



كلية الصحة العامة - فلسطين

School of Public Health



جامعة القدس

Deanship of Graduate Studies

Al-Quds University

**Knowledge, Attitude and Practice Among Primary School  
Teachers of UNRWA and Governmental Regarding Air  
Pollution in Rafah Governorate.**

**Student Name:** Kamal Mutlaq El-Dahodi

M.Sc Thesis

Jerusalem – Palestine

2008/1429



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School of Public Health- Gaza , Al-Quds University

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***Al-Quds University***

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Teachers of UNRWA and Governmental Regarding Air  
Pollution in Rafah Governorate.**

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**Jerusalem – Palestine**

**2008/1429**

*Declaration*

***I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.***

Signed .....

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Date: December / 2007

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## **Abstrsact**

Teachers can play an important role in educating their students about environment which is possible only when the teachers themselves have a necessary level of environmental knowledge and awareness for this purpose. The policy makers of educational programs should introduce and enrich environmental education programmers in both in service and pre service teacher's programmers. Various co-curricular activities in schools may be encouraged to help in developing student's environmental awareness.

The purpose of this study (Knowledge, Attitude and Practice Among Primary School Teachers of UNRWA and Governmental Regarding Air Pollution in Rafah Governorate) is to determine the level of knowledge, attitude and practice (KAP) and their relationship with gender, type of school, qualifications and years of experiences.

The study was implemented in all primary schools (boys and girls) in Rafah governorate. The sample of this study is composed of (238) teachers distributed on 32 schools, 8 teachers were chosen from every school by simple random selection. SPSS (Statistical Package for Social Science) software version 11 was used to process the data.

The results indicated that the study teachers have a high level of knowledge regarding air pollution with a percentage level of 79.6%, and a positive attitude toward air pollution was high with a percentage of 91.8%. The findings showed that the level of practice was low with a mean percentage of 58.1% of the points reflecting the level of practice .There are significant statistical differences (sig. value 0.0000) in the level of KAP regarding air pollution based on gender in favor of female teachers.

In addition, no significant differences were found in the teacher's KAP based on type of primary school (Government and UNRWA) in Rafah governorate.

Also, no significant differences were found in the teacher's KAP regarding air pollution according to their qualifications. The results showed that different years of experience do not affect teacher's KAP regarding air pollution.

According to the findings, a high level of knowledge and attitude among teachers toward air pollution could lead to developing the practice toward air pollution by enriching and enhancing the relationship with the institutions of local community. However, this study may be useful for improving teacher's awareness regarding air pollution to ensure protection of Palestinian environment from further deterioration.

## الخلاصة

يلعب المدرسون دورا مهما في تعليم طلابهم عن البيئة، والتي لا يمكن أن تتحقق إلا عندما يكون المدرسون أنفسهم ذى مستوي عال من المعرفة والإدراك للبيئة المحيطة بنا.

ولهذا الغرض يجب علي واضعي سياسة البرامج التعليمية إدخال وإثراء برامج التعليم البيئي والمشاركة في مختلف الأنشطة و البرامج في المدارس، و يمكن تشجيعهم والمساهمة في تطوير الوعي البيئي لدي الطلاب.

الغرض من هذه الدراسة هو تحديد مستوي المعرفة والاتجاهات والممارسة لدي مدرسي المدارس الابتدائية (وكالة وحكومة) المتعلقة بتلوث الهواء في محافظة رفح وعلاقتها بكل من نوع الجنس ونوع المدرسة والمؤهلات و سنوات الخبرة.

الدراسة طبقت في جميع المدارس الابتدائية في محافظة رفح ( بنين وبنات ) وقد تكونت عينة الدراسة من 238 مدرس موزعين على 32 مدرسة وتم اختيار 8 مدرسين من كل مدرسة بطريقة العينة العشوائية واستخدام برنامج الرزم الإحصائية للعلوم الاجتماعية . SPSS ) لتحليل العينة.

وأشارت نتيجة الدراسة أن لدي المعلمين مستو عال من المعرفة والمتعلق بتلوث الهواء يصل إلى 79.6% بينما الموادراسة تدينيات الايجابية تجاه تلوث الهواء كانت أيضا ذات مستو عال بمعدل 91.8%، لكن أظهرت الدراسة تديني المستوى المتعلق بالممارسة لدي المدرسين بالنسبة لتلوث الهواء بمعدل 58.5% للنقاط المتعلقة بالممارسة.

يوجد اختلافات ذات دلالة إحصائية لعلاقة مستوي المعرفة والاتجاهات والممارسة لدي المدرسين بالنسبة لنوع الجنس لصالح المدرسات، و بالإضافة إلي ذلك لا يوجد أي اختلافات ذات دلالة إحصائية لعلاقة مستوي المعرفة والاتجاهات والممارسة لدي المدرسين بالنسبة لنوع المدرسة سواء أكانت حكومة أو وكالة في محافظة رفح. كذلك لم تظهر النتائج أي دلالة إحصائية بالنسبة لمستوي المعرفة والاتجاهات والممارسة لدي المدرسين وعلاقتها بالمؤهل العلمي للمدرسين. وأخيرا لم تظهر النتائج أي تأثير لسنوات الخبرة لدي المدرسين علي مستوي المعرفة والاتجاهات والممارسة المتعلقة بتلوث الهواء.

فإن المستوي العالي من المعرفة والاتجاهات لدي المدرسين والمتعلق بتلوث الهواء ممكن أن يؤدي إلي تطوير الجانب العملي عن طريق تحسين العلاقة بين مؤسسات المجتمع المدني، ومن جانب آخر يمكن أن تكون ذو فائدة عالية لتطوير المعرفة والوعي لدي المدرسين والمتعلق بتلوث الهواء لتأكيد حماية بيئتنا الفلسطينية من مخاطر أخرى .

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### List of abbreviations

<b>DALYS</b>	<b>Disability Adjusted Life Years.</b>
<b>EQA</b>	<b>Environmental Quality Authority.</b>
<b>KAP</b>	<b>Knowledge, Attitude, Practice.</b>
<b>SPSS</b>	<b>Statistical Package for Social Science.</b>
<b>PEF</b>	<b>Palestinian Environmental Friends.</b>
<b>PCBCS</b>	<b>Palestinian Central Bureau of Statistics.</b>
<b>UNRWA</b>	<b>United Nations Refugee and Works Agency</b>
<b>UNEP</b>	<b>United Nations Environmental Program.</b>
<b>WHO</b>	<b>World Health Organization.</b>
<b>UNESCO</b>	<b>United Nations Education, Scientific, and Cultural Organization</b>

### Definition of Terms:

**Knowledge:** Expertise, and skills acquired by a person through experience or education (Wikipedia, 2007).

Other definition: What is known in a particular field or in total; facts and information?

**Attitude:** An emotion that all people got when they have other emotions. Attitude can be positive, negative or neutral views of an object like a person, a behavior or an event (Wikipedia, 2007).

**Practice:** The observation, description, evaluation, interpretation, or modification of human behavior by the application of psychological principles and methods (Nebraska DHHS, 2005).

**Air pollution:** The occurrence or addition of foreign particles, gases and other pollutants into the air which have an adverse effect on human beings, animals, vegetation, buildings, ect. (Kumar ,2002).

**Pollutants:** The substances (e.g., smoke), chemicals (e.g., Sulpher dioxide) or factors (e.g., heat) which cause a potential or actual adverse effect on natural quality of any constituent of the environment. (Kumar, 2002).

**Pollution:** An undesirable change in the physical, chemical or biological characteristics of our air, water and land that may or will harmfully affect human life, the lives of the desirable species, our industrial processes, living conditions and cultural assets, or that may or will waste or deteriorate our raw material resources. (Kumar, 2002).

**Primary school:** Establishment providing schooling from the first year of compulsory schooling to the last year of primary schooling, the last stage of early childhood development corresponding with primary school about age 6 to age 13.(Ovider\_Guidelines\_2005).

**UNRWA primary school:** Follows UNRWA regulations and laws of basic education in refugee camps in Palestine, in line with the Palestinian curriculum.

**Government primary school:** Follows the regulations of Palestinian authority educational programs?

**Environmental awareness:** The attitude of having consciousness about the consequences of the human intervention on the environment and the performances of appropriate behavior to reduce negative effects (Nunez, 2000).

**Environmental education:** Refers to organized efforts to teach about how natural environments function and, particularly, how human beings can manage their behavior and ecosystem in order to live sustainable (Wikipedia, 2007).

# **Chapter One**

## **Introduction**

# **Chapter One**

## **Introduction**

### **1.1 Background**

Environmental education aims to produce an environmentally literate citizen with basic skills of awareness, knowledge, and concern for the environment (Fien, 1988; Ford,1981).Research studies show that increased awareness and knowledge of individual as well as global environmental action strategies contribute to increased student motivation to take action (Palmberg and Kuru, 2000 ).

Environmental education attempts to empower students with the knowledge, skills, and attitudes to solve environmental problems and prevent new ones. Combining formal and informal activity is more effective in transmitting environmental knowledge, also provides students with a multidisciplinary approach to the environment, thereby nurturing positive and pro-active concrete and abstract environmental attitudes (Fien, 1988; Ford, 1981).

Concerning the very important role that the environmental education and awareness play to prevent or minimize the environmental pollution, the main topic we are facing for future challenge is that air pollution as a major problem in industrialized as well as in developing countries. Clean air is considered to be a basic requirement of human health and well being; however air pollution continues to pose significant threat to health world wide. Out of the estimated 3 million deaths due to air pollution world wide each year, 2.8 million are related to indoor exposure and only 0.2 million to outdoor exposure. In both cases, developing countries account for some 90% of deaths (WHO, 2002).

In addition, according to a WHO assessment of the burden of disease due to air pollution, more than 2 million premature deaths each year can be attributed to the effects of urban outdoor air pollution caused by the burning of solid fuels. More than half of this disease burden is borne by the populations of developing countries (WHO, 2002).

In the Eastern Mediterranean Region, the studies showed that Cairo and Karachi suffer serious problems of air pollution by suspended particulate matter (SPM) and lead, In Cairo there was moderate to heavy pollution by carbon monoxide as well as Jordan, Amman by SPM. Teheran, another big city experiencing a major air pollution problem was shown by global environmental monitoring system (GEMS) to have very high level of Sulphur, SPM and lead (Blackwell,1992 ).

The environment in Palestine is suffering from considerable strains. The shortage and pollution of resources coupled with a high population growth and insufficient job opportunities have created many environmental problems (MEnA, 2000). There are few observations of air pollution in the west bank and The Gaza Strip; Estimates have been made by MEnA on the emissions from different source for a number of pollutants. Based on these estimates it is concluded that transportation contributes about 40-50% of the air pollution which is clearly noticed in urban areas due to dense traffic and old cars in the urban centers, dust and particulate matter from stone quarries in the west bank and solid waste burning at open dumps sites (EQA,2004).

In addition air pollution in The Gaza Strip is occasionally caused by industrial coastal zone in Israel, especially from the coal-ignited power station of Ashdud, Asqalan and the Ashdud refinery (EQA, 2004). However, the wind in Gaza blows mainly from the west, and therefore this air pollution only occasionally affects the Gaza strip (EQA, 2004).

To improve air quality a high priority needs to be given, in both rural and urban areas, to raising awareness about air pollution and its effects on the health and environment and bringing about behavioral change.

According to the above mentioned, it is important to highlight that the air pollution already inflicted cannot be reversed unless a collective thinking and efforts are made by coordination among different institutions concerned with the environmental health protection. It is only

possible through improving environmental education and fostering of environmental ethics. On the other hand, in view of the needs of the present and future generations; education at schools, colleges and at the various society levels is imperative. Moreover, public awareness and community participation can help to achieve a change in attitude towards preventing further damage to the environment.

## **1.2 Problem Statement**

Measuring the level of Knowledge, Attitude and Practice (KAP) regarding air pollution among primary school teachers in Rafah governorate can be considered as the key in evaluating the status of awareness related to air pollution and its effects among teachers in Rafah governorate. Therefore, the study findings might help in determining the level of KAP among teachers and presenting proper solutions to develop their KAP toward air pollution. The problem of this study can be stated as the following: what the level of Knowledge, Attitude and Practice (KAP) regarding air pollution among primary school teachers in Rafah governorate?.

## **1.3 Justification of the study**

Based on the demographic status of the Gaza strip where population growth is very high (estimate 40,000 person/ year), coupled with limited land is considered one of the highest density (3450 persons /km<sup>2</sup>) of population all over the world (PCBS, 1999).

This will lead to low ventilation particularly in the refugee camps. The increase of motor vehicles, unplanned small industries and petrol stations between citizen buildings which in turn will increase the probability of air pollution and alter the public health, specially of children.

Negative health behaviors related to lack of awareness about indoor air pollution such as active and passive smoking and the type of cooking by oven makes it possible to expose people to many pollutants that may lead to respiratory infections or carcinogenic substances.

In addition, the primary school teachers represent the important part of educational process in the society. they play very important role forming the health behavior of our children in the school. Children represent large part of the population (about 25%), (PCBS, 1999). On the other hand, both teachers and students may be exposed to many predisposing factors that alter their health such as burning tires near the schools, burning the garbage containers and chalk dust particularly the teachers.

Therefore, it is important to determine the area of existing strategies that necessitate further development in order to match relatively with update international strategies such as protection from air pollution to reduce morbidity among children and other negative impacts of health.

#### **1.4 Background about Rafah:**

Rafah governorate is located in the southern part of the Gaza Strip, overlooking the Mediterranean; it is the main link between Palestine and Egypt. In the southern side of West Palestine. Rafah is bounded to the West by the Mediterranean, to the East by Beer-Essaba to the North by Khan Younis governorate and to the South by the Arab Republic of Egypt. As the southern gateway to the continent of Africa Rafah has gained a historic importance in the different ages .

The total area of Rafah governorate, according to the Master Plan where done by Ministry of Planning in 1999, is approximately 26,000 dunams. The total population of Rafah Governorate is 177,632 inhabitants (PCBS, Project mid year population 2007). About 60% of

them are refugees living in the Rafah refugee camp. Average household size is estimated to be 8.6 persons per household, and annual population growth rate is estimated to be 4.32 %.

