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بسم الله الرحمن الرحيم

PALESTINIAN NATIONAL AUTHORITY
MINISTRY OF EDUCATION &HIGHER EDUCATION.
DIRECTORATE OF EDUCATION.
TUBAS.
AL FARA SECONDARY SCOOL.

WASTEWATER TREATMENT.

Inayat rashed salahat.

ABSTRACT

Palestine is a country with limited water resources.

The population is growing urbanization increasing and the rapid growth of agriculture require the development of the available resources.

The most water resources are the scarcity of precipitation and ground water only.

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For that reason substantial quantities of wastewater can properly utilized by wastewater treatment plant.

Wastewater is defined as the combination of liquid or water carried wastes removed from residential, commercial, and storm water.

Wastewater contain some heavy metals that have dangerous effects on life, micro-organisms and dissolved gases such as nitrogen and carbon dioxide.

Discharging raw waste to the environment causes problems and pollution, there for the treatment of wastewater is essential to prevent pollution and protect the environment

In this project the environment about wastewater treatment, purpose of wastewater treatment, description of quantity and quality of wastewater that will be treated, and a description of the environmental impact of the project on agriculture and ground water and the acceptance of people to the idea of the reuse of wastewater after treatment.

CHAPTER ONE
INTRODUCTION

1-1: Background:

Water is an important to human life, and life is not possible without it. Palestine's natural water resources are relatively limited and scare. Treated waste water in present a supplementary source for irrigation water.

Generally, waste water is a liquid carried wastes removed from residential, institutional and commercial establishment. Waste water includes industrial waste which might have high concentration of Pb, Cu and Zn ions (Chang 1981) . Many companies have large volume of water containing low concentrations of metal (Balcombe 1989). In order to conserve water resources the Israelis recycle waste water for agricultural irrigation (Avnimeleh , 1993 .).

In conventional waste water treatment, heavy metals are transferred from the liquid to the solid phase through precipitation, adsorption or biological uptake (Avnimeleh, 1993). Chemical forms of heavy

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metal elements in a soil system would affect their chemical reactivates and their pollution potential in the environment. (Schalscha, Chang and Morales 1982).

Irrigation with waste water for a long time may polluted ground water with heavy metal such as ; Pb, Cu and Zn ions.

In Palestine, there is no separation between domestic and industrial sources and therefore waste water collection include industrial waste from various origins.

CHAPTER TWO:
LITERATURE REVIEW

2-1-: Waste Water :

Waste water is defined as combination of liquid or water carried wastes removed from residential, commercial and industry establishments, together with ground water, surface water and storm water. Discharging raw waste to the environment caused problems and pollution, there for the treatment of waste water is essential to prevent pollution and protect the environment (Motogmeiy, 1988). Reuse of waste water is mandatory in one sense due to the fact that we have a fixed water budget on this plant (Martin). If raw domestic waste water is passed into a river and is used for a low quality water use such as navigation, there is hardly any concern. However, if the untreated domestic waste water is pumped directly into water supply reservoir of a downstream city, some eyebrows are raised. So the quality required for the subsequent reuse and intermediate treatment control the possibility of waste water reuse (Diltri, 1981).

Several principles are important in designing for reuse where domestic consumption may be involved. Efficient conventional treatment is important. Infiltration through sandy soil back to ground water is most desirable because of water quality enhancement effected in viral and bacterial removed. Also,

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organic are oxidized (Bolto and Pawlwski). Practically and aesthetically, to gain approval of the public, the time period before it is subsequently reused should be as long possible (Purdom, 1980). Contaminants of domestic waste water be categorized in disease causing microorganisms, essential plant nutrient element, dissolved minerals and toxic chemicals (heavy metals) and biodegradable organic matter. (Vanhandel).

Even after the waste water undergoes the purification processes, the treatment effluent is not entirely free of undesirable constituents (Avnimelech,1993). Interns of a land - oriented waste water disposal practice, any on category of the above mentioned contaminants may limit the soil's ability to receive the waste water (Arar 1988) . However, since the advent of community waste water treatment systems, the attention of land disposal of waste water has invariably been focused a pathogenic organisms (Okun and Schulz 1984).

Waste water reclamation and reuse is of interest in the Mediterranean region, particularly for irrigation. In Mediterranean environments, uneven distribution of precipitation and runoff specially and temporally

requires the construction of costly water storage and higher levels of waste water treatment (Angelakis, Marecos and Bontoux, 1998).

In most Mediterranean countries, the main problem may not be scarcity of water in terms of average per capita, but the high cost of for water making water available at the right place, at the bight time with the required quality. In these countries, more than anywhere else, an integrated approach sources management including waste water reclamation and reuse locally is required.

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Regulations on waste water reclamation and reuse are essential. They help to protect public health, increase water availability, prevent coastal pollution and enhance water resources and nature conservation policies (Angelakis, Marecos and Bontoux, 1998).

2-2: Wastewater Treatment plant:

Wastewater treatment occurs at specially designed plant that accept municipal sewage from homes, businesses, and industrial sites.

The raw sewage is delivered to the plant through a network of sewer pipes. Following treatment the wastewater is discharged into the surface-water environment, or in some limited cases may be used for crop irrigation.

