD where it reaches 36%. The same percentage goes down to the lowest (16%) for the very low income category whose income is less than 200JD. The reason behind that may be that this group of very low income cannot find the time or the mode to play even near the container. On the other hand the medium income category 400-600JD is busy in collecting their livelihood, leaving their children to play in the streets and near the containers.

**Table 4.6:** Cross tabulation between the monthly income for the family and weather kids are playing with solid waste in nearby containers.

Monthly income for the family		Children play with solid waste in nearby containers	
		yes	no
less than 200JD	Count	6	31
	%	16%	84%
200-400 JD	Count	21	75
	%	22%	78%
400-600 JD	Count	43	78
	%	36%	64%
more than 600JD	Count	32	87
	%	27%	73%
Total	Count	102	271
	%	27%	73%

(Chi-square = 7.852, df = 3, p-value = 0.049 )

#### 4.4.4 Relationship between the sufficiency of size of the container and weather the kids are playing in the nearby container

The overall percentage of kids playing in the nearby container is 27%, Table 4.7. This percentage is highest for the case when the size of container is not sufficient as it reaches 32% and decreases to 20% when the size of container is sufficient. It can be stated that a container overflow with waste resembles a seduction for kids to explore its contents. Enough number of containers, regular uploading of these containers before they became overflow will decrease the desire of kids to play with the SW, decreasing in HHW will be expected.

**Table 4.7:** Cross tabulation between the sufficiency of size of SW container and weather kids are playing with solid waste in nearby containers.

Size of SW container is sufficient		children play with solid waste in nearby containers	
		Yes	no
Yes	Count	30	121
	%	20%	80%
NO	Count	74	157
	%	32%	68%
Total	Count	104	278
	%	27%	73%

(Chi-square = 6.823, df = 1, p-value = 0.009 )

#### 4.5 Hazardous Components of Hebron City Household Waste

The total quantity of solid waste analyzed in this study was 14,562.1 kg of which there was 140.669 kg of hazardous waste with an average percentage of 0.97%.

Table 4.8 shows the amount of household solid waste in the years 2011 and 2014. The estimated values in 2014 are based on the population estimated by the PCBS for the West Bank and Gaza in 2011 and 2014. Then the HHW quantities in the Palestinian territories in the year 2014 were estimated as 0.97% of the household solid waste. The estimated HHW reached to 22.78 tons/day.

**Table 4.8:** Average daily quantity of household solid waste produced in the Palestinian Territory, 2011 and 2014 and HHW in 2014

Region	Total daily produced quantity (ton) in 2011*	Total daily produced quantity (ton) in 2014**	Total daily produced HHW(ton) in 2014
Palestine Territory	2,151.9	2348.8	22.78
West Bank	1,505.4	1628.0	15.79
Gaza Strip	646.5	716.34	6.948

\* PCBS: Household Environmental Survey 2011

\*\* estimated based on the population growth rate

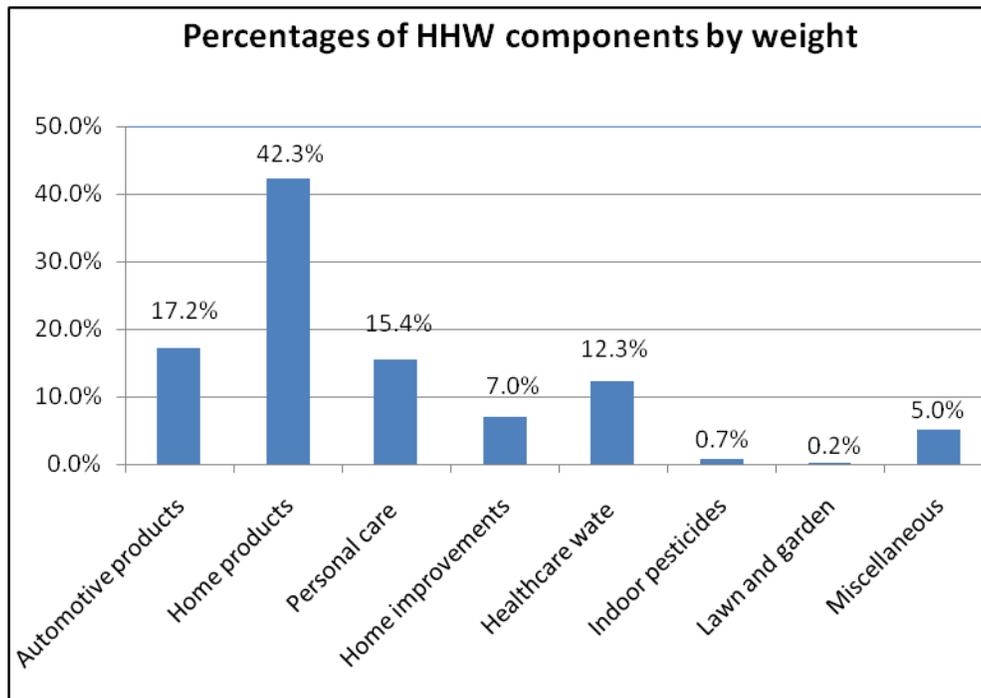
The statistical parameters of the different components of HHW are shown in Table 4.9. It is no note the larger coefficient of variation (Standard deviation divided by mean) is for lawn and garden as expected with a value of 7.7. The lower is for home products (0.6) as there is stability and similarity in this percentage among different households. The same thing applies for the personal care products which percentage is (0.9) and to some extent to healthcare waste (1.1).

**Table 4.9:** Percentage distribution of household hazardous and nonhazardous waste components in Hebron city

Waste component	Statistical parameter				
	Min %	Max %	Mean %	SD	Coefficient Variation
Automotive products	0.0	3.228	0.191	0.428	2.2
Home products	0.0	1.196	0.411	0.245	0.6
Personal care	0.0	0.682	0.148	0.135	0.9
Home improvements	0.0	1.197	0.072	0.169	2.4
Healthcare waste	0.0	0.656	0.122	0.131	1.1
Indoor pesticides	0.0	0.238	0.006	0.035	5.4
Lawn and garden	0.0	0.111	0.002	0.012	7.7
Miscellaneous hazardous waste	0.0	0.659	0.052	0.124	2.4
Nonhazardous household waste	96.32	99.870	98.996	0.636	0.0

Results in Figure 4.6 show that the home product is the largest component of HHW with a percentage of 42.3%. This is expected as most of the HHW are usually home products like batteries, cleaners, and most of the other HHW that is not classified under any other category. Automotive products come in the second rank with a percentage of 17.2%. This is again expected, as most of the households have one car or more, so the automotive products are there. The personal care products come in the third rank with a percentage of 15.4%. This is an indication of interest of citizens with their style and fashion, and also may be an indication of spending a non-negligible portion of their income on these products. The lowest percentage is products for lawn and gardens with

a percentage of only 0.2%. Again, this is an indication of negligence of citizens for the issue of gardens and planting, compared to the high percentage of personal care products. The high percentage of healthcare waste (12.3%) with their potential toxic effects on soil, water and air, as most of extra or expire date drugs are thrown with domestic waste, neglecting possibility of poisoning the environment.



**Figure 4.6:** Percentage of HHW components by weight from 0.97%.

In Spain, the percentage of HHW was 1.33%, contributing by 9,480 tons/year, of HHW to the MSW stream (Residuos, 1997) While, Altolaguirre (1999) showed that 25% of families dispose 1000 Kg of SW annually, this stream includes HHW with a weight percentage of 1% of the total, or 10 kg (Benitez, 2013). It is apparent that our percentage of HHW of 0.97% is close to that of Spain.

In a study carried out in Mexicali city the cleaning products waste was the largest component of HHW with a percentage of 43.89%. In our study cleaning products was only one part of the home products, which have a percentage of 41.1% which is close to that of Mexicali, assuming that the major part of HHW home products is cleaning materials. In the Mexicali city study the second component in rank was personal grooming aids and beauty products with a percentage of 23.30%, while this component was the third one in rank in our study with a percentage of 15.4%. Again, the type and percentage of waste components reflects the culture, attitudes, practices, ideology of a community. It may be possible to some extent to analyze the culture and development of a community by analyzing their solid waste.