Educational institutions in the Rafah governorate is about 75 distributed between kindergartens and schools at all levels as well as the Jerusalem Open University branch. The number of primary schools is 32, including 19 UNRWA school and 13 governmental school. The number of students per classroom has reached up to 40 students, at the governmental schools, and at UNRWA schools (primary and preparatory) has reached 44 students in the classroom.

The health service is offered through:

- 1- Palestinian Authority: offering services to members who have health insurance.
- 2- UNRWA: offering health services free of charge to refugees through primary health care centers.
- 3- NGO, s and Private Sector: provide services to the public with low fees.

The number of clinics where 9, 4 UNRWA, and 5 Governments, and there are two government hospitals (Abu Yousef Najjar general hospital and the other one Tel Sultan Obstetric hospital), and one Private hospital (Al-Kwaity hospital)

The economic situation depends primarily on agriculture and some simple crafts, as well as internal trade movement.

### **1.5 Aim of the study:**

The aim of the study is to determine the KAP level regarding air pollution and their relationships with sociodemographic factors among primary school teachers in Rafah governorate.

### **1.5.1 Objectives of the study:**

- 1- To investigate the level of KAP among primary school teachers in Rafah governorate regarding air pollution. .
- 2- To determine the differences in KAP regarding air pollution between male and female teachers.
- 3- To identify the effect of school type on KAP regarding air pollution among teachers.
- 4- To explore the differences in KAP regarding air pollution related to qualifications of teachers.
- 5- To identify the effect of years of experience in KAP regarding air pollution among teachers.

### **1.6 Research questions:**

- 1- What is the level of knowledge, attitude and practice regarding air pollution among primary school teachers in Rafah?
- 2- What is the level of knowledge regarding air pollution among primary school teachers in Rafah?
- 3- What is the level of attitude regarding air pollution among primary school teachers in Rafah?
- 4-What is the level of practice regarding air pollution among primary school teachers in Rafah?
- 5-Are there differences in KAP regarding air pollution between male and female teachers?
- 6-Are there differences in KAP regarding air pollution between UNRWA and GOV.teachers?
- 7- Are there differences in KAP regarding air pollution related to teacher's qualification?
- 8- Are there differences in KAP regarding air pollution related to teacher's years of experience of teachers?

### **1.7 Research Hypotheses:**

- 1-Primary school teachers have statistically significant level of KAP regarding air pollution.
- 2-Primary school teachers have statistically significant level of Knowledge regarding air pollution.
- 3-Primary school teachers have statistically significant level of attitude regarding air pollution.
- 4-Primary school teachers have statistically significant level of practice regarding air pollution.
- 5-There are no significant differences in KAP regarding air pollution between male and female teachers?
- 6-There are no significant differences in KAP regarding air pollution between UNRWA and GOV teachers?
- 7-There are no significant differences in KAP regarding air pollution different qualifications of teachers?
- 8-There are no significant differences in KAP regarding air pollution due to years of experience?

### **1.8 General review of the study chapters**

The researcher will present the study about KAP among primary school teachers (gov. and UNRWA) regarding air pollution in Rafah governorate, in seven chapters. Chapter one includes introduction about the importance of environmental education and explore the magnitude of air pollution problem globally, regionally, and in Palestine. In addition background about Rafah governorate, problem statement, justification of the study, study aim and objectives and study questions and hypotheses.

In chapter two, the researcher will highlight about the air pollution problem (sources, causes and effects) globally, regionally, and in Palestine the (West Bank and The Gaza strip). Also, discusses the importance of environmental education during early childhood years, review the main studies described the relationship between KAP among different levels of students and population regarding environmental issues.

In chapter three which concern with conceptual framework the researcher will display the main part of this study which involves description of environmental knowledge and attitude. Through chapter four of this study, the researcher will describe the main methodological parts in the study, which include: Study design, study sample (study population, sample size, sampling process) study area, ethical consideration, study instruments, pilot study, data collection, processing and analyzing the data, and limitation of the study.

In chapter five the researcher will present the main study results based on the results of the statistical analysis, which involves distribution of the study population, the results of the study questions and hypotheses.

The study results will be discussed in chapter six, and based on the study results, the researcher in chapter seven, will suggest recommendations and further researches.

# **Chapter Two**

## **Literature Review**

## **Chapter Two**

### **Literature Review**

#### **2.1 Introduction**

This chapter is divided into different sections. It begins with the definition of air pollution and discussed the sources, causes, effects of air pollution globally, regionally, and in Palestine particularly in Gaza Strip. it highlights on the importance of environmental education during the early childhood years and explores the relationship between the environmental education and students in the schools, Also their knowledge, attitude and practice toward environmental pollution, and the studies that have are done to determine the level of KAP environmental problems among different level of the students and efficiency of environmental education. The level of environmental knowledge and attitude and their relationship with gender will be discussed.

#### **2.2 Air pollution**

According to the world health organization (WHO) air pollution may be defined as follows "Substance put into air by the activity of mankind into concentration sufficient to cause harmful effects to health, vegetation, property (Raj, 1992). According to (Ibid, 1999), air pollution may be also defined as the presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odor, smoke, or vapor in quantities, of characteristics, and duration such as to be injurious to human, plant or animal life or to property, or which unreasonably interferes with the comfortable enjoyment of life and property (Skaik.G, 2002).

An other definition of the world health organization defines air pollution as " the presence of materials in the air in such concentrations which are harmful to man and his environment". In fact air pollution is the occurrence or addition of foreign particles, gases and other pollutants into the air which have an adverse effect on human beings, animals, vegetation, buildings, ect (Kumar, 2002)

### **2.3 Causes of air pollution**

Skaik (2002), in her study for analysis of some air pollutants produced by road traffic in Gaza city and their health impacts, referred the causes of air pollution to the lack of comprehensive and effective laws and regulations for the control of air pollution and the protection of clean air, rapid and continuous rise in population and the resulting increase in the number of vehicles of all kinds, and the increase in energy consumption in the Gaza Strip. In addition, increment of the number of industries in the Gaza strip, leds to the overlap of industrial and craft areas with residential and commercial areas. The other causes include the depletion of green areas, and encroaching upon agriculture land, from other side. The growth of the construction sector, and the accompanying increase number of quarries and the transport of building materials and construction wastes and, irregular maintenance of static and mobile fuel- burning equipment are the main causes of air pollution.

Fuel quality in terms of the level of toxic materials such as sulphur and lead, the use of old technology in industries, which do not take environmental consideration into account and shortage of financial resources and technical capabilities in the area of development activities. Finally, air pollution is not considered as high priority as well as water (Skaik, G; 2002).

## **2.4 Automobile Exhausts**

Is one of the major sources of air pollution? The important pollutants are (i) Carbon monoxide (ii) Benzpyrene (iii) Lead (iv) Nitrogen oxides (v) Sulphur compounds (vi) Ammonia. One thousand liters of petrol produce on combustion about 320 kg of CO, 20 – 40 kg of organic vapors, 2-7.5 kg of nitrogen oxides, 1.8 kg of Aldehyde, 1.7 kg of sulphur compounds, 0.6 kg of lead, 0.2 kg of organic acids, 0.2 kg of ammonia and 0.03 kg of solid carbons. About 90% of lead pollution is caused by gasoline combustion which contains tetraethyl or tetra methyl lead as antiknock agent (unleaded antiknock agents like olefinic or aromatic chemicals are expensive). Lead is emitted as aerosol and dust particles. The aerosol parts pass into the lung and hence to blood. Bombay residents have a lead content of 16-18 $\mu$ g/100ml of blood while lead begins to show toxic effect beyond 2  $\mu$ g/100 ml of blood. Traffic policeman and shop owners along the busy city roads receive high lead content from the air. The larger lead particles settle down on the soil and pass into food chain (Kumar, 2002).

## **2.5 Sources of Air Pollution**

### **2.5.1 Natural Sources**

Natural sources include pollen grains, spores, fog, smoke, ash, various gases, dust and other substance, and they have always been present in the atmosphere. They come from the ground, volcanoes, forest and bush fires, and dust storms, from activities of plants and animals, and even from outer space (meteoritic dust). These pollutants are seldom harmful. Without atmospheric dust, for example, rain and snow would never fall.

Nature easily handles its own forms of air pollution. Heavier pollutants soon settle out of rain, one of nature's most effective " antipollution devices ", washes dust and other pollutants from the atmosphere. Finer particles and gases may remain airborne indefinitely, becoming

spread far and wide through the atmosphere. From the point of view of pollution, air –borne pollutants are significant because of the allergic response produced in sensitive individuals. In people who suffer from asthma or hay fever, mostly the symptoms disappear at the end of the pollen season. However some develops bronchitis, bronchial asthma, and dermatitis (Raj, 1992).

### **2.5.2 Artificial (Man –made) Sources:**

The sources of air pollution resulting from human activities are of three broad types:

1- **Stationary sources** :.These can be subdivided into :

- \* Rural area sources such as agricultural production, mining and quarrying.

- \* Industrial point sources such as manufacturing of chemical, non-metallic mineral products, basic metal industries, power generation.

- \* Community sources e.g. heating of homes and buildings, municipal wastes and sewage sludge incinerators, fireplace, cooking, facilities, laundry services and cleaning plants.

2 - **Mobile sources:** These comprise any form of combustion engine vehicle e.g .light duty gasoline powered cars, light and heavy duty diesel powered vehicles, motorcycles, aircraft, and including line sources such as fugitive dusts from vehicle traffic.

3- **Indoor sources:** These include tobacco smoking, biological sources (such as pollen, mites, moulds, insect, micro-organisms, and pet allergens ect.), combustion emission, emission from indoor materials or substance such as volatile organic compounds, lead, radon, asbestos, various synthetic chemicals and others (WHO, 1999).

According to Kumar (2002), the sources of air pollution are divided into the following:

(a) **Stationary Combustion Sources:** these include products of burning of fuels by people.

(b) **Mobile Combustion Sources:** These include locomotives, automobiles, aircrafts, etc.

(c) **Industrial Processing and Other Sources:** These include chemical industries and operations such as crushing, blasting, drilling, dyeing, mixing and grinding.

### **2.5.3 Effects of Urban Air Pollution**

#### **A. Effects on the Human Health:**

The public health implications of exposure to high levels of air pollution are currently giving concern in cities throughout the world. These health effects can be classified into three main categories (Table 2.1):

**1- Acute health effects** – resulting from exposure to an episode of air pollution e.g, an asthma attacks. In certain conditions acute episodes of air pollution are also associated with an overall increase in respiratory and cardiovascular mortality.

**2- Chronic health effects** - owing to long term exposure to low levels of pollution, e.g, bronchitis resulting from SO<sub>2</sub> exposure, or the increased respiratory and cardiovascular mortality observed in a number of epidemiological studies due to exposure to particulate matter.

**3- Carcinogenic and toxic health effects** – from exposure to carcinogenic substances such as benzene, 1-3 butadiene, benzo-a-pyrene, or effects from exposure to heavy metals such as lead and cadmium.

**Table (2.1): Health effects of common air pollutants:**

<b>Pollutants</b>	<b>Chronic/Toxic health effects</b>	<b>Acute health effects</b>
<b>SO<sub>2</sub></b>	Increased prevalence to chronic bronchitis	Narrowing of the airways , particularly in sensitive individuals , producing symptoms ranging from coughing and wheeze to bronchitis and asthma
<b>Particulate matter</b>	Increased respiratory mortality and morbidity ; no observable threshold	Increased cardio-respiratory mortality and morbidity – particularly in combination with SO <sub>3</sub>
<b>NO<sub>2</sub></b>	No definitive effects of outdoor exposure but indoor exposure suggest s arrange of effects upon lung function.	Sensitizes the lungs to other pollutants and allergens
<b>O<sub>3</sub></b>	None known for certain but it has recently been suggested O <sub>3</sub> is a geno-toxin	Powerful oxidant reacting with most biological substance ; a lungs irritants and sensitizer to other pollutants and allergens ; can produce runny eyes and sore throats
<b>CO</b>	None known	Reduce oxygen carrying capacity of the blood by combining with hemoglobin
<b>Pb</b>	Neurotoxin ;( suggestion of impairment to cognitive development); affects blood biochemistry and can raise blood pressure.	None known
<b>PAHs</b>	Benzo-a-pyrene and certain other species are carcinogenic.	None known
<b>Benzene</b>	Powerful carcinogen linked to leukemia.	None known

(UNEP and WHO, 2002)

## **B. Effects on the Environment:**

In addition to the health effects of urban air pollution, there are a number of other environmental consequences. The most visible of these are the soiling and degradation of building caused by deposition of black acidic particulate matter and the public nuisance caused by dust and dirt produced by construction and demolition sites and resuspension from roads by the movement of vehicles. Fumes, especially odorous ones, from industrial processes are also often a source of irritation and complaint from urban residents. The loss of amenity caused by reduced visibility is another effect of urban air pollution which can be observed both in cities and downwind of them. This is considered a serious environmental issue. Especially in areas of outstanding natural beauty (UNEP, WHO, 2002).

### **2.5.4 Effects of Air Pollution on Human Health:**

The most controversial and probably the most important effect of air pollution is that on human health, where exposure to air is probably as old as human exposure to fire (WHO, 1999).

Apart from food and drink whose daily intake dose not exceeds a few kilograms and which can be chosen more or less freely, the air we breathe represents a medium which is taken in by all people of a certain area in the same way. On an average the air volume coming into contact with the organism of an adult comes to approx. 20 m<sup>3</sup> per day. Human can live without food up to 40 days, but without air to breathe, however, only a few minutes. One must therefore devote special attention to the quality of the air inhaled.

The pollutants contained in the air reach the inside of the body through respiration and remain to be transformed or stored and enriched over a period of many years.