A simplified diagram of a wastewater treatment plant is shown in figure number and a description of the stages of treatment at the plant are follows:

a- Primary Treatment:

Incoming raw sewage enters the plant from the municipal sewer line and at first it passes through a series of screens, the purpose of which is to remove large floating materials. The sewage next enters the grit chamber, where sand, small stones, and grit are removing and will be disposed off.

The sewage then enters the primary sedimentation pit, where the particular matter settles out to form a sludge. The sludge is removed and transported to the digester for further processing.

Primary treatment removes large sizes of pollutants from

wastewater which depend at the type of the screens.

b- Secondary Treatment:

The wastewater from the primary sedimentation pit enters the aeration pit, where the wastewater is mixed with air and some of the sludge from the final sedimentation pit, which contains aerobic bacteria that consume organic material in the waste.

After several hours the wastewater enters the final sedimentation pit, where sludge settles out.

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Most of the sludge is transported to the sludge digester, it is treated by anaerobic bacteria, which further degrade the sludge by microbial digestion. Methane gas is a product of the anaerobic digestion. Wastewater from the final sedimentation pit is then disinfected by chlorinating to eliminate disease-causing organisms.

2-3: Pollutants in Wastewater:

Wastewater is comprised mainly of water and wastes .The waste portion, although relatively small includes a wide variety of suspended and dissolved, organic and inorganic materials. Table Number 1 shows concentrations of the major constituents of typical municipal wastewater for different strength levels.

* Wastewater may also contain some heavy metals that have dangerous effects on life.

* Micro-organisms also exist in wastewater mainly as bacteria, viruses, protozoa, and helminthes

*Wastewater contains dissolved gases such as nitrogen ,and hydrogen sulfide.

2-4 :Purpose of Wastewater Treatment:

1-Discharging raw wastewater to the environment caused health problems and pollution, the treatment of wastewater is essential to prevent pollution and protect the environment.

2- Decreasing the pollution of ground water which causes from wastewater because wastewater may be mixed with seasonal surface water and percolated into the ground, thus contaminating ground water. -

3-Prevent the pollution of surface water because surface water may be mixed with rain water in winter.

2-5 : Description of the project: :

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a- Description of the quantity of the wastewater which will be treated in plant.

Wastewater which is flowing east of Nablus city and the camps and villages(AL-Fara , Al-Badan, and Balata refugee camp).

The quantity of wastewater that will be treated =number of population *per capita for each person *percentage of water from person convert to wastewater.

Per capita for each person of water = 50 - 75 litter/day = 62.5 litter/day.

Wastewater produced = 70 – 80 %..

The number of population = 115000 persons.

The quantity of wastewater = 115000* 62.5*7 5%.

The quantity of wastewater = 5390625 litter/day.

b- The quality of wastewater:

Table number 1 shows the characteristics of raw wastewater which is flowing east Nablus city.

Parameter(mg/litter)	Nablus(East)
PH	6.5
COD	1338
BOD	560
TSS	840
Chloride	1300
Phosphorous	15.6
Nitrate as NO3	45.9
SODIUM	842

Table Number 2-1: Characteristics of wastewater following east of Nablus City. Source: Pecdar , 1994.

Table number 2 shows concentrations of the major constituents of typical wastewater from(FAO) for different strength levels.

Constituent	Concentration mg/litter(strong)	Concentration, Medium	Concentration, weak
Total solids(TS)	1200	700	350

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Dissolved Solids(DS)	850	500	250
Suspended Solids(SS)	350	200	100
Nitrogen	85	40	20
Phosphorous	20	10	6
Chloride	100	50	30
Alkalinity as (CaCO3)	200	100	50
Grease	150	100	50
BOD(5-days,20˚)	300	200	100
COD	900	500	250

Table number 2- 2: Major Constituents of Typical wastewater.
Source: FAO Irrigation and Drainage, paper number 47.

From these tables:

Wastewater from Nablus contains a high percentage of nitrate and a high percentage of sodium and chloride compared with the concentration from who.

If wastewater used for irrigation it will effect soil, and increase high –salinity water, sodium hazard from soils and plant presence of other soluble anions in irrigation water lowers the value of sodium absorption ratio(SAR).

If we compare these results from table number 1 with concentration in table number 2 which shows concentration of the major constituents of typical municipal wastewater for different strength levels.

Comparing results of untreated wastewater we find:

* The percentage of phosphorus in wastewater is very high.

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* The percentage of nitrogen is very high.

* The concentration of BOD and COD is high.

*The concentration of chlorides in wastewater is very high.

2 – 6 : Description of Geology and climate and Topography:

a- Topography:

Nablus is situated at a height over 500 meters above sea level in the hills of Nablus, 64 kilometers, north of Jerusalem and 45 kilometers east of the Mediterranean.

The Military Government area at the eastern side of the town forms the ridge and divider for the flow of the rain water as well as for the flow of the wastewater.

The west basin of the town which includes all parts western of the Military government area drain to the west.

While the east basin of the city in addition to Balata and asker camps drain to the east.

b- Geology:

The eastern site is located on a thin layer of too soil, below this layer limestone and dolomite,

And these layers are very permeable and these layers are very permeable.

The route of the effluent from the eastern side which flows over the Beit Dajan ridge to Wadi Sajur and Wadi Badan, passes through outcrops of limestone and dolomite

.c - : Climate:

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The average annual temperature for this area between(18˚-20˚) centigrade with an average temperature (25-28) centigrade during the hottest month, August, and (8˚-10˚) centigrade for the coldest month, January.