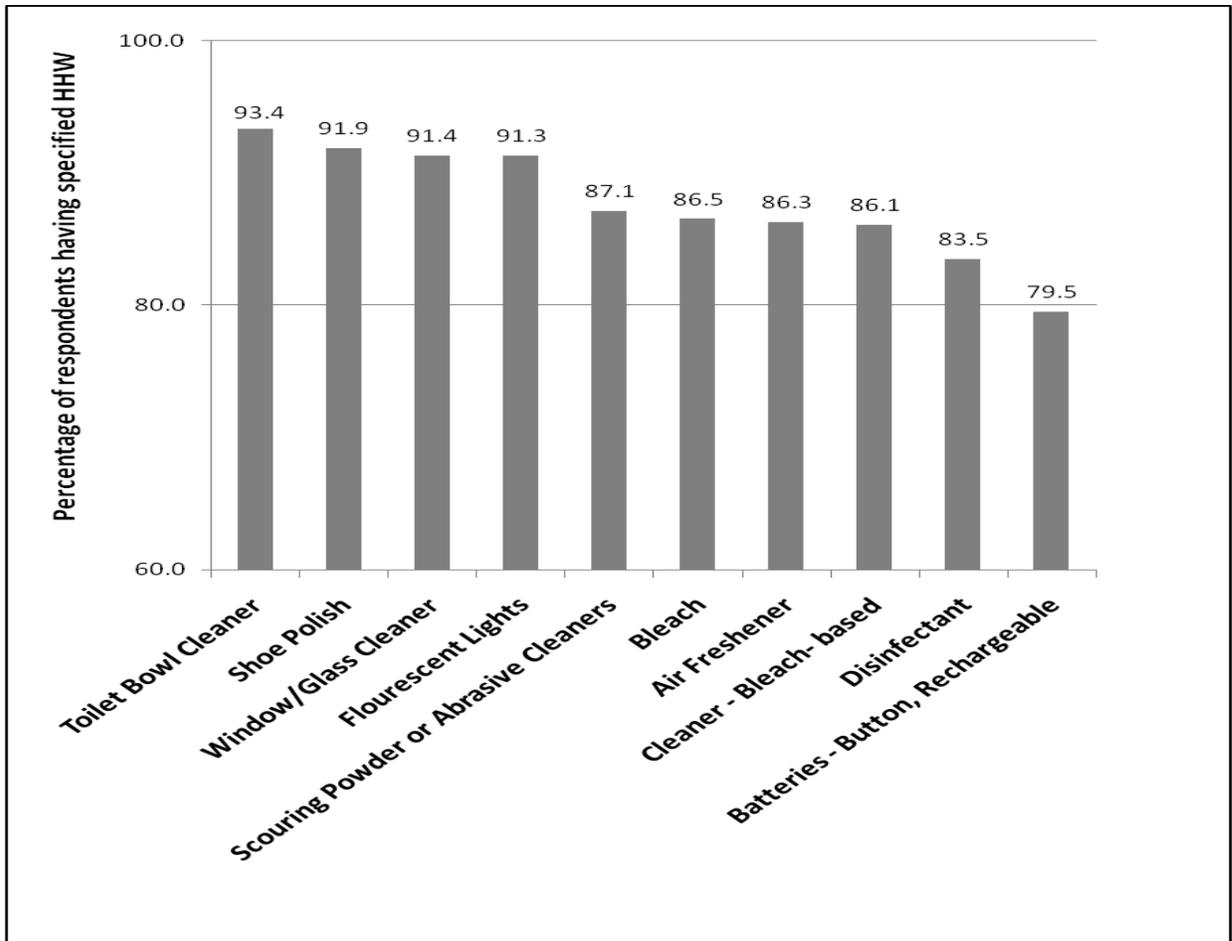
#### **4.6 Citizens generation of HHW**

In the questionnaire there were several questions covering the issue of the components of the HHW and the way of disposing these HHW. The citizen was asked to answer whether he is generating the HHW specified in the questionnaire. In case he was generating the specified type, he was asked whether he is throwing with other domestic waste, saving to be collected with HHW, throwing randomly. In the questionnaire, questions covered 46 HHW items distributed into four major categories (automotive products, home products, home improvement products, personal care products). Details are shown in Table 4.10.

**Table 4.10:** distribution of questionable items in questionnaire according to HHW category

Category of HHW product	No of questionable items
Automotive products	13
Home products	20
Home improvement products	6
Personal care products	7
<b>Total</b>	<b>46</b>

For the case of home products Figure 4.7 shows the most 10 home products of HHW produced in Hebron City according to respondent’s viewpoint.



**Figure 4.7:** Most ten HHW home products

The largest percentage of householders generated toilet bowl cleaner with a percentage of 93.4%, while the lowest percentage of 8.1% was for the houses that generate smoke detectors as shown in Table 4.11 and Figure 4.7.

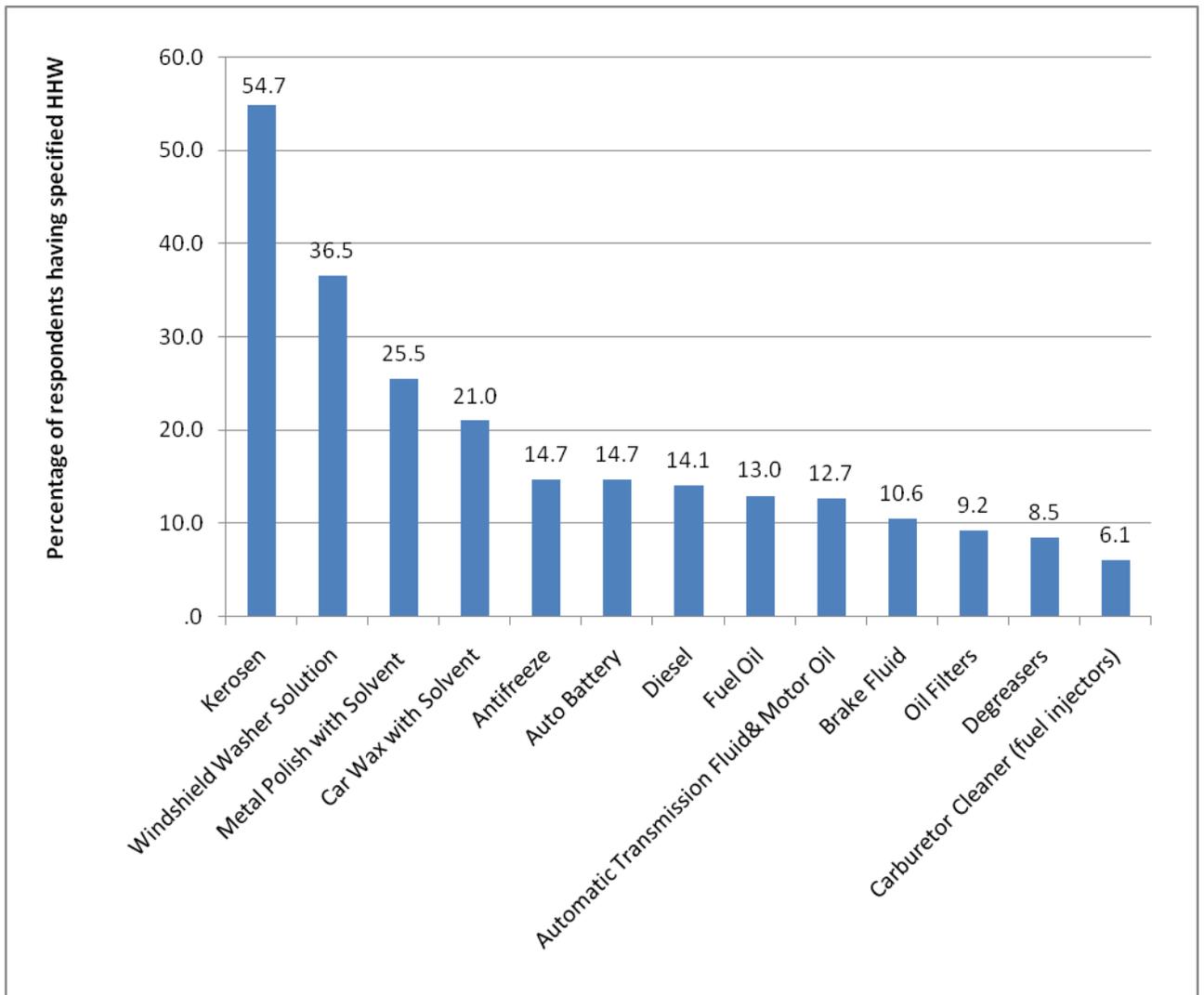
**Table 4.11:** Percentages of houses generating HHW of the home product category sorted from largest to smallest