The harmfulness of air pollutants for humans depends on the following factors:

- Toxicity of the individual pollutants,
- Pollutants dose = Concentration of the pollutants X length of exposure,
- Combined effects of several pollutants,
- Ambient conditions such as temperature, radiation, air movement, and humidity

(Baumbach, 1996).

### **2.5.5 Population Risk Groups**

The following groups of people are particularly sensitive to pollutants in ambient air:

\*Small children whose respiratory and cardiovascular system is still at the development stage.

\*Old people with weak hearts, circulatory and respiratory function.

\*Sick people e.g. those with asthma, bronchitis or cardiovascular problems

(Baumbach, 1996).

Pre- school and school children appear to be both sensitive and specifically reactive to air pollution health effects. Another point to be noted is the effect of air pollution on human health is worst during the winter season, when pollution levels reach a climax (Raj, 1992)

### **2.5.4 General Health Effects of Air pollution**

- 1- Eye Irritation.
- 2- Nose and throat irritation
- 3- Irritation of the respiratory tract
- 4- Increase in mortality rate and morbidity rate
- 5- A variety of particulates particularly pollens, initiate asthmatic attacks.
- 6- Chronic pulmonary diseases like bronchitis and asthma, are aggravated by high concentration of SO<sub>2</sub>, NO<sub>2</sub>, particulate matter and photochemical smog.

- 7- Carbon monoxide combines with the hemoglobin in the blood and consequently increase stress on those suffering from cardiovascular and pulmonary diseases.
- 8- Dust particles cause respiratory disease. Diseases like silicosis, asbestosis, ECT, result from specific dusts (Skaik G, 2002).

## **2.6 Indoor Air Pollution**

### **2.6.1 Definition and Background:**

Indoor air pollution is defined as "the presence of physical, chemical or biological contaminants in the air of confined environments, which are not naturally present in high quantities in the external air of the ecological systems." (Italian ministry for the Environment, 1991)

In the last thirty years much attention has been paid to reducing the outdoor pollution, but only recently has the international scientific community worried about reducing the Contamination of the air of closed environments. If we consider the amount of time a person spends in a closed environment nearly (90%) we will understand that the issue of indoor pollution is of primary importance. The atmospheric composition inside an edifice is fundamentally the same we find outside, but the amounts and types of contaminants differ. To the pollutants present outside, one must add all the polluting agents generated within the edifices.

### **2.6.2 The main sources of indoor air pollutants are:**

- Construction materials
- Heating, air-conditioning devices, and cooking apparatuses and appliances.
- Furniture.
- Coatings such as wall paint varnish and floors.
- Maintenance and cleaning products such as detergents and pesticides.
- Use of space and activities done within it.( Fabio Bertrand Elsa,2007)

The studies of the effects of air pollution on the human health is complex for the symptoms are not specific and many pollutants can be responsible for the same disease.ss Furthermore there are also the effects caused by stress and climatic discomfort. The fact that different people react differently to the same conditions, must be considered as well.

The main observed effects are:

- Respiratory,
- dermal and mucosa irritation,
- effects on the nervous system,
- cardiovascular,
- effects on the gastrointestinal apparatus,
- effects on the reproductive system,
- Infections and intoxications. ( Fabio Bertrand Elsa ,2007),

### **2.6.3 Indoor/Outdoor Air Pollution Relationships**

A number of investigations have been carried out to study indoor/outdoor air pollution relationships. Tow types of situations can be conveniently defined. (a) Where air pollution is dominated by outdoor sources, and (b) where air pollution is dominated by indoor sources.

An example of where pollution is apparently dominated by outdoor sources, the following cases can serve to illustrate different aspects of the situation: (i) ozone which is generated in outdoor air. E.g. by photochemical reactions, however much of this ozone if it enters a building, can be rapidly destroyed on contact with surfaces within the indoor environment. (ii) Sulphur dioxide from various external combustion sources which upon entry to a building, may possibly be (gradually) absorbed by certain materials. (iii) Carbon monoxide from external traffic sources upon entry to an indoor environment will remain (ie. not be absorbed) until it becomes gradually diluted with fresh air over time. Thus depending on the nature of the pollutant, its importance and potential impact will vary.

An example of where air pollution is dominated by indoor sources, the following cases illustrate different aspects of the situation: (1) carbon monoxide, oxides of nitrogen and particulate matter from combustion of fuels for heating and cooking indoors (2) tobacco smoke gases vapors and particles. (3) Formaldehyde resulting from the use of certain building materials like chipboard.

Although investigations of indoor/outdoor air pollution relationships can be helpful in the planning of the studies to estimate exposures to indoor air pollutants and for control purposes, there is usually no substitute for actually monitoring the air (in relation to the actual exposure to human beings inside buildings) or other indoor environments) because of the wide range of different situations (WHO- EHA, 1999).

#### **2.6.4 Examples of control approach for indoor air pollutants:**

- 1- Combustion products produced during heating and cooking processes using fossil and biomass fuels: provision of effective flues ducted to outside air.
- 2- Radon and daughters, combustion products including tobacco smoke and biological particles: ventilation by dilution of indoor air with fresh outdoor air can be effective.

- 3- Organic substance and tobacco smoke: by source removal or source substitution, and restriction of smoking.
- 4- Particulates, combustion products and biological agents: by air cleaning and purification of indoor air by gas absorbers and air filters (WHO– EHA, 1999).

### **2.6.5 Global burden of disease due to indoor air pollution**

In the year 2000, indoor air pollution from solid fuel use was responsible for more than 1.6 million annual deaths and 2.7% of the global burden of disease (in Disability-Adjusted Life Years or DALYs). This makes this risk factor the second biggest environmental contributor to ill health, behind unsafe water and sanitation. The importance of indoor air pollution as a public health threat varies drastically according to the level of development: in high-mortality developing countries, indoor air pollution is responsible for up to 3.7% of the burden of disease, while the same risk factor no longer features among the top 10 risk factors in industrialized countries. (WHO, 2006).

Acute lower respiratory infections, in particular pneumonia, continue to be the biggest killer of young children and cause more than 2 million annual deaths. Dependence on polluting solid fuels to meet basic energy needs is one of the underlying causes of pneumonia among children. Every year, indoor air pollution is responsible for nearly 800000 deaths due to pneumonia among children under five years of age. The damage to human health, especially children, from indoor air pollution, was emphasized. A range of health affects from indoor air pollution due to solid fuel use were also examined, including acute lower respiratory infections in young children, the primary cause of childhood mortality; worldwide and the disease responsible for the most lost life years in the world. Indoor air pollution seems to play an important role, although the main risk factor is malnutrition; chronic obstructive pulmonary disease, such as chronic bronchitis and emphysema, particularly in adult women

who have cooked over un-vented solid fuel stoves for many years; and lung cancer, mainly from coal smoke. It seems that young children are twice as likely to contract acute lower respiratory infections and women are three times more likely to suffer from chronic bronchitis if exposed to indoor air pollution from solid fuels (Smith and others, 2004).

### **2.6.6 Regional burden of disease due to indoor air pollution**

Clearly, some of the world's regions rely heavily on solid fuel use at the household level, whereas others have made an almost complete transition to cleaner fuels, such as gas and electricity. For example, more than 70% of the population in India, China and Africa continue to cook with solid fuels. These differences in household solid fuel use patterns are reflected in an unequal share of the disease burden due to indoor air pollution, with Africa, South East Asia and the Western Pacific Region shouldering the biggest death toll. More than one third of the total DALYs lost due to exposure to indoor air pollution occur in Africa and highlight the urgent need to intervene (WHO, 2006).

### **2.7 Arab Region and Air Pollution**

In the Arab Region air pollution is common in industrial areas. For example, in Egypt, high levels of particulate matter and sulphur oxides have been found in the air in the industrial areas of Helwan and Shoubra EL-kheima (Cairo area) and in Alexandria. All measurements indicate that the levels of these pollutants are much higher than the WHO guidelines. In Saudia Arabia, the levels of sulphur dioxide, hydrogen sulphide, nitrogen dioxide, ozone and carbon monoxide, emitted from the new industrial areas of Jubail and Yanbu are lower than the air quality criteria because of the environmental protection measures adopted and good monitoring systems in place. However, the levels of particulate matter have been found to vary seasonally and are normally higher than the air quality guidelines, mainly due to local climatic conditions. In Bahrain more or less similar concentrations of particulate matter have

been found. In addition, high levels of non-methane hydrocarbons have been recorded (mainly from refineries, storage tanks, and production of natural gas). In Qatar, high levels of the common air pollutants and ammonia have been recovered from the UmmSaid industrial area. Also high levels of such pollutants have been reported from Al-Shuaiba area in Kuwait. Trans – boundary air pollution is becoming a problem in some areas, for example in the Arab Gulf (UNEP/ LAS, 2000).

## **2.8 Current Status of air pollution in Palestine**

### **2.8.1 West Bank**

There are very limited observations regarding air and noise pollution in the West Bank. Hence, estimates have been made by (MEnA, 2000). On the emissions from different sources for a number of pollutants. Based on these estimates it is concluded that:

- 1- Transportation contributes about 40-50 % to the air pollution of the West Bank. Its impacts are clearly noticed in urban areas.
- 2- Charcoal industry is the main source of air pollution in Jenin Governorate .The industry is located nearby residential areas creating disfavoured living conditions and having a severe impact on public health.
- 3- Quarries and stone crushing factories, which are widely spread in the West Bank emit huge amounts of dust and particulate matters to the atmosphere.
- 4- Uncontrolled open waste burning in some areas is the only available method of solid waste disposal .There is increased concern about open burning and its impact on public health.
- 5- Agriculture activities that produce air pollutants include the application of methyl bromide (causing depletion of ozone layer) and the burning of plastic sheet waste.
- 6- Israeli industrial estates in the West Bank settlements generate relatively high levels of air pollution, compared to the industrial estates in Israel.

7- Trans boundary pollution basically stems from industry and transportation in Israel. Israel has dense traffic and strong industrial base. As a consequence, air pollution in Israel is high and, given the prevailing western winds, it affects the air quality of the West Bank.

### **2.8.2 Gaza**

In Gaza the air pollution problem is mainly caused by the high density of traffic and the average old age of cars. In addition to this, air pollution in Gaza is occasionally caused by the industrial coastal zone in Israel, especially from the coal –ignited power stations of Asdud and Asqalan and the Asdud refinery .However, the winds in Gaza blow mainly from the West, and therefore this air pollution only occasionally affects the Gaza Strip.

Most of the air contaminants are transported by wind to the eastern part of the Gaza Strip away from the coastal area. Most of the industrial wastes are burned in the open dumpsites, due to the wind direction and speed it contributes huge air pollutants in the atmosphere. (MEnA,2000).

Friends of the Palestinian Environment have prepared a special report on air pollution and its relationship to green house effect in the Gaza Strip in March 2003. The report stated that, the spread unlicensed of stations to sell fuel (shops for the sale of fuel) have significantly represented a danger to the lives of citizens and public health. According to statistics of the General Petroleum Corporation for the year 1997, there are 134 stations in the provinces of Gaza, including 38 licensed stations (28%) and 96 unlicensed stations (72%).

New statistics on the current situation is not available; however, the General Authority of Petroleum estimated the number of new stations at about 100 stations. The basic objective of the study was to do a field survey to measure air pollutants and its relationship with thermal\_heating and to provide accurate information about the level of concentration of greenhouse gases carbon dioxide and oxides of sulfur and nitrogen, methane,

in addition to the level of concentration of oxygen in different locations. The results showed that there is some influence of the means of transportation on the level of concentration of different gases (PEF, 2003).

Conclusion of Skaiks study, 2002, on the health impact of air pollutants produced by road traffic in Gaza, the main purpose of that study was to identify the main types of pollutants that are responsible for air pollution in Gaza. The results obtained imply that there is an air pollution problem in the studied locations. Regarding  $\text{SO}_2$  and  $\text{SPM}_{10}$ . The results showed that the concentrations of  $\text{SO}_2$  and  $\text{SPM}_{10}$  exceeded the WHO guidelines & Israeli standards.

The number of recorded accidents was sufficiently large to warrant border investigation of health implications that may result from high levels of  $\text{SO}_2$  and  $\text{SPM}_{10}$  in Gaza city.

The highest mean value for both CO and traffic flow at the Sheikh Radwan (G1) and Sabra area (G2) was on Saturday while the lowest mean value was on Friday (the weekend in Palestine). This comes in line with the direct relation between road traffic flow and CO concentration. The lowest mean value for  $\text{SPM}_{10}$  was on Friday at both locations. The highest mean value for  $\text{SO}_2$  at the Sheikh Radwan was on Saturday and Friday, while the highest mean concentration of  $\text{SO}_2$  at the Sabra area was on Friday. Taking into consideration that Friday has the minimal traffic count, the  $\text{SO}_2$  concentration could be due to the effect of Ashdod power plant. The observed levels confirm the fact of the nature particulates at the studied locations in Gaza city. The possible causes of that is soil and sand blow off construction activities, road works and road traffic flow, poorly adjusted oil burners and diesel vehicles. During this pilot study, air pollutants showed clear trend. With the exception of the suspended particulates at location G2 b, all pollutants levels were higher during hot (dry) period of the years.

Noteworthy, that on occasions, the maximum average of more than one pollutants occurred during the same period. Therefore, combined exposure to high levels of  $\text{SPM}_{10}$  and  $\text{SO}_2$  was

inevitable at both study locations, particularly at location G1. The high concentration of SO<sub>2</sub> associated with high concentration of SPM<sub>10</sub> at location G1 enhances the prevalence of bronchial asthma in the area (Skiak, G 2002).

In the Gaza strip, about 1:10 of the children suffer from bronchial asthma, which is one of the commonest diseases among children. Gaza Strip has a population of about 1,500,000 of which about 50% are below 15 years. That means about 75,000 of Gaza Strip children suffer from various degrees of bronchial asthma. More than one third of admissions in the pediatric hospital are due to bronchial asthma, many of them are without positive family history of such disease.

This problem has terribly increased in the last few years, due to increase of different provoking factors such as: smoke, humidity and air pollution, continuous stress, poor economical housing condition as well as many others. It is well known that severity of asthma is related to exposure to indoor and outdoor contaminants (Sanabel, 1998).