The maximum temperature can reach (44˚) centigrade in summer and minimum of zero during the winter months.

CHAPTER THREE:
METHOLOGY

3-1: *Literature review:*

There are many studies that were done in the world about the wastewater treatment and reuse; we can review some of these studies:-

** One of these study done in 1996 about sludge and recycling strategy in Grampion. Grampion regional council is working to comply with the URGA in wastewater treatment(Scotland)regulation in 1995 by building new sewage plants and up grading others. In this study the water services department has responded to the expected increase in sludge volume by developing sludge recycling strategy.(Pinnel 1996).

** Other study done Denmark in 1995 about the aim of wastewater modeling in agriculture is to provide tools for simulation in put, transformation, out put and subsidiary degradation in recipient of organic compound nitrogen and phosphors. The direct purposes of this modeling is to make it possible for re taker and water authorities to calculate wastewater discharge from existing and planned agriculture activities.(Friar 1995).

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** One of these studies done in Egypt in 1996 about slow sand filtration for wastewater territory treatment. The data obtained for about 20 month operation illustrated that septic tank removal efficiency for BOD,COD and suspended solid for 73%-85% respectively. Date recorded of the influent and effluent wastewater to the septic tank number recorded are the average though the operational period, the long retention period in the septic tank resulted in the high removal efficiency achieved though these tanks.(Fadal,1669).

- From what mentioned above we notice that these studies dealing only with the method of recycling the wastewater and the way we can use it in, the missing point there that there is no reported survey that does to measure the people opinion about the reusing of wastewater, but the importance of these studies is to increase our and people knowledge about the recycling teqniqe and reusing method almost in agriculture and industries.

Methodology & sampling

METHOLOGY:

3-2:Sampling and Target group:

The samples that conducted in this research is not random, the total number of population is 230 from different area in the west Bank (Al'Fara, Al Badan, Tumoon, Aqaba and Tubass).

3-3: Appendix 1

Questionnaire for survey about the awareness among people about reusing of wastewater.

استبيان

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هذا الاستبيان عن آراء الناس عن إعادة استخدام المياه العارمة في معظم المجالات مثل: الزراعة والصناعة وغير ذلك.

معلومات عامة:

المنطقة السكنية:
المهنة:
عدد أفراد الأسرة:
أ-)اقل من 5 ب-)من 5 إلى 10 ج-)أكثر من 10
مستوى الدخل شهرياً لدى الأسرة:
أ-)اقل من 200 دينار ب-)من 200 دينار إلى 500 دينار ج-)أكثر من 500 دينار

الأسئلة:

7

أ)الوعي عن مضار المياه العادمة:
1- في اعتقادك تحتوي المياه العادمة على أي من المواد التالية:
أ-) جراثيم تسبب أمراضا صحية ب-) مواد كيميائية ضارة ج-) ملوثات عامة د-) لا يوجد
2- برأيك ما هي مضار المياه العادمة:
أ-) روائح كريهة ب-)مصدر للحشرات والقوارض ج-) تلويث البيئة د-) جميع ما ذكر
ب) معرفة طرق التنقية:
3- هل تعلم عن طرق لتنقية المياه العادمة حتى يتم استخدامها ثانية:
أ) لا ب) نعم
4- إذا أجبت بنعم فما هي مصادر معلوماتك:
أ)الحديث بين الناس ب)وسائل الإعلام {التلفزيون والإذاعة}
ج)وسائل الإعلام {صحف,كتب,تقارير} د)غير ذلك
ج) مجالات الاستخدام:
5- هل لديك معرفة عن المجالات التي يمكن استخدام المياه العادمة بعد معالجتها:
أ)نعم ب)لا
6- لو توفر في منطقة سكناك محطة لمعالجة المياه العادمة ففي أي المجالات يمكن أن تستخدم:
أ)الاستخدام المنزلي ب)ري المزروعات ج)ري الحدائق البيتية
د)لا يمكن استخدامها حتى بعد معالجتها
المساهمة في دفع المصاريف:
7- هل تؤيد أن تزيد فاتورة المياه لتشمل جزءا من المصاريف:
أ)نعم ب)لا
8- هل توافق أن يدفع المزارع تكلفة المياه المعالجة:
أ)10% ب)50% ج)70% د)100%
ذ) مستوى الخدمات:
9-هل يوجد شكوى من تلوث المياه في منطقة سكناك:
أ)نعم ب)لا
10- هل تتأكد عند شراء الخضراوات بأنها لم تسقى بمياه عادمة :
أ)نعم ب)لا
11- لو علمت بأنها تسقى بمياه معالجة فهل تشتريها:
أ)نعم ب)لا

ر) المؤسسات المسؤولة في فلسطين:
12- هل تعرف المؤسسات المسؤولة عن تصريف و معالجة المياه العادمة:

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أ)قسم الهندسة في البلدية ب)سلطة المياه الفلسطينية ج)سلطة البيئة الفلسطينية
د)غير ذلك
13- هل تعتقد أن أجهزة السلطة المختصة تقوم بدور ايجابي في توعية المواطن في استخدام المياه.
أ)نعم ب)لا
ز) وجود بئر:
14- هل يوجد خزان مياه مطر {بئر} في المنزل:
أ)نعم ب)لا
15- ما هو موقع البئر من الحفرة الامتصاصية:
أ)على بعد اقل من 5 متر من الحفرة الامتصاصية. ب- على بعد أكثر من 5 متر من الحفرة الامتصاصية
ج- غير ذلك.
16- هل تقوم بفحص دوري لمياه البئر:
أ)نعم ب)لا
ت)حالات الأمراض و خصوصا الإسهال
17- ما هي عدد حالات الإسهال في الثلاث أشهر الماضية في العائلة:
أ)لا يوجد ب)4 حالات ج) 5-8 حالات د)أكثر من 9 حالات

ث) مشاهدة فيلم عن معالجة المياه:

18- هل شاهدت فيلما عن معالجة المياه العادمة و إعادة استخدامها:
أ)نعم ب)لا

3-4:Appendices 2:

Data analysis of the survey about wastewater treatment.

To obtain the base line information for the survey, structured interview with key manager. The instrument that used to conduct this survey is questionnaire that divided into seven categories and these are as the following:

1- Awareness among people about the hazard of wastewater.

2- Knowledge among people about wastewater treatment and recycling method.

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3- Some question deals with people's participation if they want financial support if there is any future plan concern wastewater reuse.

4- Awareness among people about the governmental institution who deals with this topic and it service.

5-Knowledge about diseases that may have a relationship with using untreated water.

6- Final topics if they are watching film about reusing of wastewater.

Data analysis

:

First our analysis deals with basic data about the target population was sharing in providing us about their opinion in this subject, table(1)&(2) represent this basic information that include district area of living and their natural work.

المنطقة السكنية	طوباس	الباذان	عقابا	طمون	الفارعة
المجموع	40	40	40	70	40
النسبة المئوية	17.39%	17.39%	17.39%	30.4%	17.39%

Table(3- 1) : Identify the district area of the target group in this study.

المهنة	طالب	سائق	موظف	مزارع	راعي غنم	تاجر	لا يعمل
المجموع	15	16	75	16	3	11	11
النسبة المئوية	6.52%	6.95%	32.6%	6.15	1.3%	4.7%	4.78%

Table(3-2) : Occupational type for the target group.

-About question that concern knowledge about recycling method we found that 22% of them they dose not know, and78% they have an idea about this subject, in addition to source of information see Fig(3-1).

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Representing the area that can be used the wastewater a treatment.

طرق الاستعمال	الاستخدام المنزلي	ري الحدائق	ري المزروعات	لا يمكن استعمالها	
المجموع	23	166	56	35	230
النسبة المئوية	10%	50.43%	24.34%	15.23%	100%

Table (3-3) : Represent the area that can be used the wastewater a treatment

Represent the knowledge among people in relation to occupation.

سائق	عامل	موظف	مزارع	راعي غنم	تاجر	لا يعمل	المجموع
1	6	8	3	0	2	1	23
11	35	31	3	2	5	20	116
4	23	17	6	1	2	0	56
0	12	18	4	0	0	0	35

Table(3-4): Represent the knowledge among people in relation to occupation.

In question that deal with knowledge about the institution we see that- 14% of them agree that engineering department in municipal, 30% of them agree that Palestinian water authority, 56% see that environmental authority responsibility. ((For more detail see Fig(3 -2)))..

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-About the diseases among family especially diarrhea we found that 37% of people they don't have any history of occurrence of the disease, 63% of this target group have history of 1-4 times only, for more detail see Fig(3-3).

About date that concern about sharing in cases that government want to make project for building institution for reusing the wastewater.

	100%	70%	50%	10%	نسبة المساهمة في المصاريف
230	8	14	51	157	المجموع
100%	3.47%	6%	22.17%	68.26%	النسبة المئوية

Table (3-5):Show the percentage that public can agree to pay in case if there is project about reuse of wastewater.

Finally the question that concern about watching films deals with reusing of wastewater we found that 30% they see films and the other 70% they don't.

3-5::Environmental Impact:

1-Ground Water:

We have long believed that ground water is in general quite pure and safe to drink, so we give the ground water value of W=25.

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Wastewater of Nablus is flowing to the east and then to Jordan Valley where the depth in range of 40-60 meters the depth is very high for wastewater to pollute the ground water, in addition to the average rainfall from (550 –650 mm) which will decrease the pollution of ground water. V1=V2=0.5

V1:Value in environmental quality with project.

V2:Value in environmental quality without project.

W: Relative weight of parameter.

10

2- Surface Water:

Pollution of surface water occurs when too much of an undesirable or harmful substance flows into a body of water, exceeding the natural ability of that water body to remove the10 undesirable material, dilute it to a harmless concentration, or convert it to a harmless form.

So we give W=20

Untreated wastewater is combined with storm water in Winter flowing to the east along Wadi Sajur then to Jordan Valley, so surface water will be polluted with wastewater.

So V1=0.5,V2=0.8

3-Agriculture Impact:

Agriculture is very important for people and it depends at water. So W=35

Using wastewater for irrigation of crops make many problems for the soil and the crops, because wastewater contains a lot of salts especially sodium which will cause soil permeability problems, low permeability reduces soil aeration, so when treated wastewater is recycling for irrigation there are many purposes such as:

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Increasing the irrigated area in Palestine which lead to improve economy.