No	HHW item	%
1	Toilet Bowl Cleaner	93.4
2	Shoe Polish	91.9
3	Window/Glass Cleaner	91.4
4	Fluorescent Lights	91.3
5	Scouring Powder or Abrasive Cleaners	87.1
6	Bleach	86.5
7	Air Freshener	86.3
8	Cleaner - Bleach- based	86.1
9	Disinfectant	83.5
10	Batteries - Button, Rechargeable	79.5
11	Furniture Polish with Solvents & Furniture Cleaner	75.0
12	Cleaner - All Purpose	74.1
13	Thermometers and Thermostats	73.0
14	Oven Cleaner (Iye based)	52.5
15	Drain Cleaner	44.7
16	Floor Care Products (wax/stripper)	44.0
17	Spot Removers/Carpet & Upholstery and Rug Cleaner	31.0
18	House Cleaner - Ammonia-based	27.0
19	Pet Supplies/Flea and Tick Control	13.8
20	Smoke Detector	8.1

The same analysis was done concerning the automotive products category; results are shown in Table 4.12. It is clear that the highest percentage of houses generate kerosene (54.7%), while the lowest percentage was for houses that generate carburetor cleaner (6.1%). These percentages are important when designing any program for reuse, recycle or separate HHW collection in order to take account for anticipated quantities and recurrences of different items.

**Table 4.12:** Percentages of houses generating HHW of automotive products category sorted from largest to smallest

<b>No</b>	<b>HHW item</b>	<b>%</b>
1	Kerosene	54.7
2	Windshield Washer Solution	36.5
3	Metal Polish with Solvent	25.5
4	Car Wax with Solvent	21.0
5	Antifreeze	14.7
6	Auto Battery	14.7
7	Diesel	14.1
8	Fuel Oil	13.0
9	Automatic Transmission Fluid& Motor Oil	12.7
10	Brake Fluid	10.6
11	Oil Filters	9.2
12	Degreasers	8.5
13	Carburetor Cleaner (fuel injectors)	6.1



**Figure 4.8:** Automotive HHW

For the third category in this study, personal care products, results are shown in Table 4.13.

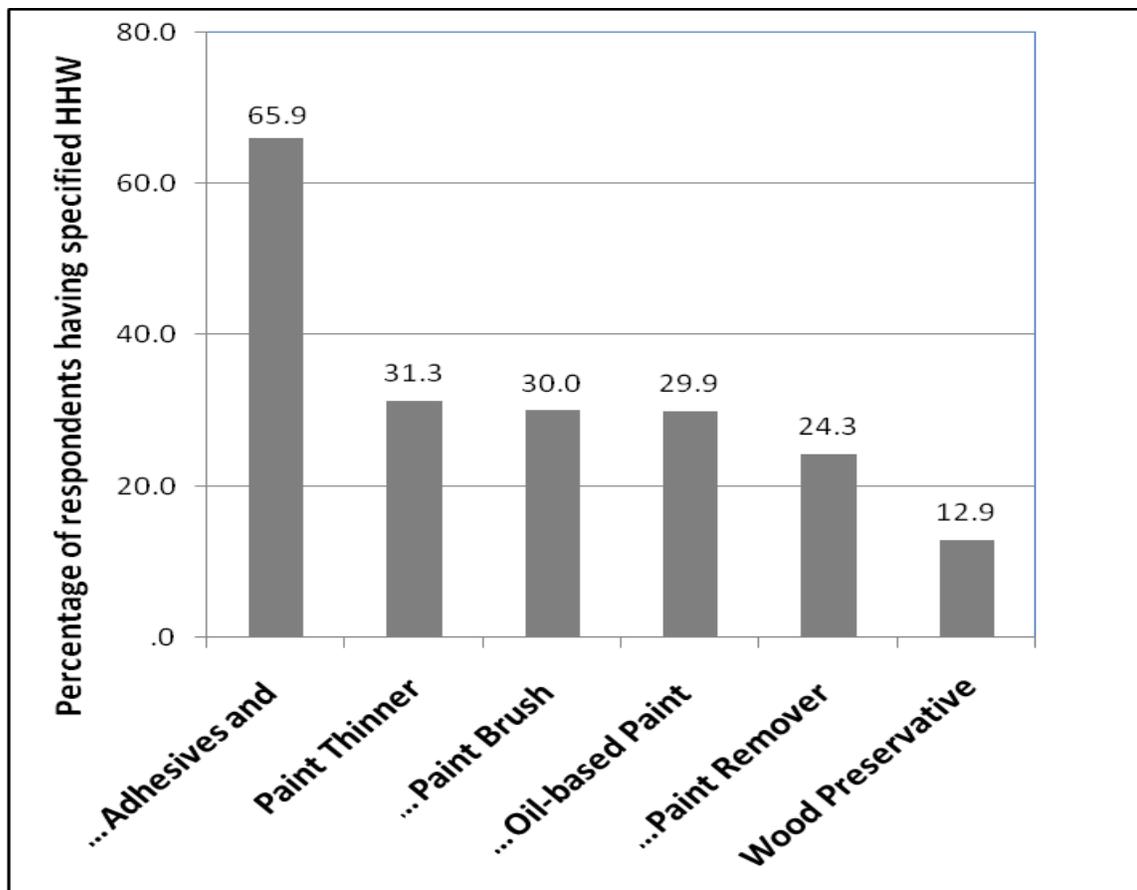
**Table 4.13:** Percentages of houses generating HHW of personal care products category sorted from largest to smallest

No	HHW item	%
1	Isopropyl Alcohol (rubbing alcohol)	95.3
2	Prescription and Over-the-Counter Medicine	93.2
3	Nail Polish Remover	81.3
4	Hair Permanent Lotion	79.8
5	Nail Polish	77.6
6	Hair Spray	71.7
7	Hydrogen Peroxide	36.5

For the fourth category in this study, home improvement products, results are shown in Table 4.14. It is noted that in general this is the lowest category that are generating HHW items, as the largest percentage of houses is for those generating adhesives and glues (65.9%) which is much lower than percentage of other home products and personal care products categories.

**Table 4.14:** Percentages of houses generating HHW of home improvement products category sorted from largest to smallest

No	HHW item	%
1	Adhesives and glues (solvent-based)	65.9
2	Paint Thinner	31.3
3	Paint Brush Cleaner	30.0
4	Oil-based Paint and Primer	29.9
5	Paint Remover and Stripper	24.3
6	Wood Preservative	12.9



**Figure 4.9:** Home improvement HHW

#### **4.7 Citizens Management of HHW**

As in the preceding section, the analysis was done to figure out how citizen is disposing HHW in case he is producing it. Disposal method may be one of four means which are: throwing with other domestic waste, saving to be collected with HHW, recycle, and throwing randomly. There were 46 HHW items covered by the questionnaire. To simplify diagnosis and analysis of data, the most ten products and the last one for each method of disposal are presented.

For throwing HHW with domestic waste, Table 4.15 shows the results. It is interesting to note that the most HHW thrown with other wastes is medicine, where 83.1% of households are disposing it with other domestic wastes. The least one in the list is auto battery with a percentage of 21.5%, as this item can be recycled or sold to interested persons. In general, it is noted that very high percentage of household are throwing their HHW with other domestic waste. Must be for whether they realize the risks and dangers of mixing these HHW with domestic wastes on the human health and on the environment.