Sanabel Asthma Society in Gaza analyzed 1350 cases who attended its clinic more than three times from July 1993 till April 1997; these cases represent both sexes from different age groups living in different areas in Gaza City (Sanabel, 1998).

### **2.8.3 Inventory of the Industrial and Hazardous Pollution Sources:**

The industrial activities in the West Bank and Gaza strip are one of the most polluting sources especially in the absence of regulations that force the industry owners to follow the national standards during the production process. The main polluting industries include the textile dyeing, electroplating, painting and foaming industries, Table (2.2). According to geographical distribution of industries and industrial estates, **there** are 6 industrial zones in the West Bank and 3 in the Gaza strip. These zones are planned for moving the existing

factories and workshops from the residential area to protect the environment from further pollution .The locations of industrial estates and free zones were selected based on certain criteria to assure the integrity with the surroundings including minimal nuisance and damage to the environment. Also the socio-economic factors have been given special attention (EQA, 2004).

**Table (2.2) Inventory of Main Industries in the Gaza Strip Governorates:**

No.	Type of Industry	North	Gaza	Middle	Kan-younis	Rafah	Total
1	Medical Work-shop	28	37	27	30	22	144
2	Textiles	5	20	-	-	24	49
3	Electroplating	2	4	1	-	-	7
4	Metal	45	55	49	31	58	238
5	Food	22	2	20	18	14	76
6	Print-shop	3	10	3	3	-	19
7	Electrical	5	11	6	8	8	38
8	Leather Manufacturing	2	35	9	1	1	48
9	Garment	13	29	21	25	46	134
10	Paper	1	3	-	-	-	4
11	Plastic	23	12	6	9	-	50
12	Wood	35	2	43	19	69	168
13	Chemical	4	3	-	2	-	9
14	Detergents	-	4	-	5	2	11
15	Paint	10	20	18	10	10	68
16	Battery	1	2	-	1	2	6
17	Concrete	1	3	4	1	3	12
18	Asphalt	1	2	-	-	1	4
19	Block	29	-	34	33	49	145
20	Tile	3	13	1	-	-	17
21	Marble	7	3	11	14	11	46
22	Glass	-	5	-	-	-	5
23	Refrigerators/Air	-	31	-	-	-	31
	<b>Total</b>	<b>240</b>	<b>306</b>	<b>253</b>	<b>210</b>	<b>320</b>	<b>1329</b>

Source: (EQA, 2004)

Note: The area of concern for our study Rafah has about 24% (320 out 1329) of the main industries in the Gaza Strip.

### 2.8.4 Number of Industries Generating Pollution

The industries described previously produce different levels of pollution and negative environmental impacts. The most polluting industries, the total number of each type of industry and an assessment of the level of pollution of all types of industries are mentioned in Table (2.3). The pollution levels are assessed as low, intermediate and high.

**Table (2.3) Total Number of the Most Polluting Industries in West bank and Gaza Strip**

Industrial Sources		Level of Pollutants Produced in		
Type of industry	Number	Land	Water	Air
Charcoal	54	Intermediate	Low	<b>High</b>
Quarries	360	High	Low	<b>High</b>
Stone Cutting & Marble	926	High	Intermediate	<b>High</b>
Leather	61	Intermediate	High	<b>High</b>
Electroplating	23	Intermediate	High	<b>High</b>
Olive Oil	193	Intermediate	High	<b>Low</b>
Slaughters	10	Intermediate	High	<b>Intermediate</b>
Textile	334	Intermediate	High	<b>Intermediate</b>
Asphalt	7	High	Intermediate	<b>High</b>
Plastics	105	Low	Intermediate	<b>Intermediate</b>

Source: (EQA, 2004)

### **2.8.5 Impact of Air Emissions:**

Air emissions from these industries are suspected to cause serious health effects, or to cause adverse environment effects. The refuse of the used motor oil as energy source in pottery or bakery ovens emits different pollutants to the atmosphere such as oxidants and other compounds which contain nitrogen and oxygen in addition to the leaded compounds and carbon oxides. Diesel burning affects the environment and health drastically through their emissions, which include nitrogen oxides, hydrocarbons, carbon monoxide, sulphur dioxides and lead. These gases are toxic, irritant, carcinogenic and mutagenic. Carbon monoxide (CO) combines with blood and prevents it from conveying oxygen. Also it causes headaches, vertigo, sensory disorder and asphyxiation, Sulphur dioxide (SO<sub>2</sub>), aggravates respiratory problem and its acidity attacks plants (acid rain), aquatic life and material. Particulate matter can impact human health through eye damage and respiratory irritation allergenic, carcinogenic or mutagenic effects (EQA, 2004).

### **2.9 Ozone:**

Ozone is mainly found in two regions of the Earth's atmosphere. Most of the ozone (about 90%) resides in a layer that begins between 8 and 18 kilometers (5 and 11 miles) above the Earth's surface and extends up to above 50 kilometers (30 miles). This region of the atmosphere is called the stratosphere. The ozone in this region is commonly known as the ozone layer. The remaining ozone is in the lower region of the atmosphere, which is commonly called the troposphere. The ozone molecules in these two regions are chemically identical, because they all consist of three oxygen atoms and have the chemical formula O<sub>3</sub>. However they have very different effects on humans and other living beings. Stratospheric ozone plays a beneficial role by absorbing most of the biologically damaging ultraviolet sunlight (called UV-B), allowing only a small amount to reach the Earth's surface. The absorption of

ultraviolet radiation by ozone creates a source of heat, which actually forms the stratosphere itself (a region in which the temperature rises as one goes to higher altitudes).

Ozone thus plays a key role in the temperature structure of the Earth's atmosphere. Without the filtering action of the ozone layer, more of the Sun's UV-B radiation would penetrate the atmosphere and would reach the Earth's surface. Many experimental studies of plants and animals and clinical studies of human have shown the harmful effects of excessive exposure to UV-B radiation.

Two responses are natural when a new problem (Ozone layer depletion) has been identified; cure and prevention. When the problem is the destruction of the stratospheric ozone layer, the corresponding questions have been the following: Can we repair the damage already done? How can we prevent further destruction? Remedies have been investigated that could (1) remove chlorofluorocarbons (CFCs) selectively from the atmosphere, (2) intercept ozone – depleting chlorine before much depletion has taken place, or (3) replace the ozone from cities that have too much smog or by making new ozone. However, because ozone reacts strongly with other molecules, it is too unstable to be made elsewhere (e.g. in the smog of cities) and transported to the stratosphere, Considering the huge volume of the Earth's atmosphere and the magnitude of global stratospheric ozone depletion, the suggested remedies quickly become much too expensive, too energy consuming, impractical, and potentially damaging to the global environment.

Repair involves the internationally agreed upon Montreal Protocol and its Amendments and Adjustments. This agreement regulates the productions of CFCs and other ozone –depleting substance. Production of the most damaging ozone – depleting substances was eliminated, except for a few critical uses, by 1996 in developed countries and will be eliminated by 2010 in developing countries. As the result, the total concentration of chlorine in the lower atmosphere that can be carried to the stratosphere would likely have peaked already. The

concentration in the stratosphere will likely peak by the end of this decade and then will start to decrease slowly as natural processes remove the ozone-depleting substance. All other things being equal, and with the adherence to the international agreements, the ozone layer is expected to recover over the next 50 years or so. (Scientific assessment of Ozone depletion, 1998).

**2.10 Control of Air Pollution :** Kumar (2002), summarizes the control of air pollution as the following:

- 1- Industrial estates should be established at a distance from residential areas.
2. Use of tall chimneys shall reduce the air pollution in the surroundings.
3. Compulsory use of filters and electrostatic precipitators in the chimneys.
4. Removal of poisonous gases by passing the fumes through water tower scrubber or spray collector.
5. Use of high temperature incinerators for reduction in particulate ash production.
6. Desulphurization of fuel or removal of sulphur from gas after combustion.
7. Development and employment of non-combustive sources of energy, e.g., nuclear power, geothermal power, solar power, tidal power, wind power.
8. Use of non-lead antiknock agents in gasoline.
9. Complete electrification of railway track.
10. Attempt should be made to develop pollution free fuels for automobiles, e.g., alcohol, hydrogen, battery power.
11. Automobiles should be fitted with exhaust emission control.
12. Industrial plants and refineries should be fitted with equipment for removal and recycling of wastes.
13. Switching over from coal to gas fuel when atmosphere is calm.

14. Growing plants capable of fixing carbon monoxide, e.g., (*Phaseolus vulgaris*, *Coteus blurnei*, *Daucos carota*, *Fici variegate*).

15. Growing plants capable of metabolizing, nitrogen oxides and other gaseous pollutants, e.g., (*Vitas pinus*, *Juniperus*, *Quercus*, *Pyrus*, *Robinig pseudo-acacia*, *Viburnun crataegus*, *Ribes*, *Rhamnus*).

16. A forestation of the mining area on priority basis (Kumar, 2002).

### **2.11 Environmental Education during the Early Childhood Years.**

When should environmental education begin--in the third grade; first grade; kindergarten? Even earlier. Environmental education based on life experiences should begin during the very earliest years of life. Such experiences play a critical role in shaping life-long attitudes, values, and patterns of behavior toward natural environments (Tilbury, 1994; Wilson, 1994). Because young children learn about the environment by interacting with it, educators and other adults must attend to the frequency, nature, and quality of child-environment interactions during the early years. Many young children have limited opportunities for such experiences. Studies indicate that the average American spends more than 95% of his or her time indoors (Cohen, 1984), and that by the year 2000, more than 90% of all Americans will live in urban areas (Schicker, 1988). Studies also indicate that children growing up in urban areas tend to develop unfounded fears and feelings of disgust in relation to natural objects (Bixler, Carlisle, Hammitt, & Floyd, 1994).

Yet, it's not just children living in urban areas who should be targeted for environmental education during their preschool years. Many young children, regardless of where they live, spend most of their time in settings and activities that keep them essentially isolated from direct contact with the natural world. Recreation tends to be indoors (e.g., watching TV); transportation tends to be by car or other motor vehicle versus walking; and daycare

programs--where many children spend most of their walking hours--tend to be much more oriented toward the classroom than outdoors. The result is that many young children are at risk of never developing positive attitudes and feelings toward the natural environment or achieving a healthy degree of competency on the environmental literacy continuum (Disinger & Roth, 1992). Attention to environmental education at the early childhood level is proposed as a partial antidote to this concern.

The rationale for environmental education during the early childhood years is based on two major premises. The first premise is that children must develop a sense of respect and caring for the natural environment during their first few years of life or be at risk for never developing such attitudes (Stapp, 1978; Tilbury, 1994; Wilson, 1994).

The newly-emerging field of early childhood environmental education reflects an increasing awareness that "environmental experience in the critical phase of the early learning years can determine subsequent development in environmental education" (Tilbury, 1994, p. 11) and that the preschool years may "prove to be critical for the environmental education of the child" (Tilbury, 1994, p. 11).

The rationale for environmental education at the early childhood level is also based on the premise that positive interactions with the natural environment is an important part of healthy child development (Carson, 1956; Cobb, 1977; Crompton & Sellar, 1981; Miles, 1986/87; Patridge, 1984; Sebba, 1991; Wilson, 1994) and that such interactions enhance learning and quality of life over the span of one's lifetime (Wilson, 1994). Children who are close to nature tend to relate to it as a source of wonder, joy, and awe. Their spirits are nurtured by nature and they discover through it "sources of human sensibility" (Wilson, 1992, p. 348).

Nature-related experiences tend to foster a child's emerging sense of wonder--referred to by Plato as the source of knowledge and by Cobb (1977) as our source of imagination. According to Cobb, it is through wonder that we come to know the world. It's wonder--rather than books, words, or learning all the facts--that provides the direction and impetus for environmental education in early childhood. Young children tend to develop an emotional attachment to what is familiar and comfortable to them. If they are to develop a sense of connectedness with the natural world, they need frequent positive experiences with the outdoors. Providing opportunities for such experiences and sharing them with young children is the essence of what environmental education is all about. Rachel Carson, in "The Sense of Wonder," was one of the first to articulate the importance and characteristics of environmental education at the early childhood level. In her words (Carson, 1956), "If a child is to keep alive his inborn sense of wonder...he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement, and mystery of the world we live in" (p. 45). Environmental education for the early years focuses primarily on young children exploring and enjoying the world of nature under the guidance and with the companion of an adult (Wilson, Ruth A., 1996).

## **2.12 Using of Environmental Education in Schools**

The United Nations Conference in 1972 on the Human Environment recommended that every nation promote and develop environmental education (EE) programs (Engleson and Yockers, 1994). Since that time, many programs have been implemented within schools worldwide. But how exactly is environmental education being used in the schools? What approaches and techniques are being used to bring environmental education to the students? The following will provide information on how EE is being used by looking at methods such as infusion and insertion, and by investigating more specific techniques such as the use of the school, senses, and technology as modes for environmental learning.

## **Four Broad Approaches**

There are four broad approaches to incorporating environmental education into schools, and more specifically, the curriculum. These include infusion, imposition, insertion, and framing. *Infusion* is the incorporation of environmental concepts, activities, and examples into existing curricular goals. An example of infusion can be seen in a tenth grade chemistry class in California (Monroe and Cappaert, 1994). The teacher had students investigate current environmental issues such as a proposal to control hydrocarbon emissions and their effect on cars, dry cleaning, gas pumps, and other sources of smog. By infusing these environmental issues and concepts into his class, the teacher was able to help students understand processes such as oxidation and ionization, and also help them to see the connection between high school chemistry and Los Angeles air.

*Imposition* refers to making environmental topics requirements within the curriculum.

An example of this may be seen when a school district requires that the science classes within the districts' public schools include topics such as endangered species, water quality, and forest health within the curriculum.