Provide enough water for domestic purposes.

Reduce water shortage problems.

So V1=0.4, V2=0.5

4- Social Impact:

The people income in this area is from their land, so W=15

Wastewater treatment plant will be build at a large land nearly 6000m2,these lands are suitable for agriculture and we will not used them for building a plant, so the project will make economic problem and social problems.

So V1=0.6, V2=0.1

5- Air Pollution:

Air pollution has considerable effects on many aspects of our environment: Visually aesthetic resources , vegetation, animals, soils, water quality and human health. So W=5.

Wastewater causes bad smell and air pollution, treatment of wastewater in the plant will cause bad smell and air pollution for people working in the plant.

So V1=0.6,V2=0.1

Parameter	W	V1	V2	WV1	WV2
Ground water	25	0.5	0.5	12.5	12.5
Surface water	20	0.5	0.8	10	16
Agriculture impact	35	0.4	0.5	14	17.5
Social impact	15	0.8	0.2	12	3
Air pollution	5	0.6	0.1	3	0.5
Total	100	2.8	2.1	51.5	49.5

Table number(3-6): Environmental Impact by using Battle System.

Battle System:

E=V1W-V2W
E=51.5-49.5
E=2
Environmental impact of the project is good.

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3-6:Budget.

Total volume of water = 6 million meter cubic.

Total cost = 8 million sequel.

The area of the Lands = 6 dunum.

Total volume of wastewater generate in once year is about 660Mm3

3-7:Wastewater Treatment plant (For the Project) :

Wastewater treatment occurs at specially designed plant that accept municipal sewage from homes, businesses, and industrial sites. The raw sewage is delivered to the plant through a network of sewer pipes. Following treatment the wastewater is discharged into the surface-water environment, or in some limited cases may be used for crop irrigation.

A simplified diagram of a wastewater treatment plant is shown in figure number (3-4) and figure number (3-5) a description of the stages of treatment at the plant are follows:

Primary Treatment:

Incoming raw sewage enters the plant from the municipal sewer line and at first it passes through a series of screens, the purpose of which is to remove large floating materials. The sewage next enters the grit chamber, where sand, small stones, and grit are removing and will be disposed off. The sewage then enters the primary sedimentation pit, where the particular matter settles out to form a sludge. The sludge is removed and transported to the digester for further processing. Primary treatment removes large sizes of pollutants from wastewater which depend at the type of the screens.

Secondary Treatment:

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The wastewater from the primary sedimentation pit enters the aeration pit, where the wastewater is mixed with air and some of the sludge from the final sedimentation pit, which contains aerobic bacteria that consume organic material in the waste. After several hours the wastewater enters the final sedimentation pit, where sludge settles out. Most of the sludge is transported to the sludge digester, it is treated by anaerobic bacteria, which further degrade the sludge by microbial digestion. Methane gas is a product of the anaerobic digestion. Wastewater from the final sedimentation pit is then disinfected by chlorinating to eliminate disease-causing organisms.

3-8:- Project Site:

The proposal site for a wastewater treatment plant is Al-Faria north to Nublos in West Bank.
In addition to source of information see figure number (3-6).

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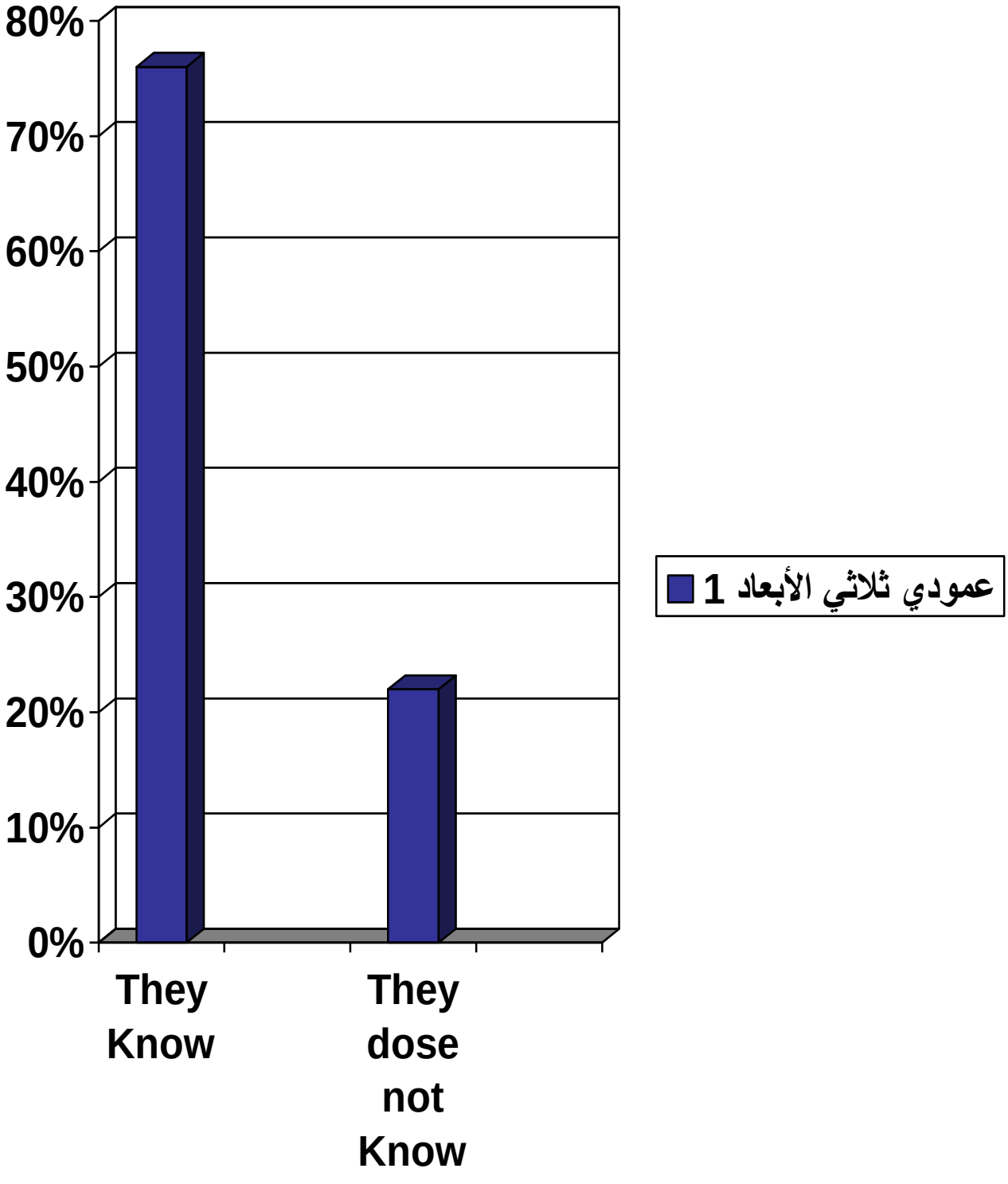