**Table 4.15:** Disposal of HHW by throwing with domestic wastes sorted from largest to smallest

No	HHW item	Throwing with domestic waste %	Save to HHW collection %	Recycle %	Throwing randomly %
1	Prescription and Over-the-Counter Medicine	83.1	8.3	2.2	6.4
2	Toilet Bowl Cleaner	83.1	7.8	3.9	5.3
3	Nail Polish Remover	82.4	4.9	4.3	8.3
4	Nail Polish	81.7	6.7	3.2	8.3
5	Cleaner - Bleach- based	81.5	9.1	3.5	5.9
6	Bleach	80.7	7.7	6.2	5.3
7	Shoe Polish	80.3	7.2	3.9	8.6
8	Scouring Powder or Abrasive Cleaners	80.2	7.0	7.6	5.2
9	Ant/Cockroach Spray and Bait	79.5	8.9	3.9	7.7
10	Adhesives and Glues (solvent-based)	79.3	9.3	2.6	8.9
.	.	.	.	.	.
.	.	.	.	.	.
46	Auto Battery	21.5	39.8	17.2	21.5

For saving HHW to be for HHW collection, Table 4.16 shows the results. It is the degreasers that are most saved with a percentage of 43.3%., and the nail polish remover is the least with a percentage of 29.5%. In general, it has been observed not bad percentage are stored for HHW collection. This trend should be encouraged so as to separate HHW from other domestic wastes.

**Table 4.16:** Disposal of HHW by saving to HHW collection sorted from largest to smallest

No	HHW item	Throwing with domestic waste %	Save to HHW collection %	Recycle %	Throwing randomly %
1	Degreasers	22.4	43.3	9.0	25.4
2	Oil Filters	31.3	42.2	10.9	15.6
3	Auto Battery	21.5	39.8	17.2	21.5
4	Carburetor Cleaner (fuel injectors)	27.9	36.1	16.4	19.7
5	Automatic Transmission Fluid& Motor Oil	33.7	35.9	12.0	18.5
6	Diesel	34.5	32.2	12.6	20.7
7	Fuel Oil	45.5	30.7	10.2	13.6
8	Smoke Detector	42.4	30.3	9.1	18.2
9	Brake Fluid	50.0	29.5	8.9	11.6
10	Car Wax with Solvent	50.0	29.5	8.9	11.6
.	.	.	.	.	.
.	.	.	.	.	.
46	Nail Polish Remover	82.4	4.9	4.3	8.3

For recycling, Table 4.17 shows the results. It is the kerosene that is the most recycled with a percentage of 22.7% as usually it is used; auto battery comes in the second rank with a percentage of 17.2% as usually it is sold to concerned persons. It is to note that automotive products have the highest percentage for recycling compared to other products. Of course the medicine is in the last portion of this disposal method as anticipated, no one will use expired medicine or the medicine of others.

**Table 4.17:** Disposal of HHW by saving to HHW collection sorted from largest to smallest

No	HHW item	Throwing with domestic waste %	Save to HHW collection %	Recycle %	Throwing randomly %
1	Kerosene	51.6	17.3	22.7	8.4
2	Auto Battery	21.5	39.8	17.2	21.5
3	Carburetor Cleaner (fuel injectors)	27.9	36.1	16.4	19.7
4	Diesel	34.5	32.2	12.6	20.7
5	Automatic Transmission Fluid& Motor Oil	33.7	35.9	12.0	18.5
6	Pet Supplies/Flea and Tick Control	43.5	27.2	12.0	17.4
7	Windshield Washer Solution	57.1	18.5	11.9	12.5
8	Oil Filters	31.3	42.2	10.9	15.6
9	Metal Polish with Solvent	56.7	22.8	10.2	10.2
10	Fuel Oil	45.5	30.7	10.2	13.6
46	Prescription and Over-the-Counter Medicine	83.1	8.3	2.2	6.4

For throwing randomly, Table 4.18 shows the results. It is the degreasers that are the most thrown randomly with a percentage of 25.4% with its potential of reacting with any other material and causing harm to human or animal. Unexpected, auto battery comes in the second rank with a percentage of 21.5%, as usually it is sold to concerned persons. Automotive products have the highest percentage for thrown randomly compared to other products. Scouring powder comes in the last portion of this disposal method.

**Table 4.18:** Disposal of HHW by throwing randomly sorted from largest to smallest

No	HHW item	Throwing with domestic waste %	Save to HHW collection %	Recycle %	Throwing randomly %
1	Degreasers	22.4	43.3	9.0	25.4
2	Auto Battery	21.5	39.8	17.2	21.5
3	Diesel	34.5	32.2	12.6	20.7
4	Carburetor Cleaner (fuel injectors)	27.9	36.1	16.4	19.7
5	Antifreeze	50.0	24.1	6.5	19.4
6	Automatic Transmission Fluid& Motor Oil	33.7	35.9	12.0	18.5
7	Smoke Detector	42.4	30.3	9.1	18.2
8	Pet Supplies/Flea and Tick Control	43.5	27.2	12.0	17.4
9	explosives like fireworks	50.7	28.0	4.0	17.3
10	Oil Filters	31.3	42.2	10.9	15.6
.	.	.	.	.	.
.	.	.	.	.	.
46	Scouring Powder or Abrasive Cleaners	80.2	7.0	7.6	5.2

Analysis of methods of management of HHW was carried out also in relation to the category of the HHW (home, automotive, personal care, and home improvement). On the average for the different HHW items related to automotive products the average for the disposing methods is 40.9% throwing

with domestic wastes, 30.9% saved to HHW collection, 12.1% for recycle and 16.1% thrown randomly. These figures are not satisfying, as they show bad practice for dealing with this type of waste that can be recycled or reused , and if not should be separated from other domestic wastes.

**Table 4.19:** Methods for management of HHW automotive products

<b>HHW item</b>	<b>throwing with the domestic wastes</b>	<b>Save to HHW collection</b>	<b>Recycle</b>	<b>throwing randomly</b>
Antifreeze	50.0	24.1	6.5	19.4
Auto Battery	21.5	39.8	17.2	21.5
Automatic Transmission Fluid& Motor Oil	33.7	35.9	12.0	18.5
Brake Fluid	50.0	29.5	8.9	11.6
Carburetor Cleaner (fuel injectors)	27.9	36.1	16.4	19.7
Car Wax with Solvent	50.0	29.5	8.9	11.6
Degreasers	22.4	43.3	9.0	25.4
Diesel	34.5	32.2	12.6	20.7
Fuel Oil	45.5	30.7	10.2	13.6
Kerosene	51.6	17.3	22.7	8.4
Metal Polish with Solvent	56.7	22.8	10.2	10.2
Oil Filters	31.3	42.2	10.9	15.6
Windshield Washer Solution	57.1	18.5	11.9	12.5
<b>Average</b>	<b>40.9</b>	<b>30.9</b>	<b>12.1</b>	<b>16.1</b>

Table 4.20 shows that in general the average for the different HHW items related to home products the average for the disposing methods is 73.0% throwing with domestic wastes, 12.4% saved to HHW collection, 6.1% for recycle and 8.5% thrown randomly. These figures are not satisfying, as most of the HHW is thrown with domestic waste, activation of separation methods at home should be encouraged and started.

**Table 4.20:** Methods for management of HHW home products

<b>HHW</b>	<b>throwing with the household solid wastes</b>	<b>Save to HHW collection</b>	<b>recycle</b>	<b>throwing randomly</b>
Air Freshener	75.7	9.0	5.1	10.2
Batteries - Button, Rechargeable	75.7	10.0	3.4	10.9
Bleach	80.7	7.7	6.2	5.3
Cleaner - All Purpose	77.8	10.8	6.1	5.4
house Cleaner - Ammonia-based	66.9	16.2	6.6	10.3
Cleaner - Bleach-based	81.5	9.1	3.5	5.9
Disinfectant	75.8	11.8	5.5	7.0
Drain Cleaner	68.9	18.1	5.2	7.8
Floor Care Products (wax/stripper)	75.9	12.6	5.8	5.8
Fluorescent Lights	76.7	9.4	2.8	11.1
Furniture Polish with Solvents & Furniture Cleaner	74.7	9.7	7.3	8.3
Oven Cleaner (lye based)	78.6	11.8	2.6	7.0
Pet Supplies/Flea and Tick Control	43.5	27.2	12.0	17.4
Scouring Powder or Abrasive Cleaners	80.2	7.0	7.6	5.2
Shoe Polish	80.3	7.2	3.9	8.6
Smoke Detector	42.4	30.3	9.1	18.2
Spot Removers/Carpet & Upholstery and Rug Cleaner	67.6	16.6	7.6	8.3
Thermometers and Thermostats	74.3	9.9	9.6	6.2
Toilet Bowl Cleaner	83.1	7.8	3.9	5.3
Window/Glass Cleaner	78.7	6.7	7.8	6.7
<b>Average</b>	<b>73.0%</b>	<b>12.4%</b>	<b>6.1%</b>	<b>8.5%</b>

Table 4.21 shows that in general the average for the different HHW items related to personal care products the average for the disposing methods is 78.7% throwing with domestic wastes which is close to that of home products, 7.0% saved to HHW collection, 5.4% for recycle which is also closed to home products, and 8.9% thrown randomly, which is again close to home products. These figures are not satisfying, as most of the HHW is thrown with domestic waste, activation of separation methods at home should be encouraged and started.