*Insertion* is the addition of an environmental unit or course to the class or curriculum (Monroe and Cappaert, 1994). In this case, something else is also sometimes removed from the curriculum to make room for the EE unit. The efforts of a few home-arts teachers give an example of this approach. In Calvert County, Maryland some middle school home-arts teachers developed a two week unit focusing on water conservation. Components of the unit included showing a film called "Down the Drain," reading "The Story of Drinking Water," and facilitating several different activities (Monroe and Cappaert, 1994).

**Framing** refers to eliminating the subjective boundaries of traditional disciplines and instead creating a structure of study that integrates subject areas (Heimlich, 1992). In northern Wisconsin, a third-grade teacher used this approach when she decided to use loons as a unifying theme throughout all of her classes. It is clear that there are not only a variety of approaches to integrating EE into schools such as infusion and insertion, but also a vast array of environmental education techniques that are currently being used. It is also apparent that every level of education can make use of these approaches and techniques for strengthening their EE program. One reason why so many environmental education approaches and techniques are being used in schools is because they can very often be tied into national standards in subject areas such as science and social studies (Engleson and Yockers, 1994).

### **2.13 Gender Related Issues in Environmental Education**

An information sheet has been designed by Gambro & Switzky, (1998) to investigate some of the myths and assumptions associated with gender and environmental education, as well as to suggest methods teachers can use to address these issues.

#### **2.13.1 Assumptions regarding female involvement**

There are many assumptions that must be addressed when considering the involvement of women in science related subjects. A major assumption is that men and women have identical learning experiences at school. In reality, the experience is different for each gender, and similarly, for each individual. (Gambro & Switzky, 1994) According to Century (1994), women are also viewed as having less interest in science and mathematics than men have. Another assumed gender related difference that may have an effect on involvement in environmental education is that women are more intuitive and rely more on feelings. Women are considered to be passive rather than speaking out or defending their opinion and are

thought of as being dependent on others, less comfortable with themselves, and less likely to seek a life of their own. (Owens & Cooney 1998; Tobias 1995). A study by Gambro and Switzky (1994) suggested that gender is an influential factor in gaining environmental knowledge. The number of science classes taken by students factored into the differences in knowledge between genders, but did not account for the entire difference. In this study, out of a group of high school students questioned about energy and pollution issues, 29.2% of females had satisfactory knowledge as compared with almost 44% of male students. (Gambro & Switzky, 1994). There are also some assumed gender related moral differences that may affect attitudes and activities surrounding environmental education. As mentioned, women may make decisions based on feelings, while men base their decisions on fact and science. Within the classroom, female students may receive less attention than their male counterparts, and even that attention may be a lower quality. Studies have also shown that stereotypical gender role orientation affects care voice. The aforementioned stereotyping of each gender can, over time, be detrimental to female self-esteem and confidence when considering involvement in science. These stereotypes and assumptions could lead to a decrease in female achievement and an increase of negative attitudes, reducing desire to pursue science and environmental careers.

### **2.13.2 Challenging the assumptions**

Some studies, however, insist that there are no significant differences between the two genders in terms of science and environmental education. One study about influential factors of learning environment showed that gender was not one of the top three factors related to attitudinal outcomes (Henderson 1998). Similarly, there has been no evidence to indicate that there are significant differences in perception between the sexes or that a person's gender has an effect on their ability to distinguish between fact and opinion (Corral-Verdugo; Newsom-

Stewart and Stuphin, 1994) main difference identified, however is career choice; females are less likely to choose environmental sciences than males (Newsom-Stewart and Stuphin, 1994).

### **2.13.3 Addressing gender related issues**

Teachers can take precautions to help reduce any gender difference that may be felt in the class room. Lesson plans and activities need to be based on the learning situations on an individual basis, rather than by gender. Students need to be encouraged to think about the importance of environmental issues and impact of this knowledge to their own lives (Gambro & Switzky, 1994), regardless of gender and associated stereotypes. One way to address the gender-related environmental issues could be to develop a moral learning and development model created to include both genders independently, rather than one or the other. By treating each gender separately, the model would account for any differences in morality and approaches to the environment. Four factors of morality should be included in this development model : moral sensitivity, moral judgment, moral decision making and moral action (Scott 1986). These factors tie directly into the five progressive stages of environmental education, with moral development being the key to progressing through each stage. Owens and Cooney (1998) presented a three step plan for minimizing gender bias in the classroom. The first step was to examine where the problem is founded, and to set classroom procedures that would encourage equal participation of each gender. After that, activities were planned that would cause females to be more active than before. The final step was to have class discussions about cooperation and participation. The researchers reported that this not only increased female participation, but also resulted in teacher time being equally spent between each gender, and a decrease in disruptive behavior of students.

Teachers can also group class activities in such a way as to allow all students to learn from the experience and to feel comfortable in participating in the activities. In addition, when asking questions, teachers should be sure to ask questions that do not involve spontaneous responses, which male students sometimes tend to dominate in. Rather, a mix of spontaneous answers and those that require more thought would allow for each gender's strengths and involvement (Hannan 1995).

By redesigning the way teachers approach education, they can be sure that they are not including stereotypes and assumptions about gender, giving females a fair chance at an equal education (Gambro & Switzky, 1998).

#### **2.14 Environmental Awareness and Environmental Attitudes**

The study of Sichuan Union University (2002) that evaluated the environmental awareness of middle school and university students, aimed to understand the differences in environmental attitudes of university, secondary and primary school students, as well as students' environmental awareness.

The environmental awareness is rather pronounced: 91% of the students claim to know the concept of environment, 87% differentiate between environmental protection and public sanitation, 85% consider environment to be a resource, and 94 think that natural environment has a price. There is some environmental awareness: Less than 5% of the student's state they've never heard of global warming, ozone layer decomposition, biodiversity reduction, freshwater resource depletion and acid rain, 80-85% claim to understand something of the topics, the rate of students who were able to write down the effects of the glasshouse was 70%. From four electric appliances, 85% of the students chose freezers as ozone- layer destroying. More than 80% of the students had heard of green food.

Having certain knowledge of environmental law: 93% of the persons have heard about environmental protection laws, 80-95% had heard about that it is prohibited to import/export rubbish that paying pollution fees cannot substitute the necessity for environmental recovery, and which are the responsibilities of the environmental department.

There is some awareness about the urgency of the environmental problems: 94% of the students know that environmental resources are scarce.

About 15% of the students think TV set, computers or microwaves are directly related to ozone layer destruction, and 30% don't know the results of the greenhouse effect.

The male respondents were more aware of knowledge and environmental law than female respondents who in turn are more willing to participate in environmental activities: 46% of males vs. 27% of females know the environment day's date, males ranked the environment as third most important problem, females as the second most important one, only 49% of male and 63% of female want to participate in environmental action. However, that data are significant at the  $p < 0.01$  levels, the ratio of male interviewees was also significantly higher in the university than in the middle school population. The anticipated, environmental knowledge is better within the environment department, but the attitude about the china's environmental future is also the most pessimistic one. Something should be done to overcome this pessimistic mood (Joy Palmer, 2002).

The study purpose of Nigerian school teachers (2002) was to determine the environmental knowledge and attitudes of some School Teachers (n - 360) of three subject groupings (Arts, Sciences and Social Sciences) were administered an environmental knowledge and attitude scale. The teachers generally demonstrated a low level of environmental knowledge, although the science and social science teachers were found to be more knowledgeable than their arts

counterparts. Negative environmental attitudes were also found to be prevalent among the three categories of teachers. The study revealed that most of the teachers have never heard of environmental education and have never attended any workshop or seminar on teaching of the subject (Environmental Education Research, EER, 2002).

### **2.15 KAP among Different Levels of Students Regarding Environment**

A study was conducted by amal sarsuor (2005) to evaluate the Environmental Awareness among School-Age Children in Gaza city.

The purpose of that study to determine the level of environmental awareness and attitude among students of class 9 in the governmental high basic school in Gaza city, and their relationships with gender, residential area and grade of students' scores achievement at school. Also, to investigate the relation between environmental awareness and attitude. The results indicated that the study students' have a relatively moderate level of environmental awareness, with a mean score of 16.85 (total: 24 score) and percentage of their environmental awareness level was 70.2%. While their positive attitude toward the environment was low with a mean of 19.30 scores (total: 30 score) with a percentage of about 64.33%. There were significant differences in the level of environmental awareness and attitude based on gender. One of the most interesting results was that, males have a significantly higher environmental awareness than females, while females have shown more positive attitude toward environment than males. In addition, significant differences were found in the students' environmental awareness and attitude based on students' place of residence favoring resident area, that the level of environmental awareness and attitude among students of the study area was higher than those of the other three areas in Gaza city (popular area, recent area and agricultural area). Also, significant differences were found in the students' environmental awareness and attitude according to grade of students' study achievement at school favoring

students whose grades were higher than 90 %, which indicates that there was a direct proportional relation between the level of environmental awareness and attitude with students' grade. The results showed that there was a positive significant relationship between environmental awareness and attitude among the study population (Sarsuor, 2005).

Affifi (2000), conducted a study to find out the environmental enlightenment level of sixth grade children in Rafah governorate and its relation with some variables. The researcher has studied many factors, such as, type of school (governmental or UNRWA), gender, children's level of achievement and place of residency. The study was conducted on 400 children. The study results showed that the average children's marks were (65.3%) which was below the accepted standard of the established study which is (80%). The results indicated that the level of the environmental enlightenment of the children was below the accepted standard. There were statistically significant differences between UNRWA and governmental schools toward UNRWA schools. While there were no statistically significant differences related to the place of residency (camp, town) through out Rafah governorate on the environmental enlightenment level. A strong relation was found with academic level achievement of the students in favor to excellent achievers, where the excellent students have more environmental enlightenment level than other student (Affifi, 2000).

In Hong Kong (2003), a study was implemented to explore the teachers' perceptions of teaching environmental issues within the science curriculum: The study was an exploratory study of Hong Kong secondary school integrated science teachers' perceptions of environmental education. Both questionnaire survey and interviews were used. Teachers were classified according to their scores of attitudes, perceived barriers, and current emphasis on teaching environmental education. The study found that Integrated Science teachers' attitudes toward environmental education, skills of teaching environmental education, beliefs in the relevance of integrated science to environmental education, and intentions of teaching

environmental education in Integrated Science classes were associated with their actual ways of teaching of environmental education. Teachers tended to teach more environmental education if they held more favorable attitudes toward environmental education, had more skills of teaching environmental education, believed more in the relevance of Integrated Science to environmental education, and would actually want to teach more environmental education in Integrated Science classes if there were fewer constraints. Moreover, variations in the teaching of environmental education were reflected by teachers' emphasis on teaching environmental education, and their use of a variety of teaching methods and their regular practices of extracurricular activities on environmental education (Andre chi-chung KO, john chi- kin lee, 2003).

A study by Tehran University to compare environmental awareness among secondary school students in Iran and India was implemented in 2007. The study investigated secondary school students' environmental awareness in India and Iran. Nine hundred and ninety-one students were selected through the stratified random sampling technique from 103 secondary schools of Mysore city (India) and Tehran city (Iran). Subjects consisted of 476 boys and 515 girls. They were assessed using the Environment Awareness Ability Measure (EAAM).

Results indicated that there are significant differences between Indian and Iranian students in their level of environmental awareness. Also there are significant differences between them in environmental awareness across and within two groups with regard to their gender. Also type of school management (Government and private) is a factor, which can affect student's environmental awareness in both countries. In the study, it was found that there was a significant difference in the level of students' environmental awareness between two countries. The study found that the number of Indian students with average level of environmental awareness (44.00 percent) is more than their counterparts in Iran (14.9 percent). Further, it is noticed that number of Iranian students with high level of

environmental awareness (85.10 percent) is more than Indian students (56.00 percent). Result indicated that, in total, there is no significant difference between boys and girls students and their level of environmental awareness. The study highlighted that in total there is an influence of type of school management on level of student's environmental awareness. Results of Tehran university from this study revealed that:

More than 70 percent of students in both countries (Iran and India) informed that their level of environmental awareness is high. Indian students with average level of environmental awareness (44.00 percent) are more than their counterparts in Iran (14.90 percent). Number of Iranian students with high level of environmental awareness (85.10 per cent) is more than Indian students (56.00 percent). Boys and girls students in this study have the same level of environmental awareness and gender is not a factor, which affects their environmental awareness. Boy students in Iran have more awareness about conservation of soil, forest, air, etc.', conservation of human health' and 'conservation of wild life and animal husbandry' of their environment than other students. Type of school management has an impact on environmental awareness of students in both countries. In all sub factors of student's environmental awareness, Iranian Government school students scored significantly higher than their counterparts in India (Tehran University, 2007).

### **2.16 KAP among Public Regarding Environment**

The 1998 National Environmental Education & Training Foundation NEETF/Roper Survey is a continuation of seven straight years of data gathering about American's view on the environment. The National Report Card was launched in 1992 by Times Mirror Magazines in collaboration with Roper Starch. Times Mirror commissioned each of the first four years of the survey, and National Education & Training Foundation (NEETF) took over the project in 1995. These surveys assess environmental knowledge in America and evaluate public

attitudes as they exist today and have changed over the past seven years. The main purpose is to help America's leaders - educators, policy makers, business executives, media representative and the general public better understand what Americans know about the environment. This mission is accomplished every year by a survey of a representative population of America.

Using a quiz style format, *The 1998 National Report Card* (also referred to as the NEETF/Roper Survey) examines the public's belief in environmental "myths" - outdated or erroneous information about the environment. The 1998 report is based on a nationally representative sample of 2,000 Americans, ages 18 and older, surveyed by Roper Starch Worldwide in May 1998. It looks at how Americans would respond when asked questions on subjects imbued with prevailing environmental myths.

The 1998 myths quiz (quite different from the *more* general 1997 quiz) shows the power that certain environmental myths have in America. Indeed, the mean number of correct responses to the ten myths questions was just 2.2. Therefore, in order to separate out a high knowledge group from the universe of respondents the dividing line is three or fewer correct answers versus four or more correct. Fully, 69% of the higher-knowledge groups are men while 31% are women. In past *National Report Cards*, as well as the 1998 survey, a notable difference between the environmental attitudes of men and women has repeatedly surfaced. While the majority of all Americans (71%) favor the environment over the economy, if a choice between them must be made, fully 74% of women favor the environment compared to 68% of men. This stronger pro environment feeling of women in America is evident from the responses they give to many questions.