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Target group.

Fig(3-1) : Knowledge about recycling method.

CHAPTER FOUR

-1::Results & Discussions.

Water treatment:

The treatment and potable and waste water utilizing filtration, inert chemicals, aerobic and other newly developed processes are approaches in relationship to local jurisdictional requirements and dents needs.

- Controlling non point source pollution of ground water.

-Poliovirus distribution in the soil-plant system under reuse of secondary wastewater.

-Sewage treatment and recycling:-

- From raw wastewater valuable effluents and energy resources.

-Sequencing batch reactor (SBR) biological treatment and high-rate sand filtration..

-Intensive efforts have been pursued to optimize the use of scarce water resources available in arid and semi -arid regions. Water-supply constraints restrict Agricultural production, which must increase to support the growing world population and elevated demands for food. Saline water, runoff water and treated domestic wastewater are potential sources in areas with limited conventional water sources .

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One of the preferable sources is the reuse of treated wastewater for agricultural immigration this wastewater also be used for other purposes, such as industrial cooling, structural fire fighting just control dust on roads and streets, in concrete and soil compaction.

Application of treated wastewater for irrigation of industrial crops, including vegetables for processing or fresh production is gradually becoming a common practice world wide. In addition to studying health risks associated with treated wastewater reuse for irrigation, further research is needed to determine whether applying treated .

Domestic wastewater can solve disposal problems.

** Wastewater treatment and reuse is an important component in meeting the increasing demands for water in the Middle-East region. As urban populations grows and their demand rise. In order to still maintain the desired level of agriculture, the reduction in availability of potable water should be compensated by providing treated wastewater for agriculture and additional purposes.

** Reuse of reclaimed wastewater for irrigation simultaneously also alleviates environmental problems caused by effluent disposal into public areas.

** Wastewater treatment level is determined by a number of combined considerations. The effluent should not pose any human health risk. When disposed to public sites the effluent should not contaminate the environment or endanger soil and water resources. When reusing the effluent for irrigation characteristics related to soil properties, crop, cultivation technology must be taken into account.

Scientific and propsessional collaboration among experts in the prevailing field of wastewater treatment and reclamation can stimulate better water use and environment control.

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** The new political developments in the middle east have led to the recognition that water shortages in Palestine and in neighboring countries should be solved by a careful water resource management that incorporates advanced technologies. Desalination of seawater and brackish ground water and reclamation and reuse of municipal wastewater are the main strategies that have been often need on investigation and application.

The core of most municipal wastewater treatment plants is the biological process, also known as the secondary treatment stage. Wide reuse including edible crops, therefore requires the additional of tertiary treatment stage. The sequencing batch reactor(SBR) activated sludge system has been shown to be a system with simple operation and a highly-efficient process for the treatment of municipal wastewater, as well as of industrial and agricultural waste.

Sewage treatment and recycling from raw wastewater to valuable effluent and energy resources, also about poliovirus distribution in the soil-plant system under reuse of secondary wastewater.

Conclusions :

The result indicate in this survey that there is still deficiency in knowledge among people to reusing of wastewater and they need more program to increase their awareness to ward this subject and this is the responsibility of the environmental and engineering institution. This program includes television , radio , newspaper and pamphlets about reusing wastewater area and recycling method.

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Recommendations :

****Palestinians should have their own plans for using treated wastewater for irrigation. We should get benefit from the variation climate among Palestine, there is no need to treat the wastewater in order to reach 20mg/Litter BOD. Where various variety of crops can be easily and safety irrigated by wastewater of BOD of 60 mg/Litter as fodder crops.