**Table 4.21:** Methods for management of HHW Personal Care Products

<b>HHW item</b>	<b>Throwing with domestic wastes</b>	<b>Save to HHW collection</b>	<b>Recycle</b>	<b>Throwing randomly</b>
Hair Spray	77.3	7.0	5.6	10.1
Hair Permanent Lotion	76.4	7.2	5.3	11.0
Hydrogen Peroxide	77.0	9.7	6.1	7.3
Isopropyl Alcohol (rubbing alcohol)	77.6	6.2	8.1	8.1
Nail Polish	81.7	6.7	3.2	8.3
Nail Polish Remover	82.4	4.9	4.3	8.3
<b>Average</b>	<b>78.7</b>	<b>7.0</b>	<b>5.4</b>	<b>8.9</b>

Table 4.22 shows that in general the average for the different HHW items related to home improvement products the average for the disposing methods is 65.0% throwing with domestic wastes , 17.6% saved to HHW collection, 7.1% for recycle, and 10.3% thrown randomly.

**Table 4.22:** Methods for management of HHW Home Improvements products

<b>HHW</b>	<b>Throwing with the household solid wastes</b>	<b>Save to HHW collection</b>	<b>Recycle</b>	<b>Throwing randomly</b>
Adhesives and Glues (solvent-based)	79.3	9.3	2.6	8.9
Oil-based Paint and Primer	69.3	16.8	5.1	8.8
Paint Brush Cleaner	64.0	17.6	8.8	9.6
Paint Remover and Stripper	60.9	21.7	7.8	9.6
Paint Thinner	61.8	17.4	9.0	11.8
Wood Preservative	54.8	22.6	9.5	13.1
<b>Average</b>	<b>65.0</b>	<b>17.6</b>	<b>7.1</b>	<b>10.3</b>

Table 4.23 summarizes the management methods of HHW in relation to their category. It is obvious that personal care product is the category that is mostly disposed with domestic wastes (78.7%). Automotive products have the highest percentage (as expected) of recycling (12.1%), although this is not a satisfying result, but they also have the highest percentage of saving to HHW collection (30.9%), and also unfortunately the highest percentage being thrown randomly.

**Table 4.23:** Management methods of HHW in relation to their category

<b>HHW</b>	<b>Throwing with the household solid wastes</b>	<b>Save to HHW collection</b>	<b>Recycle</b>	<b>Throwing randomly</b>
Automotive products	<b>40.9%</b>	<b>30.9%</b>	<b>12.1%</b>	<b>16.1%</b>
Home products	<b>73.0%</b>	<b>12.4%</b>	<b>6.1%</b>	<b>8.5%</b>
Personal care products	<b>78.7%</b>	<b>7.0%</b>	<b>5.4%</b>	<b>8.9%</b>
Home improvement products	<b>65.0%</b>	<b>17.6%</b>	<b>7.1%</b>	<b>10.3%</b>

## **Chapter Five**

### **Conclusions and Recommendations**

#### **5.1 Conclusions**

The study consisted of two parts, the first in regard to components of HHW in Hebron and it was carried out by analyzing the waste in the transfer station. The second part concerned the trends, practices attitudes of citizens in regard to HHW management and the effect of demographic parameters on these issues. This was carried out using a questionnaire that was analyzed for 385 respondents.

The study showed that there were some negative practices that may affect health of citizens especially kids. Children are responsible for transferring garbage from home to container in 40.2% of the cases. In 66.4% of cases garbage is disposed to container every day, and 24.9% every two days, but for the rest percentage it will last more than two days at home. In most cases the container is less than 150 m from home 81%, but for 19% either it is far or there is no container. This is a red alarming light that should be pursued in order to achieve 100% coverage for SW collection service.

Risks associated with HHW were examined in order to diagnose any danger source. In 8.8% of houses, there is a hazardous substance kept in home, which relates to father work. In 27.2% of houses the children are playing in the nearby container. Again, this is a red alarming light; responsible authorities should provide sites and activities for children to invest their time, instead of playing near SW containers. In 18.5% of houses there is an accident because of HHW. This large percentage should push responsible individuals, institutes, local and governmental authorities to take immediate steps toward the issue of

HHW management. Time is running, and they should not wait till a disaster takes place. What actually increases the risk is presence of kids in most houses (59%). The study showed that persons who were exposed to an HHW accident, suffered psychologically for a long time from accident in 35.6% of cases. The accidents because of HHW were injuries (42%), poisoning (36%), and burns (22%).

The study figures out the significant relationship between the income and kids playing near the container. It was found out that there is a significant relationship between the sufficiency of size of the container and kids playing near it. It seems that overflow containers will attract kids to play around (32%) compared with (20%) in case the container was of sufficient size.

The percentage of HHW is 1% of the total SW weight. The home products constitute the largest percentage of HHW (42.3%), followed by automotive products (17.2%), personal care products (15.4%) and healthcare waste (12.3%). The least category contribution was lawn and garden of only 0.2% followed by indoor pesticides of 0.7%, which indicates the low attention paid to home gardens and home agriculture.

The study diagnosed the current practices of citizens in regard to HHW management. Personal care products are the most categories which are thrown with domestic waste (78.7%), while automotive products are the least (40.9%). Automotive products are the most that are saved for HHW collection (30.9%) and also for recycle (12.1%) and also have the highest percentage of being thrown randomly (16.1%).

## **5.2 Recommendations**

Awareness and education in regard to SW and HHW issues should be given the priority. Awareness should be on all levels and with all available means. Awareness should be based on a strategy for dealing with HHW issues. Awareness campaigns should be designed by specialists to take into account the different behaviors and attitudes of different people in accordance with their socioeconomic conditions.

Awareness should be on the individual level for households, mothers, and children. Each category should be targeted with suitable approach that fits. Awareness should also be carried out to cover the institutional level as potential targets may be local councils, NGOs, concerned governmental authorities.

Citizens should be aware of proper storing, handling, disposing means for hazardous products. They should monitor these substances and ensure proper knowledge.

Awareness should be done using all means like bulletins, leaflets, brochures, internet, radio, TV, and any other possible mean.

Awareness also should focus on wise consumption without squandering, so we achieve both less expenses and less waste.

In order to achieve this awareness strategy, there should be an institutional body responsible for that, it may be either part of an existing foundation like solid waste management council or an independent body on the level of country.

Service of SW collection should be improved horizontally for complete coverage and vertically for better management, like more frequent collection, more efficient and clean containers, more efficient transporting vehicles.

There should be solid intervention for management of HHW as this issue should take the required attention and care. Several alternatives are there, as separate collection of HHW, assigning one or two days a week for collecting these HHW or assigning centers for collecting these HHW, curbside pickup may be an alternative. The important thing is that officials in charge of SW know and feel about the seriousness of HHW.

There should be innovation in finding disposal methods of HHW either by recycling or reuses. The challenge will be to open new horizons with private sector to invest for make use of HHW and to change waste into money, and thus better job opportunities and better economy.

Further studies should be carried out to diagnose the problem of HHW in other location and from other views. Focusing in these studies should be on the details of accidents because of HHW, and their long and short effect, details of quantities of each item of the HHW and its percentages and its variations according to geographic and socioeconomic factors, in addition to the seasonal variation of HHW generation rate and percentages.

All this need money and financial resources, training and capacity building of solid waste staff and the role of ministry of planning should be clear in addressing these needs to foreign donors in order to secure required financial support.

## References

Aprilia, A , Tezuka,T. , Spaargaren, G., (2013). Inorganic and hazardous solid waste management: Current status and challenges for Indonesia. *Procedia Environmental Sciences*, 17, 640 – 647.