In The 1998 National Report Card. for example, 21% of men think environmental regulation has gone too far while just 13% of women feel that way. Conversely, a majority (51%) of

women feel that regulation should go further while a 41% plurality should go further while a 41% plurality of men holds that belief (NEETF/Roper, 1998).

A Survey was conducted in Jakarta (1998) to determine the perception, knowledge, awareness, and attitude in regard to environmental problems in a sample of two different social groups. A quantitative study was conducted in 1998 to investigate differences in perception, knowledge, awareness, and attitude with regard to environmental problems between educated and community groups and to identify human-dimension factors to improve public perception, knowledge, awareness, and attitude in relation to global environmental conservation concerns in developing countries. Educated and community groups in Jakarta were interviewed, and data obtained from a total of 537 males aged 30-49 years were analyzed. The data were evaluated by the chi-squared test and logistic regression was applied after factor analysis. The results show that: (1) The perception, knowledge, awareness, and attitude of educated subjects in regard to regional and global environmental problems were much better than those of subjects in the community group; (2) The highest 'yes' response in the community group was in regard to perception of AIDS (82.9%). Few subjects in the community group knew the effects and the cause or source of environmental problems; however, they were well informed about AIDS (86.4% for effects and 93.9% for cause or source). The conclusions are: (1) subjects in the educated group had better perception, more detailed knowledge, were more aware, and had better attitudes in regard to regional and global environmental problems than those in the community group; (2) more education is needed to develop environmental actions and ethics in developing countries; (3) non-formal environmental education through popular mass media should be used more widely and frequently, and more detailed information on the environment should be provided to literate people by newspapers and other means (Springer Netherlands, 2002).

## **Summery:**

The literature reviewed has discussed the air pollution from different sides to provide knowledge and information about the source, causes and its effects on the human health and environment to be more aware about this problem and change our behavior toward outdoor and indoor air pollution.

The reviewed literature studies described strongly the current status of air pollution through the world, regional and in Palestine (the west bank and the Gaza strip).

On the other hand, the literature reviewed has shown the importance of improving environmental knowledge and attitude among citizen through different ways by providing environmental concept in the environmental education curriculum and informal way such as mass media and other environmental activities.

This chapter also, focuses on the importance of environmental education during the early childhood years and the using of environmental education at schools. Different studies across countries support the efficiency of environmental education to improve the level of environmental awareness and attitude, while there was a large variation in the results of the studies conducted to measure the level of KAP among different students and teachers.

The studies show a variation in the level of environmental knowledge and awareness and attitude across countries. Also, several studies have found that the level of KAP can vary considerably between different environmental awareness and attitude according to gender. In contrast, another researches reported that the relationship between environmental knowledge and attitude has proved to be very weak, while from the other hand, different studies have shown that teachers' knowledge about environmental problems is not matching with their attitude. In some cases teacher's knowledge is low and level of attitude is high. This can be explained according to different cultures.

# **Chapter Three**

## **Conceptual Framework**

## Chapter Three

### Conceptual Framework

#### 3.1 Definitions of Environmental Education

The process in which individuals gain awareness of their environment and acquire knowledge, skills, values, experiences, and also the determination, which will enable them to act - individually and collectively - to solve present and future environmental problems .

Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 1977).

Environmental education enhances critical thinking, problem-solving, and effective decision-making skills, and teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions. Environmental education does not advocate a particular viewpoint or course of action.

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp, W.B., et al. 1969).

#### **UNEP Environmental Education and Training**

Environmental education and training has contributed to general awareness about the environment and fostered environmental education in States around the world. The importance of the environmental education and training programme are developed environmental education guidelines and strategies as well as educational materials, curriculum prototypes, modules, posters and audiovisual aids and promoted their local adaptation. Also, trained key educational personnel to serve as a multiplier effect for fostering the development of environmental education and fostered international cooperation

in environmental education through technical and financial support, field missions and participation in relevant activities of international governmental and NGOs. In addition, supported member states, of which ninety-five States have adopted environmental education as a key component in their national formal and non-formal education, however, developed curriculum prototypes for primary and secondary schools and for teachers on the basis of sub-regional environmental and educational needs and priorities for developing countries.

### **3.2 Definition of Environmental Awareness**

According to Tbilisi declaration, 1977, environmental awareness is defined as the way to help social group and individuals acquire an awareness and sensitivity to the total environment and its allied problems (UNESCO and UNEP, 1990).

Environmental awareness is the attitude of having consciousness about the consequences of the human intervention on the environment and the performances of appropriate behavior to reduce negative effects (Nunez, 2000).

### **3.3 Definition of Environmental knowledge**

The way to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems. (UNEP, 2006). The Environmental Knowledge aims to build a virtual storehouse of information about the environment, good relevant knowledge and best practices for the Priority Areas of Works helps in a timely and efficient manner for the informed-decision making on the areas of assessment, policy development, planning, and implementation. (UNEP/INF, 2000).

### **3.4 Definition of Environmental Attitude**

Referring to Tbilisi Declaration, 1977 defined environmental attitude as, the way to help social groups and individuals acquire a set values and feelings of concern for the environment

and the motivation for actively participating in environmental improvement and protection. (UNESCO and UNEP, 1990).

To have an impact on the environment, action needs to be demonstrated at individual or community level through change in behavior or attitude. The environmental reporting process can contribute to behavioral change by providing information that has the power to influence the way individuals or communities look at their environment attitude. (Erick Litswa, 2007).

### **3.5 Definition of Environmental Participation**

The way to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (Washington: Status Report, 2004), Implementation refers to all relevant laws, regulations, policies, and other measures and initiatives, that contracting parties adopt and/or take to meet their obligations under a multilateral environmental agreement and its amendments if any (UNEP, 2006).

### 3.6 Theoretical framework

After reviewing several studies, there are different sources of teachers' knowledge and awareness, such as school, media, family and environmental clubs. Also, from the evidence of literature reviewed, environmental knowledge and attitude and practice may be influenced by gender, type of school, qualification and years of experience as hypothesized in the study.

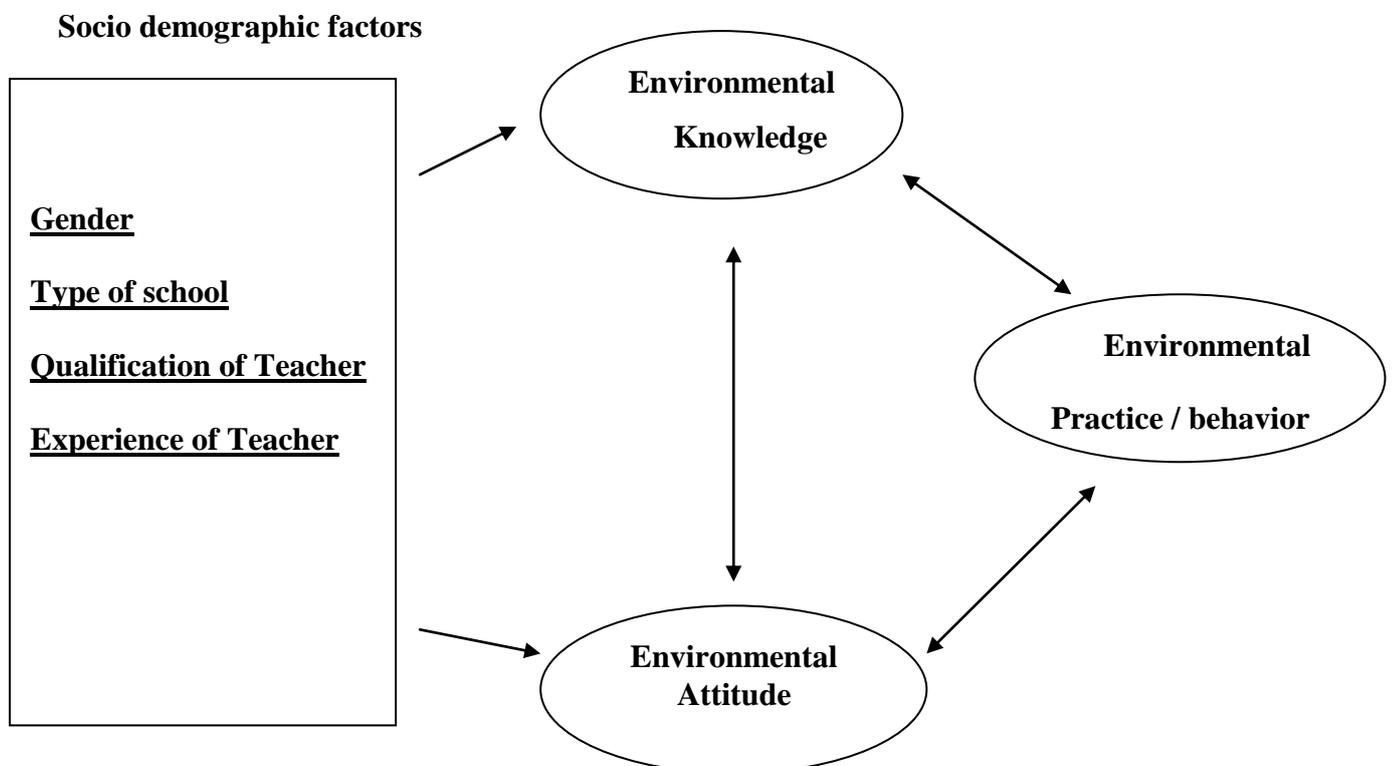


Figure: The relationship between KAP of teachers, with different socio demographic factors.

# **Chapter Four**

## **Methodology**

## **Chapter Four**

### **Methodology**

#### **4.1 Introduction**

To implement this study, the researcher followed the proper steps of the methodology mentioned in the thesis preparing guideline, which includes the study design, the study sample, the study instrument, pilot study, data collection, and data processing and analysis.

A pilot study was carried out on a sample of 27 teachers who have been selected randomly, and not included in the actual study sample. A cover page was provided to give instructions for completing the self-administered questionnaire, and verbal explanation was also given to the subjects. The study included all primary schools (GOV. and UNRWA) in Rafah governorate.

The researcher implemented the questionnaire after receiving an official approval letter from " Helsinki Committee" in the Ministry of Health , another approval letter from the Ministry of Education and Higher Education and education department of UNRWA allowing the researcher to carry out the study on primary school teachers (GOV. and UNRWA ) in Rafah governorate (Annexes 2, 3, 4).

#### **4.2 Study Design**

A quantitative analytical descriptive method was used in this study to describe the present status of the level of knowledge, attitude and practice among primary school teachers (GOV. and UNRWA) regarding air pollution in Rafah governorate.

The dependent variables include knowledge, attitude and practice where the independent variables include socio demographic factors including gender of teachers, type of school, qualifications and years of experience.

### **4.3 Sample and sampling**

#### **4.3.1 Study Population:**

The study population consisted of all primary school teachers (GOV. and UNRWA) in Rafah governorate (850) teachers from 32 schools, 13 GOV. Schools (277 teachers) and 19 UNRWA schools (573 teachers).

#### **4.3.2 Sample size:**

The targeted teachers were selected from all primary schools (GOV. and UNRWA) in Rafah governorate. The sample size was 250 teachers based on Epi- info representing about 29% of the total study population (850) teachers, according to the Ministry of Education and Higher Education and education department of UNRWA records.

#### **4.3.3 Sampling process:**

According to the aim of the study, the researcher investigated KAP regarding air pollution in Rafah governorate. So, the sample covered all Rafah primary schools to examine the relationship between KAP and socio-demographic factors such as gender, type of school, qualifications and years of experience. Stratified proportional random sample. Eight teachers were randomly selected from each school. Therefore, (256 questionnaire) were distributed, 152 questionnaires distributed in UNRWA primary schools and 104 distributed in GOV. Schools. Only 238 questionnaires were collected back with a response rate (93%), 139 questionnaire from **UNRWA** primary schools and 99 from GOV. primary schools.

### **4.4 Study Area**

This study was applied in all primary schools in Rafah governorate boys and girls (32) schools (19 UNRWA and 13 GOV.) during March 2007.

#### **4.5 Ethical Considerations and Procedures**

- 1- Obtaining ethical approval from Helsinki committee.
- 2- Obtaining approval letter from the Ministry of Education and Higher Education and education department of UNRWA allowed the researcher to carry out the study on primary school teachers (GOV. and UNRWA) in Rafah governorate. (Annexes 3, 4).
- 3- The researcher gave a short introduction about the research and its objectives.
- 4- Informed consent which required the signature of the participant prior to data collection process was obtained.
- 5- Insure confidentially, mention the right to stop or withdraw, to consider the consequence of the information and to make sure not to harm the informant.

#### **4.6 Study Instrument**

A questionnaire in Arabic was designed to accomplish the objective of this research to investigate the knowledge, attitudes and practice in respect to their relationship with gender, type of school, qualifications and years of experience. This design of the questionnaire was based on previously reviewed researches about education and how to measure the level of KAP. The researcher concentrated on the variety of questions included in the questionnaire about different air pollution ideas included in the environmental health curriculum of the primary schools in Palestine. The questionnaire consists of 76 questions divided into three dimensions as explained below. To ensure its validity, the researcher handled the questionnaire to experts in environmental field for their opinions.

##### **4.6.1 Personal data**

The first section includes 15 questions of personal data about the subjects who will answer the questionnaire, including socio-demographic data such as gender, type of school,

qualifications and years of experience (independent variables), also, other data about age, residency, income, ect.

#### **4.6.2 Knowledge regarding air pollution questionnaire:**

The second section refers to environmental knowledge about air pollution. The content of this part was based on many types of questions:

- 1- If the study subjects heard about the concept of air pollution ( question 1)
- 2- Multiple choice questions, some of it with one point for the right answer and the others have more than one answer. (Question 2 to 11).
- 3- Questions about general Knowledge of air pollution, the answer may be yes, no or don't know (question 12 to 18).