****There should be more input from the Palestine National Authority (PNA) in this project due to tow reasons:

A- To reduce the health hazard from sewage water.

B- This treated wastewater is considered highly important in water resources to Palestinian especially that irrigating by wastewater will minimize the need of fertilizers.

***Where there is lack of irrigated areas near by the treatment plants, industrial factories that consume a lot of water, such as stone cuttings, plastic manufacture should be established to consume the treated wastewater.

**** where possible, storage reservoir should be built to store the treated water during Winter and to store rainwater, so dilution takes place, and these reservoirs will store rainwater.

**** Training programs for farmers, agronomist as well as plant operators should start soon, as example, local university should learn recycling of treated wastewater for irrigation.

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***** Public education and warning should be carried out soon.

**** In the cases where treatment plant is found near by rain fed crops, supplementary irrigation should planned soon.

**** Close cities and villages to be served by one treatment plant, to reduce the capital and costs.

**** There should be a plan of the use of treated wastewater for irrigation or industrial purposes.

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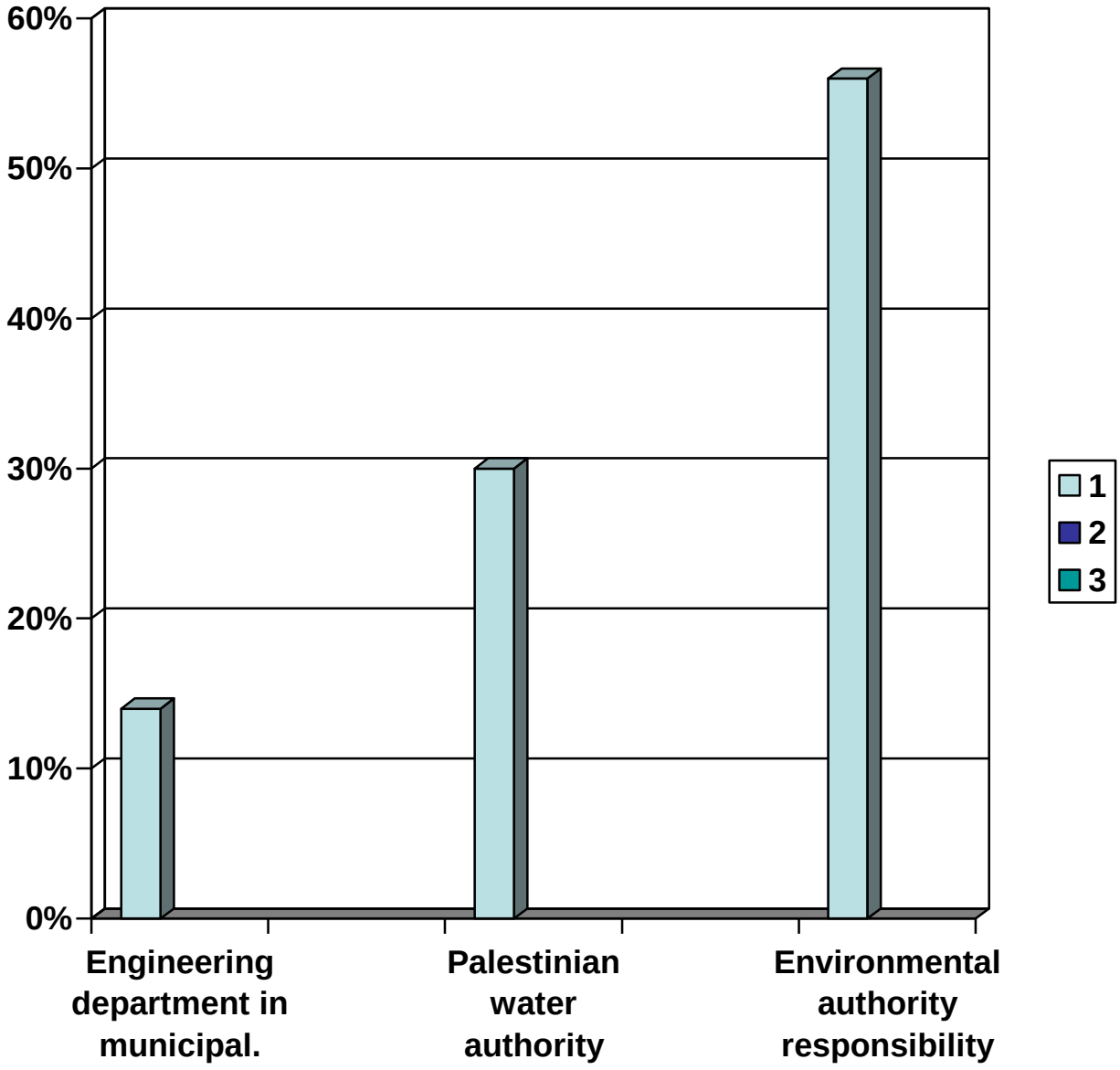

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The institution.

Fig(3 – 2): Knowledge about the institution.