Agricultural Research and Cooperative Extension (2014) Household Hazardous Products and Hazardous Waste: A Summary for Consumers, College of Agricultural Sciences, Penn State. Retrieved on May 25<sup>th</sup>, 2014 from: <http://pubs.cas.psu.edu/FreePubs/PDFs/xi0014.pdf>

Bound, P.J., Kitsou, K., Voulvoulis, N.,(2006). Household disposal of pharmaceuticals and perception of risk to the environment , *Environmental Toxicology and Pharmacology*, 21, 3, 301-307.

Banerjee, S., Aditya,G., Saha, K.G.,(2013). Household disposables as breeding habitats of dengue vectors: Linking wastes and public health. *Waste Management*, 33, 1, 233-239

Benitez, S. O., Zorrilla H. A., Olvera G. L., Quantification and characterization of household hazardous wastes in a Mexican family: A case study. Retrieved on October 28<sup>th</sup>, 2013 from <http://promepca.sep.gob.mx/archivospdf/produccion/Producto475784.PDF>

Burnley, S.J., Ellis, J.C., Flowerdew, R., Poll, A.J., Prosser, H. (2007). Assessing the composition of municipal solid waste in Wales. *Resources, Conservation and Recycling*, 49, 264–283.

Dale Ortego, J., Aminabhavi, M.T., Harlapur ,F.S., Balundgi,H.R., A review of polymeric geosynthetics used in hazardous waste facilities , *Journal of Hazardous Materials*, 42, 2, 115-156

Delgado, O.B., Ojeda-Ben, S., Marquez-Benavides, L. (2007). Comparative analysis of hazardous household waste in two Mexican regions. *Waste Management*, 27,792-801.

Duan, H., Huang, Q., Wang, Q., Zhou, B., Li, J., (2008). Hazardous waste generation and management in China, *Hazardous Materials*, 158, 2–3, 221-227

Environmental Protection Agency (EPA), 2005, Solid Waste and Emergency Response, Introduction to Hazardous Waste Identification, (40 CFR Parts 261), Training Module, Retrieved on May 2th, 2014 from

<http://www.epa.gov/waste/inforesources/pubs/training/hwid05.pdf>

Environmental Protection Agency (EPA), 2012, Wastes - Hazardous Waste - International Waste Activities, Introduction to Hazardous Waste Identification, Retrieved on may 2<sup>th</sup>, 2014 from

<http://www.epa.gov/osw/hazard/international/hwid-intro2.htm>

Environmental Protection Agency (EPA), 2014, Wastes - Resource Conservation - Common Wastes & Materials, Household Hazardous Waste, Retrieved on may 2<sup>th</sup>, 2014 from

<http://www.epa.gov/wastes/conserved/materials/hhw.htm>

Friedman, L., Government Relations Director, Americans for Peace Now and Dror Etkes, Settlements Watch Director, Peace Now (Israel), Hebron - Settlements in Focus Retrieved on October 6<sup>th</sup>, 2013 from <http://peacenow.org.il/eng/content/hebron-settlements-focus>

Fauziah, S.H., Agamuthu, P., Household hazardous waste components in malaysian msw -the current scenario, *Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 ,Kuala Lumpur, Malaysia*. From <http://www.srcosmos.gr/srcosmos/showpub.aspx?aa=13030>

Hassanvand, M.S., Naddafi, K., Nabizadeh, R., Momeniha, F., Mesdaghinia, A., Yaghmaeian, K. (2011). Hazardous waste management in educational and research centers: a case study. *Toxicological & Environmental Chemistry*, 93(8), 1636-1642.

Kies Strategies, Tabor Consulting Group, and Bell & Associates, Coos and Curry Counties, (2008), Final Household Hazardous Waste Management Plan , Coos County and Curry County, Oregon

Kelley, B.G., Goldwater, C.S., Brown, M.S. (1989). Evaluation of a statewide matching grant program for the collection of household hazardous waste. *Journal of the Air Pollution Control Association*, 39(4), 427-430.

Krause.L, 2012, Medically Reviewed by George Krucik, MD, Isopropyl Alcohol Poisoning, Retrieved on June 24<sup>th</sup>, 2014 from <http://www.healthline.com/health/isopropyl-alcohol#Overview1>

Li,Y., Li ,J., Chen, S., Diao,W., (2012). Establishing indices for groundwater contamination risk assessment in the vicinity of hazardous waste landfills in China. *Environmental Pollution*, 165, 77-90

Fjelsted, L. and Christensen, T.H., (2007). *Waste Management & Research*, 25, 502–509.

Lebersorger, S., Schneider, F., (2011). Discussion on the methodology for determining food waste in household waste composition studies, *Waste Management*, 31, 9–10, 1924-1933

Malandrakis, G.N. (2006). Learning pathways in environmental science education: the case of hazardous household items. *International Journal of Science Education*, 28(1), 1627-1645.

Malik, S., Schecter, A., Caughy, M., Fixler, E.D., (2010). Effect of Proximity to Hazardous Waste Sites on the Development of Congenital Heart Disease. *Archives of Environmental Health: An International Journals*

Mohan, K.A., Degnan, D., Feigley, E.C., Shy, M.C., Hornung, A.C., Mustafa, T., MacEra, A.M., (2000). Comparison of respiratory symptoms among community residents near waste disposal incinerators. *International Journal of Environmental Health Research*, 10(1), 63-75.

Otoniel, D.B., Benavides Liliana, M., Francelia, G.P.,(2008). Consumption patterns and household hazardous solid waste generation in an urban settlement in México, *Waste Management*, 28, 1, S2-S6

Palestinian Environmental Law, 1999, Definitions and General Provisions, Retrieved on June 24<sup>th</sup>, 2014 from [http://www.pengon.org/index.php?option=com\\_content&task=view&id=38&Itemid=44](http://www.pengon.org/index.php?option=com_content&task=view&id=38&Itemid=44)

Pike.A.R, 2013, Encyclopaedia Britannica, Retrieved on June 24<sup>th</sup>, 2014 from <http://www.britannica.com/>

Reinhart R.D, 1993, a review of recent studies on the sources of hazardous compounds emitted from solid waste landfills: a US experience, *Waste Management and Research* , 11:257 – 68.

Residuos.R, 1997, Experiencia piloto de recogida selectiva de residuos tóxicos y peligrosos contenidos en los residuos sólidos urbanos (Tóxicos del hogar), 6. 34 España.

Rosenfeld, E.P., Feng, H.G.L.,(2011). The Biggest Generators of Hazardous Waste in the US, *Risks of Hazardous Wastes*, 11-22

Rushton, L., (2003). Health hazards and waste management, *British Medical Bulletin*, 68, 1183-197.

Stanek III, J.E., Tuthill, W., Willis, C., Gary, S., (1987). Household Hazardous Waste in Massachusetts. *Archives of Environmental Health*, 42(2), 83-86.

Slack, R., Letcher, T.M., (2011). Chemicals in Waste: Household Hazardous Waste. In: Letcher, T.M. Vallero, D.A.: *Waste : a handbook for management*. Burlington, MA, Academic Press. P.181-195

Slack, R.J., Gronow, J.R., Voulvoulis, N. (2005). Household hazardous waste in municipal landfills: contaminants in leachate. *Science of the Total Environment*, 337, 119– 137.

Slack, R.J., Gronow, J.R., Voulvoulis, N. (2004). Hazardous components of household waste. *Critical Reviews in Environmental Science and Technology*, 34, 419–45.

The Applied Research Institute – Jerusalem, 2009, Hebron City Profile, Hebron Governorate. Retrieved on October 6<sup>th</sup>, 2013 from: <http://vprofile.arij.org/hebron/pdfs/Hebron%20City%20profile.pdf>

Wagner, P.T., Toews, P., Bouvier, R., (2013). Increasing diversion of household hazardous wastes and materials through mandatory retail take-back. *Journal of Environmental Management*, 123, 88-97.