So, every answer has a separate variable where the researcher can measure the amount of knowledge regarding air pollution. The main points in this section consist of the causes of air pollution, environmental and health problems, the results of air pollution and other items test the relation between air pollution and other environmental issues.

#### **4.6.3 Attitude scale regarding air pollution:**

The third part of the questionnaire includes an attitude measurement scale consisting of 22 questions rated on a Likert type scale. The researcher scaled the responses to each statement into 5 possible responses, strongly agree =5, agree =4, without =3, disagree =2, strongly disagree =1.

These statements were the third part of the instrument described above and it was developed and designed on the basis of reviewed related literature. To examine the level of attitude toward different air pollution issues among the study population, the researcher established

the statements of this part into different items, the 22 statements covered most items that reflect the level of attitudes toward different environmental issues related to air pollution.

#### **4.6.4 Practice regarding air pollution questionnaire:**

The fourth part of the questionnaire referred to environmental practice related to air pollution. The content of this part was based on many types of questions, such as; mixed questions depend on the first answer of the question if yes or no. That question includes some environmental activities and practices in the school area (question from 1 to 9) .On other side, the questions from 10 to 20 asked about other environmental activities in the school and other activities related to indoor air pollution.

#### **4.7 Pilot study**

For the purpose of ensuring validity and reliability of instruments, the researcher distributed the questionnaire to experts in environmental sciences for their comments (validity of expertise).

To check reliability of the questionnaire, the researcher made a pilot study on a sample of 27 teachers from Rafah, chosen randomly. Then statistical analysis was used to find the correlation between odd and even statements (spilt half) by using Pearson correlation test.

Then Pearson – Brown equation was used to find the correlation coefficient:

$$\frac{2R}{1+R} = \frac{2 \times 0.718}{1+0.718} = 0.835$$

The correlation between odd statements and even statements was 0.718, and between odd statements and the total score of the questionnaire was 0.911 at significance level 0.01 and between even statements and the total score was 0.941.

**Table (4.1): Correlation Between odd and Even Statements (n = 27)**

		<b>ODD</b>	<b>EVEN</b>	<b>TOTAL</b>
<b>ODD</b>	R	1.000		
	P value	.		
<b>EVEN</b>	R	0.718 **	1.000	
	P value	0.000	.	
<b>TOTAL</b>	R	0.911 **	0.941 **	1.000
	P value	0.000	0.000	.

\*\* Significance level 0.01

#### **4.8 Data collection**

The data collected by the researcher from all primary schools in Rafah governorate, boys and girls schools (UNRWA and GOV.).Data collection was accomplished through using a questionnaire of three measurement tools as mentioned above, during data collection the teachers were informed about the instructions for completing the questionnaire. They were told that all the data obtained will be used for research purposes, and they were asked to answer the questionnaire as honestly as possible. According to the pilot test, it took 25 minutes to answer the questionnaire. Data collection process took two-weeks duration starting on the first of March 2007.

#### **4.9 Data entry and analysis**

Data were carefully checked to screen out any incompletely answered questions. Two hundred thirty eight were processed and entered by the researcher after designing an entry model using the computer software Statistical Package for the Social Science (SPSS) version 11. In the study, the dependent variables were knowledge, attitude and practice the

respondent teachers, and the independent variables were gender, type of school, qualifications and years of experience.

In reporting the results of the study population distribution, descriptive statistics in term of means, percentage were measured for each dependent and independent variables. Further to this, tables were used to present the data in an organized way as being easier for readers to understand. The researcher conducted independent sample T-Test to explore the differences in means between male and female and type of schools, and one way ANOVA to test differences between KAP as dependent variables, and other socio-demographic factors as independent variables. A two-tailed Pearson's correlation coefficient was used to investigate the correlation between KAP and gender and type of school.

#### **4.10 Limitations of the study**

The researcher faced some limitations during implementing this study such as:

1. Limitation of time because the time duty of teachers is limited.
2. The data collected were teachers self reported type. It was assumed that their responses were honest and it was difficult to verify.
- 3- Lack of local literature written in English language, so, the researcher translated this literature from Arabic to English language to be consistent with the language of this study.
- 4- Lack of resources including money and facilities.

# **Chapter Five**

## **Results**

## Chapter five

### Results

The study sample consisted of 238 teachers working at primary schools in Rafah governorate. Their age ranged between 22 and 60 years with mean age of 37.66. One hundred and ten are males, and one hundred twenty eight are females, 139 of them employed at UNRWA primary schools, and 99 employed at governmental primary schools. (108) hold diploma certificate, (124) hold bachelor degree, and (6) hold master or doctoral degree. Analysis of the sample is presented in the following tables:

Table (5.1) Sample Analysis Regarding Certificate

<b>Certificate</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Cumulative %</b>
<b>Diploma</b>	108	45.4	45.4
<b>Bachelor</b>	124	52.1	97.5
<b>MA / PhD</b>	6	2.5	100.00
<b>Total</b>	<b>238</b>	<b>100</b>	

Table (5.2) Distribution of Sample Regarding Gender and Type of School

<b>Gender</b>	<b>School type</b>				<b>Total</b>	
	<b>UNRWA</b>		<b>GOVERNMENT</b>		<b>frequency</b>	<b>%</b>
	<b>frequency</b>	<b>%</b>	<b>frequency</b>	<b>%</b>		
<b>Male</b>	59	24.78	51	21.42	<b>110</b>	<b>46.20</b>
<b>Female</b>	80	33.61	48	20.16	<b>128</b>	<b>53.77</b>
<b>Total</b>	<b>139</b>	<b>58.40</b>	<b>99</b>	<b>41.59</b>	<b>238</b>	<b>100.00</b>

Table (5.3) Distribution of Sample Regarding Gender and Academic Degree

Certificate	Gender				Total	
	Male		Female			
	frequency	%	frequency	%	frequency	%
<b>Diploma</b>	35	14.70	73	30.67	<b>108</b>	<b>45.37</b>
<b>Bachelor</b>	71	29.83	53	22.26	<b>124</b>	<b>52.10</b>
<b>MA / PhD</b>	4	1.680	2	0.840	<b>6</b>	<b>2.52</b>
<b>Total</b>	<b>110</b>	<b>46.21</b>	<b>128</b>	<b>53.78</b>	<b>238</b>	<b>100.00</b>

Table (5.4) Distribution of Sample Regarding Gender and Experience

Experience	Gender				Total	
	Male		Female			
	frequency	%	frequency	%	frequency	%
<b>Less than 5 years</b>	30	12.60	36	15.12	<b>66</b>	<b>27.73</b>
<b>5 – 10 years</b>	28	11.76	31	13.02	<b>59</b>	<b>24.78</b>
<b>More than 10 years</b>	52	21.84	61	25.63	<b>113</b>	<b>47.47</b>
<b>Total</b>	<b>110</b>	<b>46.20</b>	<b>128</b>	<b>53.77</b>	<b>238</b>	<b>100.00</b>

\* To measure the level of knowledge regarding air pollution, the responses of the study subjects on the first part of the questionnaire (knowledge) were analyzed. Their responses were as the following:

- 1) 98.73 % of the study subjects heard about the concept of air pollution. When asked about the source of their knowledge, their answers were as shown in the following table.

Source of knowledge	percent
Radio and T.V.	78.5
Brochures and prints	61.3
Lectures / classes	46.0
teachers	40.8
friends	24.8

The results from above table indicate the important role of informal education in gaining knowledge, especially media (TV and Radio) and brochures and prints. This result raises the need for more attention to those methods in affording special information to the target population.

- 2) Concerning the definition of air pollution 50.4% of the subjects know the right definition. When asked about the causes of air pollution, their responses were as the following:

<b>Cause of pollution</b>	<b>percent</b>
Vehicles	85.0
Factories emissions	70.0
Burned tires	65.5
Radiations	55.0
Block factories	48.3
Waste water lagoons	24.4

The results from above table show that subjects know the major sources of air pollution (vehicles, factories, burned tires), which needs more emphasis on methods to decrease the negative effects of those factors on people and environment.

- 3) Regarding environmental problems caused by air pollution, subjects' responses were as the following:

<b>Environmental problems</b>	<b>Percent</b>
Ozone layer depletion	68.1
Poor air quality	55.0
Green house effect	49.2
Acid rain	32.4

4) Regarding health problems caused by air pollution, subjects' responses were:

<b>Health problems</b>	<b>Percent</b>
Respiratory problems	90.0
Cancer / tumors	50.8
Poisoning	32.3
Immune deficiency	20.6
Preterm labor	16.8

The results from above table show that subjects know the health problems caused by air pollution. This knowledge should raise the attention toward alleviation of causes of air pollution in order to avoid related health problems.

5) When asked about the main air pollutants, the answers were 77.3% carbon monoxide, 34.9 organic materials / particulates, 31.5% sulfur dioxide, and 24.4% nitrogen oxides.

6) When asked to define the green house phenomenon, 38.6% of the subjects knew the right definition.

7) Regarding the impacts of climate change, their responses were:

<b>Result</b>	<b>Percent</b>
Disruption of air distribution	67.2
Increase of storms and floods	45.3
Elevated sea level	33.2
Increase insects	13.0

- 8) When asked about the factors that make people pollute the air, 82% related that to absence of clear policies, 47.5% to low level of education and awareness, and 29.8% to cultural reasons.
- 9) When asked about the responsibility for environment protection, 96.9% of subjects said it is the responsibility of the municipality, Ministry of environment, governorate, and family.
- 10) Concerning the general knowledge regarding air pollution, subjects responses were as shown in the following table:

<b>Item</b>	<b>Yes %</b>
Is there a relation between air pollution and prevalence of diseases?	98.7
Is there a relation between negative smoking and respiratory infections?	96.2
Is there a relation between air pollution and hospital admissions with respiratory and heart diseases?	93.7
Is there a relation between air pollution and death rate?	84.5
Is the environmental education part of school curriculum?	66.4
Do you have an idea about environmental education?	63.9
Are there rules to protect the environment?	54.2
<b>Average of general knowledge</b>	<b>79.6</b>

The results from above table show that the majority of subjects have good knowledge regarding air pollution, its effect on health, disease prevalence, and death rate. Having good understanding of this problem may make it easier to avoid the causes of air pollution, and decrease the prevalence of related health problems.

\* To measure the level of attitudes toward air pollution, the percentages of subjects' responses to each item in the scale were calculated, especially the ratings of strongly agree and agree. Then the mean percentage of the total scores was also calculated, and it was 91.88%. The results are presented in the table below:

Table (5.5): Teachers level of attitude toward air pollution

Item	Strongly agree %	Agree %	Sum %
The problem of air pollution is present in the area	43.7	47.9	91.6
I believe there will be air pollution in the future	56.7	37.4	94.1
I believe that indoor air pollution will cause diseases	62.6	34.5	97.1
I believe that outdoor air pollution will cause diseases	55.5	41.2	96.7
Vehicle emission affects community health	70.2	28.6	98.8
Mobile satellite stations may harm the human health	49.2	34.0	83.2
Overcrowded classrooms affects air quality	55.5	38.7	94.2
Burning tires closed to schools and in main roads affects human health	81.9	17.2	99.1
Burning garbage containers near schools and roads affects human health	89.1	17.2	99.1
Industrial emissions affects air quality	79.8	18.5	98.3
Sewage ponds and treatment plans affects air quality	52.9	37.4	90.3
I believe that we can decrease air pollution	60.1	28.2	88.3
I believe that media talks about air pollution	12.6	63.4	76.0
I think that students awareness regarding air pollution needs to be increased	69.7	28.6	98.3
I think that information regarding air pollution must be available at school	69.7	28.6	98.3
I think that legal actions should be taken against those who cause air pollution	75.2	20.6	95.8
There should be special equipments to deal with air pollution	62.6	34.5	97.1

Table (5.5) Continued

It is essential to cooperate with specialized groups to reduce air pollution	64.7	32.8	97.5
There should be special areas for smokers in public places	58.8	21.0	79.8
Rules and legislations must be enforced to decrease air pollution	73.9	21.4	95.3
I believe that there is a relation between air pollution sources and the distance between schools and main roads	23.9	43.7	67.6
I believe that there is a relation between air pollution and the type of chalk used at schools	41.2	43.7	84.9
<b>Mean percentage</b>	<b>91.88</b>		

\* To measure the level of practice, the frequencies and percentages of subjects' responses on the practice scale were calculated. The results were as follows:

- 1) When there is air pollution around the school, does the school administration take actions to improve the quality of air? 35.3% of the study subjects said yes, 51.3% said no, and 11.3% do not know.