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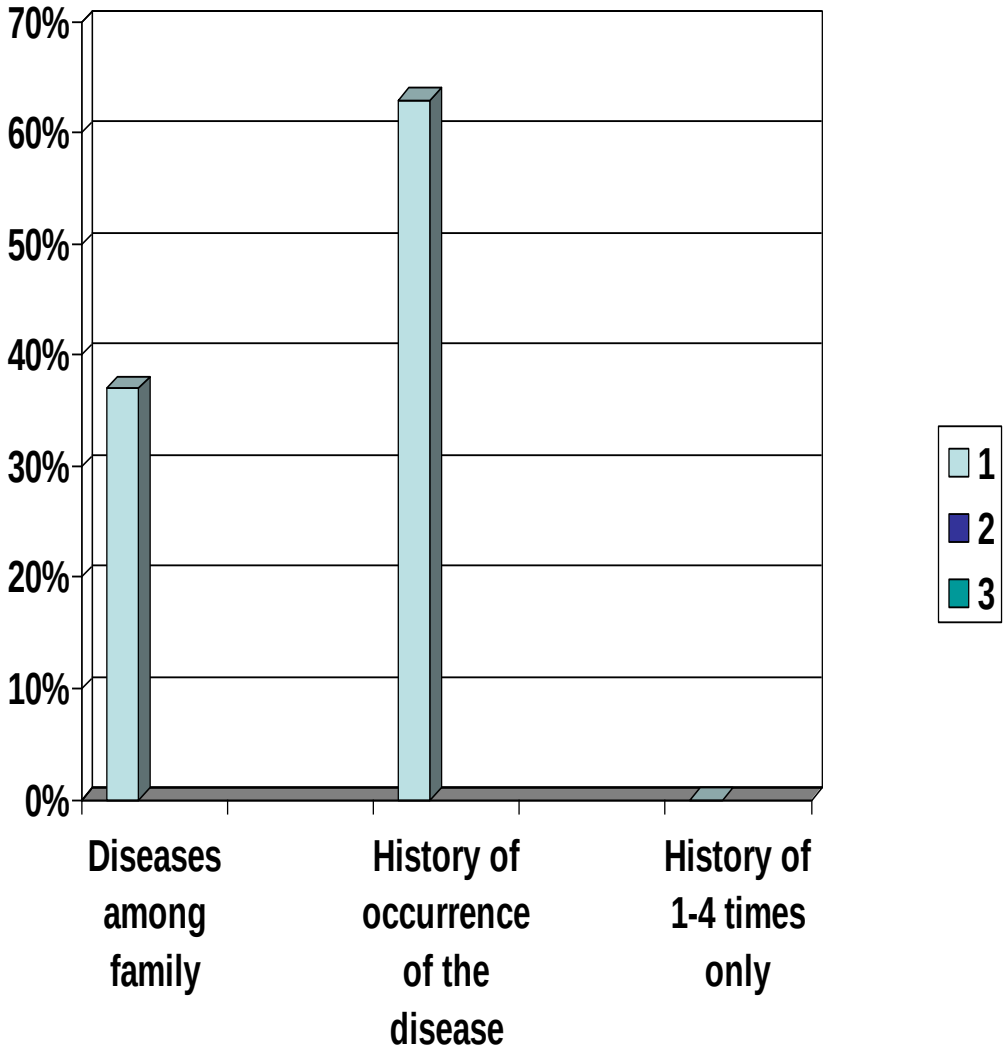

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Number of occurrence.

Fig(3-3): Diseases among family.

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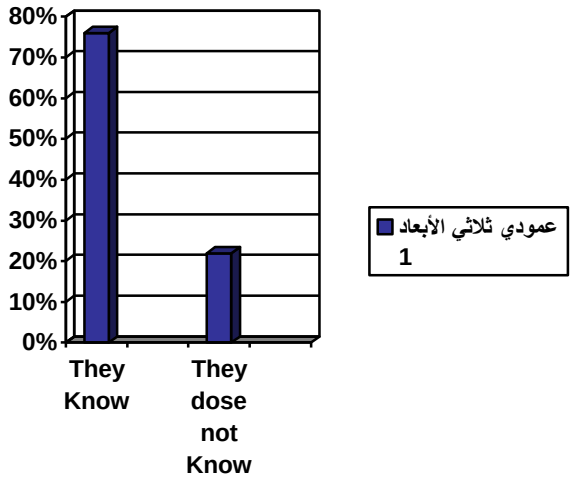
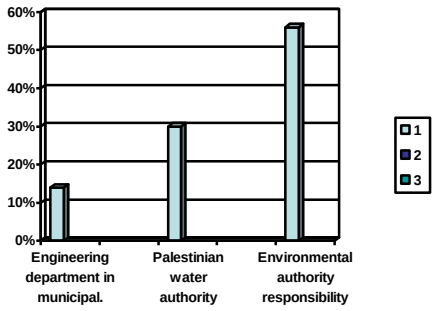


Fig(1) : Knowledge about recycling method.



Fig(2): Knowledge about the institution.

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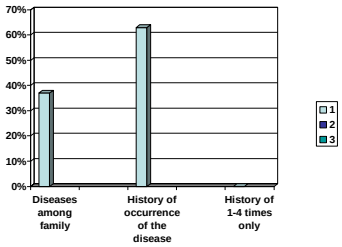

Fig(3): Diseases among family.

Fig(1): Wastewater from Al-Badan.

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Fig(2).clean water.