Waste management, (2014). Household Hazardous Waste Disposal, Retrieved on May 9<sup>th</sup>, 2014 from:

<http://www.wm.com/enterprise/municipalities/residential-solutions/household-hazardous-waste.jsp>

Wei Lu, J., Bin Chang, N., Liao, L., (2012). Environmental Informatics for Solid and Hazardous Waste Management: Advances, Challenges, and Perspectives. *Critical Reviews in Environmental Science and Technology*. Wikipedia, the free encyclopedia, 2014, Hebron, Retrieved on October 9<sup>th</sup>, 2013 from: <http://en.wikipedia.org/wiki/Hebron>

Yasuda, K., Tanaka, M. (2006). Report on hazardous household waste generation in Japan. *Waste Management and Research*, 24, 397–401.

Ziaee.S, Omrani.G, Ale Agha.A.A, Mansouri.N, (2012). Qualitative and Quantitative Examination of Household Hazardous Waste in Tehran . *Advances in Environmental Biology*, 6(2), 676-683.

Zakat Committee of central Hebron, 2014, Hebron city, Retrieved on October 9<sup>th</sup>, 2013 from [http://www.zakat.ps/index.php?option=com\\_content&view=article&id=26&Itemid=48&lang=en](http://www.zakat.ps/index.php?option=com_content&view=article&id=26&Itemid=48&lang=en)

Appendix A  
**Household Questionnaire**



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يهدف هذا الاستبيان إلى جمع المعلومات اللازمة لعمل رسالة ماجستير بعنوان (تقييم إدارة النفايات المنزلية الخطرة في مدينة الخليل) والتي أقوم بإعدادها أنا الطالب وسيم "محمد وليد" القاضي التميمي لاستكمال درجة الماجستير في تخصص علوم المياه والبيئة من جامعة بيرزيت وتحت إشراف د. عصام الخطيب (0599720257). أرجو تعبئة الاستبيان كاملاً علماً بأن المعلومات الواردة فيه سوف تستخدم لأغراض البحث العلمي والأكاديمي فقط.

مع الشكر الجزيل لتعاونكم وحسن اهتمامكم

		التاريخ / / م
V001	<input type="checkbox"/>	رقم الاستبانة
V002	<input type="checkbox"/>	المنزل: 1- مستقل 2- شقة في مبنى أو عمارة
V003	<input type="checkbox"/>	ما نوع السكن: 1- إيجار 2- ملك
V004	<input type="checkbox"/>	الحالة الاجتماعية لمجيب عن الأسئلة: 1- أعزب 2- متزوج 3- مطلق
V005	<input type="checkbox"/>	المستوى التعليمي لمجيب عن الأسئلة: 1- أمي 2- ابتدائي 3- إعدادي 4- ثانوي 5- تعليم عالي
V006	<input type="checkbox"/>	الجنس: 1- ذكر 2- أنثى
V007	<input type="checkbox"/>	التحصيل العلمي لربة البيت: 1- أمية 2- شهادة مدرسية 3- شهادة جامعية أولى 4- شهادة جامعية عليا
V008	<input type="checkbox"/>	عمر ربة البيت: 1- أقل من 25 2- 26-35 3- 36-45 4- أكثر من 45
V009	<input type="checkbox"/>	ما نوع عمل ربة البيت: 1- ربة بيت فقط 2- تعمل في الحكومة 3- تعمل في قطاع خاص

V010	<input type="checkbox"/>	هل يحتوي البيت على مواد خطرة لها علاقة بعمل الأب؟ 1- نعم 2- لا
V011	<input type="checkbox"/>	إذا كانت الإجابة لسؤال (10) نعم فأين يتم حفظ هذه المواد؟ 1- داخل المطبخ 2- داخل الحمام 3- في حديقة المنزل 4- سدة المنزل 5- مكان خاص لا يمكن الوصول إليه من قبل الأطفال
V012	<input type="checkbox"/>	كم عدد الأفراد الذين يعيشون بمنزلك؟ ( ) فرد
V013	<input type="checkbox"/>	هل يوجد أطفال في الأسرة في الفئة العمرية من ( 8 ) أشهر إلى ( 10 ) سنوات؟ 1 نعم 2- لا
V014	<input type="checkbox"/>	متى تتم عملية التخلص من النفايات الصلبة من البيت؟ 1- كل يوم 2- يوم بعد يوم 3- كل ثلاثة أيام 4- كل أسبوع 5- غير ذلك حدد.....
V015	<input type="checkbox"/>	معدل الدخل الشهري؟ (1) أقل من 200 دينار (2) 200-400 دينار (3) 400-600 دينار (4) أكثر من 600 دينار
V016	<input type="checkbox"/>	هل حجم الحاوية في منطقتك كافية للنفايات؟ 1- نعم 2- لا
V017	<input type="checkbox"/>	كم يقدر معدل وزن النفايات من المنزل يوميا بالكغم؟ ( ) كغم
V018	<input type="checkbox"/>	أذكر بعض الأمثلة على النفايات المنزلية الخطرة:.....
V019	<input type="checkbox"/>	من الذي يقوم عادة بإلقاء النفايات في الحاوية أو غيرها؟ 1- الأب 2- الأم 3- الأطفال 4- حارس العمارة 5- جميع ما ذكر 6- غير ذلك -----

V020	<input type="checkbox"/>	هل هنالك سلوك غير سليم للأطفال (عبث) اتجاه محتويات الحاوية القريبة من منزلك؟ 1- نعم 2- لا
V021	<input type="checkbox"/>	مسافة أقرب حاوية إلى المنزل(بالمتر): 1-اقل من 75 م 2- إلى 150 م 76 3- أكثر من 150 م 4- لا يوجد حاوية

**النفايات الخطرة المنزلية :** هي جزء من النفايات الصلبة ، هنالك العديد من المنتجات كثيرة الاستخدام في البيت، الحديقة و الكراج تحتوي على مكوّنات خطيرة (مثل مواد التنظيف) و تحتاج لأن تُستخدَم و تُخزَّن بأمان . إذا تقرّر التخلّص من هذه المنتجات تصبح النفايات الخطرة المنزلية التي تتطلّب التخلّص المناسب

V022	<input type="checkbox"/>	هل عانى احد أفراد الأسرة من حوادث نتيجة التعرض للمواد المنزلية الخطرة؟ 1- نعم 2- لا
V023	<input type="checkbox"/>	إذا كانت الإجابة لسؤال (22) نعم، فما هي نوع الإصابة؟ 1 - حروق 2- تسمم 3- جروح
V024	<input type="checkbox"/>	إذا كانت الإجابة لسؤال (22) نعم كيف تم إعادة حفظ وتخزين المواد المنزلية الخطرة؟ 1- لم يتم أي تغيير 2- حفظها في مكان آمن 3- عدم تخزينها في البيت كليا
V025	<input type="checkbox"/>	إذا كانت الإجابة لسؤال (22) نعم هل كان هناك تأثير نفسي سيء على المصاب؟ 1- نعم 2- لا
V026	<input type="checkbox"/>	وضع حاويات جمع القمامة المنزلية من ناحية ميكانيكية؟ 1-جيدة 2- ليست جيدة 3- لا يوجد حاوية
V027	<input type="checkbox"/>	وضع الحاوية القريبة من ناحية صحية (نظافة الحاوية)؟ 1- مقبولة 2- غير مقبولة 3- لا يوجد حاوية
V028	<input type="checkbox"/>	هل أنت راض عن وتيرة جمع النفايات المنزلية؟ 1-دائما 2- غالبا 3- أحيانا 4- نادرا
V029	<input type="checkbox"/>	هل يوجد في منزلك السائل المبرد في الرديتر؟ 1- نعم 2- لا
V030	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة

		حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V031	<input type="checkbox"/>	هل يوجد في منزلك بطاريات سيارات؟ 1- نعم 2- لا
V032	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منها ( بعد انتهاء صلاحيتها)؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V033	<input type="checkbox"/>	هل يوجد في منزلك زيت محركات السيارات؟ 1- نعم 2- لا
V034	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V035	<input type="checkbox"/>	هل يوجد في منزلك زيت الفرامل؟ 1- نعم 2- لا
V036	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V037	<input type="checkbox"/>	هل يوجد في منزلك ملمعات السيارة بشكل سائل؟ 1- نعم 2- لا
V038	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V039	<input type="checkbox"/>	هل يوجد في منزلك منظف الكاربنتير ( حاقن الوقود )؟ 1- نعم 2- لا
V040	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V041	<input type="checkbox"/>	هل يوجد في منزلك مزيل شحمة السيارات؟ 1- نعم 2- لا
V042	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا الشحمة أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V043	<input type="checkbox"/>	هل يوجد في منزلك الديزل (سولار)؟ 1- نعم 2- لا

V044	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V045	<input type="checkbox"/>	هل يوجد في منزلك المازوت؟ 1- نعم 2- لا
V046	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V047	<input type="checkbox"/>	هل يوجد في منزلك كاز؟ 1- نعم 2- لا
V048	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V049	<input type="checkbox"/>	هل يوجد في منزلك ملمعات المعادن مذابة في سائل؟ 1- نعم 2- لا
V050	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V051	<input type="checkbox"/>	هل يوجد في منزلك فلتر زيت؟ 1- نعم 2- لا
V052	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منها بعد انتهاء صلاحيته؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصاله إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامه 4- إلقائه بشكل عشوائي
V053	<input type="checkbox"/>	هل يوجد في منزلك سائل تنظيف زجاج السيارات؟ 1- نعم 2- لا
V054	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V055	<input type="checkbox"/>	هل يوجد في منزلك معطر الجو؟ 1- نعم 2- لا
V056	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حدده البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V057	<input type="checkbox"/>	هل يوجد في منزلك بطاريات؟ 1- نعم 2- لا

V058	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منها عن انتهاء صلاحيتها؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V059	<input type="checkbox"/>	هل يوجد في منزلك مبيض الغسيل؟ 1- نعم 2- لا
V060	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقاياها أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V061	<input type="checkbox"/>	هل يوجد في منزلك منظف لجميع الاستخدامات؟ 1- نعم 2- لا
V062	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقاياها أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V063	<input type="checkbox"/>	هل يوجد في منزلك منظف المدهش (الذي يحتوي على مادة الامونيا)؟ 1- نعم 2- لا
V064	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V065	<input type="checkbox"/>	هل يوجد في منزلك منظف خاص يحتوي على الكلور؟ 1- نعم 2- لا
V066	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V067	<input type="checkbox"/>	هل يوجد في منزلك المطهر؟ 1- نعم 2- لا
V068	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V069	<input type="checkbox"/>	هل يوجد في منزلك مسلك البالوعة (سوائل تسليك البواليع)؟ 1- نعم 2- لا
V070	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V071	<input type="checkbox"/>	هل يوجد في منزلك منظفات الأرضيات المحتوية على مواد شمعية؟ 1- نعم 2- لا

V072	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V073	<input type="checkbox"/>	هل يوجد في منزلك مصابيح الإضاءة؟ 1- نعم 2- لا
V074	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منها عند كسرها أو عند انتهاء صلاحيتها؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V075	<input type="checkbox"/>	هل يوجد في منزلك ملمعات الأثاث بشكل سائل؟ 1- نعم 2- لا
V076	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V077	<input type="checkbox"/>	هل يوجد في منزلك منظفات الفرن البتوغاز؟ 1- نعم 2- لا
V078	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V079	<input type="checkbox"/>	هل يوجد في منزلك مواد لتطهير أماكن تواجد الحيوانات الأليفة؟ 1- نعم 2- لا
V080	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V081	<input type="checkbox"/>	هل يوجد في منزلك مواد جلي لتنظيف الجدران والأرضيات؟ 1- نعم 2- لا
V082	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V083	<input type="checkbox"/>	هل يوجد في منزلك ملمع الحذاء؟ 1- نعم 2- لا
V084	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V085	<input type="checkbox"/>	هل يوجد في منزلك جهاز كاشف دخان؟ 1- نعم 2- لا

V086	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منه عند انتهاء صلاحيته؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصاله إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامه 4- إلقائه بشكل عشوائي
V087	<input type="checkbox"/>	هل يوجد في منزلك منظم سجاد فعال يحتوي على كحول؟ 1- نعم 2- لا
V088	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V089	<input type="checkbox"/>	هل يوجد في منزلك ميزان الحرارة؟ 1- نعم 2- لا
V090	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منه عند انتهاء صلاحيته؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصاله إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامه 4- إلقائه بشكل عشوائي
V091	<input type="checkbox"/>	هل يوجد في منزلك منظف المراوح؟ 1- نعم 2- لا
V092	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V093	<input type="checkbox"/>	هل يوجد في منزلك منظف الزجاج والشبابيك؟ 1- نعم 2- لا
V094	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V095	<input type="checkbox"/>	هل يوجد في منزلك مثبت الشعر؟ 1- نعم 2- لا
V096	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منه عند انتهاء استخدامه؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V097	<input type="checkbox"/>	هل يوجد في منزلك كريم الشعر (جل)؟ 1- نعم 2- لا
V098	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقاياها أو العبوة الفارغة؟ 1- إلقائه مع النفايات الصلبة المنزلية 2- إيصاله إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامه 4- إلقائه بشكل عشوائي
V099	<input type="checkbox"/>	هل يوجد في منزلك مواد لصبغة الشعر؟ 1- نعم 2- لا

V100	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص منه أو من العبوة الفارغة عند انتهاء استخدامه؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V101	<input type="checkbox"/>	هل يوجد في منزلك عطور؟ 1- نعم 2- لا
V102	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V103	<input type="checkbox"/>	هل يوجد في منزلك ملمع الأظافر (المونوكير)؟ 1- نعم 2- لا
V104	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V105	<input type="checkbox"/>	هل يوجد في منزلك مزيل طلاء الأظافر؟ 1- نعم 2- لا
V106	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V107	<input type="checkbox"/>	هل يوجد في منزلك أدوات طبية وأدوية؟ 1- نعم 2- لا
V108	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من ما ينتج عن استخدامها أو بقاياها أو عند انتهاء صلاحيتها؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V109	<input type="checkbox"/>	هل يوجد في منزلك اللاصقات و الصمغ مثل الغراء؟ 1- نعم 2- لا
V110	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V111	<input type="checkbox"/>	هل يوجد في منزلك دهان زيتي؟ 1- نعم 2- لا
V112	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V113	<input type="checkbox"/>	هل يوجد في منزلك منظف فرشاة الدهان؟

		1- نعم 2- لا
V114	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V115	<input type="checkbox"/>	هل يوجد في منزلك مزيل الدهان؟ 1- نعم 2- لا
V116	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V117	<input type="checkbox"/>	هل يوجد في منزلك مخفّف الدهان (النتنر أو التريبنتين)؟ 1- نعم 2- لا
V118	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V119	<input type="checkbox"/>	هل يوجد في منزلك مادة حافظة الخشب(الزيت الحار)؟ 1- نعم 2- لا
V120	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقايا السائل أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V121	<input type="checkbox"/>	هل يوجد في منزلك مبيدات للحشرات أو القوارض مثل النمل والذباب و الصراصير والفئران وغيرها؟ 1- نعم 2- لا
V122	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقاياها أو العبوة الفارغة؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V123	<input type="checkbox"/>	هل يوجد في منزلك مواد مفرقة مثل الألعاب النارية وغير ذلك؟ 1- نعم 2- لا
V124	<input type="checkbox"/>	إذا كان الجواب نعم، فكيف يتم التخلص من بقاياها؟ 1- إلقائها مع النفايات الصلبة المنزلية 2- إيصالها إلى موقع خاص لتجميع النفايات الخطرة حددته البلدية 3- إعادة استخدامها 4- إلقائها بشكل عشوائي
V125	<input type="checkbox"/>	هل لديك استعداد لفرز النفايات المنزلية الخطرة الناتجة الرئيسية وهي منتجات السيارات، منتجات العناية الشخصية، نفايات الرعاية الصحية، مكافحة الحشرات المنزلية، الحديقة ولوازم منزلية عن بقية النفايات المنزلية وذلك إذا طلب منك خلال توزيع أكياس ذات ألوان خاصة ليبدل على نوع ما بداخلها من نفايات 1)نعم مجانا 2)نعم مقابل مبلغ رمزي (3) لا

V126		<p data-bbox="727 193 1437 235">ما هي اقتراحاتك لتحسين إدارة النفايات المنزلية الخطرة بالشكل الأمثل</p> <p data-bbox="532 340 1437 361">.....</p> <p data-bbox="532 592 1437 613">.....</p>
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## Appendix B

### Photos from field during the segregation of household solid waste from Hebron city