- Those who said "yes" mentioned the following actions taken by the administration:

<b>Response action</b>	<b>%</b>
Inform the authority	36.1
Contact the community to treat the problem	11.8
Go to the source of pollution and treat it	10.5

- Those who said "no" attributed that to the following reasons:

<b>Reason</b>	<b>%</b>
Uncooperative authority	41.2
Absence of systems / regulations	29.8
Cost	16.4

2) When subjects asked if they participate in waste disposal actions at school; 89.1% said "Yes", while 10.9% said "No". Those who said yes use the following methods:

<b>Action</b>	<b>%</b>
Put the waste in the garbage containers	50.79
Put the waste in special bags	33.8
Burn the wastes in special place	15.3

3) In case of burning garbage containers or burning tires near the school, the following actions are taken:

<b>Action</b>	<b>%</b>
Discuss the harmful effects of pollution with the students	70.6
Notify the fire department	31.5
Put the fire off using water	13.9

- 4) When subjects were asked about the best action to be taken in case of air pollution, their responses were as follows:

<b>Response action</b>	<b>%</b>
Move students away from the source of pollution opposite to wind direction	45.0
Explain to students the dangers of pollution and ways of treatment	42.9
Notify the authority	7.1
Identify the source of pollution	5.0

- 5) About 24.2% of subjects attended seminars about air pollution, while 75.8% did not. Those who did not attend seminars attributed that to the following reasons:

<b>Reason</b>	<b>%</b>
Did not receive invitation to attend such seminars	68.22
There are no activities regarding air pollution	30.72
No interest in air pollution	11.45

6) To measure practice in general, the percentage of subjects' responses on the following questions was calculated. The responses were as follows:

Question	% Yes	% No
Did you have training regarding air pollution and its dangers?	73.5	26.4
Do you discuss air pollution with students?	83.2	16.8
Did you write about air pollution at school?	44.5	55.5
Did you discuss smoking with students?	66.0	34.0
Do you use learning aids to increase awareness about air pollution?	60.9	39.1
Does the type of fuel used for cooking produce smoke?	26.5	73.5
Is there a ventilator in your kitchen?	53.8	46.2
Do you use air freshener at home?	63.4	<b><u>36.6</u></b>
Do you use electrical equipment to kill mosquitoes?	45.8	54.2
Do you use smoke to get rid of mosquitoes?	9.2	<b><u>90.8</u></b>
<b>Mean percentage</b>	<b>58.16</b>	

- To test the hypothesis "**There are no significant differences in KAP regarding air pollution between male and female primary school teachers in Rafah governorate**", independent sample (T-test) was used to explore the differences in means between male and female teachers. The results are presented in table (5.6)

Table (5.6) Differences in KAP means between male & female teachers (n = 238)

Gender	n	m	t	P value
Male	110	119.800	- 4.183	0.000
Female	128	123.421		

From the above table, the results show that there is statistically significant differences at 0.01 between the means for male teachers (m = 119.800) and the means for female teachers (m = 123.421), and (t) value was – 4.183 and it is significant. This results support the correlation test results, and the differences are in the favor of female teachers. Therefore, the researcher will reject the null hypotheses and accept the alternative hypotheses.

\* To test the hypotheses **“There are no significant differences in KAP regarding air pollution between UNRWA and Government primary school teachers in Rafah governorate”**, independent sample (T-test) was used to test the differences in means between UNRWA schoolteachers and GOV. Schoolteachers. The results are presented in table (5.7)

Table (5.7): Differences in KAP means between UN & GOV school teachers (n = 238)

Type of school	n	m	t	P value
UN	139	121.172	- 1.531	0.127
GOV	99	122.555		

From the above table, the results show that there is no significant difference at 0.01 significance level between UNRWA school teachers ( $m = 121.172$ ) and GOV. School teachers ( $m = 122.555$ ),  $t$  value was (- 1.531) and significance value was (0.127) which is not significant. This means that there is no relationship between KAP regarding air pollution and school type. Therefore, the researcher will accept the null hypothesis and reject the alternative hypotheses.

- To test the hypothesis **"There are no significant differences in KAP regarding air pollution related to qualification (diploma – bachelor – MA / PhD) among primary school teachers in Rafah governorate"**, One-Way ANOVA test was used to examine the differences in means between the three groups. The results are presented in table (5.8).

Table (5.8) Differences in KAP means related to qualification ( $n = 238$ )

	Sum of squares	df	Mean square	f	P value
<b>Between groups</b>	161.826	2	80.913	1.716	0.182
<b>Within groups</b>	11079.048	235	47.145		
<b>Total</b>	11240.879	237			

From the above table, the results show that there are no significant differences in means among the three groups (diploma - bachelor – MA / PhD). The mean square between groups was 80.913 and within groups 47.145, ( $f = 1.716$ ) and significance value was (0.182) which is not significant. This means that different levels of qualifications do not affect KAP

regarding air pollution. So, the null hypothesis is accepted and the alternative hypotheses are rejected.

- To support this result, multiple comparisons (*Scheffe test*) was performed to see the means for each certificate level, mean differences between different levels, and their significance. The results show that the mean differences between the three levels of qualification are not statistically significant, which supports the above result. The results are presented in table (5.9).

Table (5.9): Multiple Comparisons – Scheffe Test (n = 238)

(I) kind of certificate	(J) kind of certificate	mean	Mean Difference (I-J)	Sig.
Diploma	BCs	122.5833	1.6237	.201
	Master or PhD		-.4167	.990
BCs	Diploma	120.9597	-1.6237	.201
	Master or PhD		-2.0403	.777
Master or PhD	Diploma	123.0000	.4167	.990
	Bs		2.0403	.777

- To test the hypothesis **“There are no significant differences in KAP regarding air pollution related to years of experience among primary school teachers in Rafah governorate”**, One-Way ANOVA test was used to examine the differences in means between the three groups (5 years and less, 6 – 10 years, more than 10 years). The results are presented in table (5.10).

Table (5.10) Differences in KAP means related to years of experience (n = 238)

	Sum of squares	df	Mean square	f	P value
<b>Between groups</b>	23.841	3	7.947	0.166	0.199
<b>Within groups</b>	11217.033	234	47.936		
<b>Total</b>	11240.879	237			

From the above table the results show that there are no significant differences in mean square between the three groups (5 years and less, 6 – 10 years, more than 10 years). The mean square between groups was (7.947) and within groups was (47.936), (f = 0.166) and significance value was (0.199) which is not significant. This means those different years of experience does not affect KAP regarding air pollution. So, the null hypothesis is accepted and the alternative hypothesis is rejected.

- To support this result, multiple comparisons (*Scheffe test*) were performed to see the means for each group of experience, mean differences between each group, and their significance. The results show that the mean differences between the three groups of experience are not statistically significant, which supports the above result. The results are presented in table (5.11).

Table (5.11): Multiple Comparisons – Scheffe test

(I) experience	(J) experience	Mean	Mean Difference (I-J)	Sig.
less than 5 years	5-10 years	121.3485	-.4651	.987
	more than 10 years		-.5614	.965
5-10 years	less than 5 years	121.8136	.4651	.987
	more than 10 years		-9.6351E-02	1.000
more than 10 years	less than 5 years	121.9099	.5614	.965
	5-10 years		9.635E-02	1.000

# **Chapter Six**

## **Discussion**

## **Chapter six**

### ***Discussion***

#### **6.1 Introduction**

In this chapter, the results of the study will be discussed and compared with the results of other studies in the same field. The purpose of this study was to explore the level of knowledge, attitude and practice (KAP) of teachers in primary schools (government and UNRWA) regarding air pollution in Rafah governorate, and to investigate the relationship between the KAP and the four socio demographic factors namely gender, type of school, qualifications and years of experience among teachers. In this chapter the relation between studies will be discussed.

#### **6.2 Level of Knowledge Regarding Air Pollution**

Concerning the general knowledge regarding air pollution among the 238 teachers, 188 of them (79.6 %) were found to have a high level of knowledge regarding air pollution, while 50 of them (20.4%) have a low level of knowledge. These results indicate that the level of knowledge regarding air pollution among primary school teachers in Rafah governorate is generally high.

This finding agrees with the study of Sichuan union university (2002) which was conducted in china. The results revealed that environmental awareness of students appear to fall into the high level (91 %) of the students who know the concept of environment, while a local study in Gaza conducted by Sarsour (2005), revealed that awareness among school age children in Gaza city relatively agrees with this study. The results indicated that the student has a moderate level of environmental awareness with a mean score of 16.85 out of 30 points, and the percentage was 70.2 the level of environmental awareness.

Also, similar results were found in the survey conducted in Jakarta, Indonesia, (2002), to compare between two different social groups in regard to environmental problems. The

results showed that the perception, knowledge and attitude among educated subjects were much better than subjects in the community group.

However, our findings are in contrast to the study in Nigeria( EER, 2002) which was conducted on 360 Nigerian secondary school teachers , where the results revealed a lower level of environmental knowledge among teachers ( arts , science and social science ) .

In addition, the study results disagree with the results of a local study conducted by Affifi (2000) on 400 six- grade students in Rafah governorate. The result revealed a lower level of environmental enlightenment of students (65.3 %) than the accepted standard of the established Affifi study which is 80%. Also, another study results disagree with our results. That was the comparative study of environmental awareness among secondary school students in Iran and India which showed a low level of student's environmental awareness (44%) in India, and (14.9%) in Iran, (Tehran University , 2007). This variation can be attributed to the differences in cultures and environmental education materials applied in their schools curriculum in different communities. Also, teacher's qualification, awareness, education and dedication play a major role in the outcomes on students.

### **6.3 Level of Attitude Regarding Air Pollution**

Attitude scale composed of 22 statements was used to measure the level of attitude toward air pollution among primary school teachers in Rafah governorate. The mean percentage among 238 teachers of the study was 91.88%. These results show that the teachers have a high level of positive attitude toward air pollution. This attitude could be due to the positive influences of the formal and informal education (such as mass media, TV and others) that shaped their attitude towards many environmental issues.

This finding is consistent with Hong Kong (2002) study that aimed at exploring school integrated science teacher's perception of environmental education. The finding showed that

the teachers tend to teach more environmental education if they hold more favorable attitude toward environmental education, had more skills of teaching environmental education and believed more in the relevance of integrated science to environmental education.

Similar results were found in a survey of perception, knowledge, awareness and attitude regarding environmental problems among two different social groups in Jakarta, Indonesia. The results indicate that the educated subjects have much better attitude than that subject in the community group in regard to environmental problems.

On other hand, there are contradicting results to our finding reported in the study of Sichuan union university (2002), the attitude towards china's environmental futures is the most pessimistic one and some thing should be done to overcome this pessimistic mode.

Also, contradicting results were found in the study of Nigerian secondary school teachers which revealed that negative environmental attitude was prevalent among the three categories of teachers (arts, science, and social sciences).

Sarsur (2005) study, conducted on 400 students in Gaza city revealed that students had low positive attitude toward the environment with mean score of 19.30 (total= 30 scores). This result does not agree with the result of our study.

These variations in attitude towards environmental issues and problems are due to differences between developed and developing communities on how they look at environment and if they consider it as a priority or not. But the results in the local study (sarsour, 2005) might be because the students is not mature enough to form an attitude toward the environment.

#### **6.4 Level of practice regarding air pollution**

The results indicate that the level of practice among primary school teachers regarding air pollution was low. The mean percentage was 58.1 % of 10 points reflecting the level of practice.

This finding of low level of practice in spite of the high level of knowledge and attitude for the same subject may be due to the lack of supplies, low concern of the authority, poor implementation of systems and costly price regarding control of air pollution.

Very few studies evaluating the level of practice regarding environmental issues had been conducted. The results of the Hong Kong study (2002) on teacher's perceptions of environmental education indicated that the variations in the teaching of environmental education were reflected by teachers emphasis on teaching environmental education, their use of a variety of teaching methods and their regular practices of extracurricular activities on environmental education .Those results contradict those of the current study, which indicate low level of practice among the study population.

However, our findings are similar to the Nigerian study that was conducted on 360 secondary school teachers, where the study revealed that most of the teachers have never attended any workshop or seminar on teaching of the environmental education. This agrees with our finding of the response to the same question (about 24.2% of the subjects attended seminars on air pollution while 75.8% did not).

The difference in level of practice regarding environmental pollution in some countries is attributed to the different abilities and availability of supplies and due to variation in knowledge and attitudes toward environmental problems.

## **6.5 KAP and Gender Regarding Air Pollution**

The results showed that there is a statistically significant difference ( $p$ - value= 0.01) between the means for male teachers ( $m= 119.80$ ) and that for female teachers ( $m=123.42$ ), and the ( $t$ ) value was  $-4.183$  which is significant. So, this result supports the alternative hypothesis and the differences are in favor of female teachers .

So, whether there are other sources of environmental education such as TV and Radio, the results show that females have more opportunity to develop their knowledge by learning more using the sources of environmental education.

In addition, females take care of family and the household issues including the source of indoor air pollution, this leads them to demonstrate a greater knowledge of the facts about the environment and the sources of contamination more than males.

In comparing our results with other previous studies we found differences between knowledge, attitude and practice regarding air pollution or environmental problems in the same study based on gender.

Similar results which emphasized that female have more knowledge, attitude and practice compared to male, were demonstrated in the study of Schuan University (2002) that showed 49% of male and 63% of female want to participate in environmental activities ( $p$ - value was $<0.01$ ). Another study of NEETF (1998) revealed that 74% of women favor the environment compared to 68% of men.

The findings of this study disagree with the result of Schuan University (2002), where the male respondents were more aware of knowledge and environmental law than female respondents, who in turn are more willing to participate in environmental activities. Also, in the study of sarsour (2005), there were significant differences in the level of environmental

awareness and attitude based on gender in favor of male, as well as in the study of NEETF (1998), where about 69% of higher knowledge group were men and 31% were women.

This finding also contradicts the results of the comparative study of environmental awareness among 991 students of secondary school in Iran and India, which indicated that there are no significant differences between boys and girls and their level of environmental awareness.

This variation in many studies between KAP and gender may be influenced by culture differences and those people of different cultural beliefs have differences in the perception toward environmental issues and its problems.

### **6.6 KAP Regarding Air Pollution and Type of School**

The results indicate that there is no significant difference at 0.01 between UNRWA school teachers ( $m=121.172$ ) and Government school teachers ( $m=122.555$ ), the significance value was (0.127) which is not significant. This means that there is no relationship between KAP regarding air pollution and school type.

Although this finding may be due to unification of the Palestinian curriculum since 1999 (according to data from ministry of education) between UNRWA and government schools, the sources of knowledge formal or informal which are the same for Palestinian in Gaza strip, also play a major role.

The previous studies mentioned in the literature review did not support or agree with this finding. This may be due to the specialty of the area (Gaza strip) where there is no variation in the culture. i.e it has the same culture.

Our findings are in contrast to the results of affifi (2000), which was conducted on 400 children in Rafah where there were statically significant differences between UNRWA and government schools in favor of UNRWA schools. That result may be explained by the variation between sample populations.

This difference was reported in the studies of Sichuan University (2002), and the comparative study JOFR, (2006) which indicated that the type of school management has an impact on the environmental awareness of students in both countries; Iranian government school students have a scientifically higher KAP regarding air pollution than their counterparts in India.

### **6.7 KAP Regarding Air Pollution Related to Qualification**

The results show that there are no significant differences in means among the three groups (diploma – bachelor – MA/ PhD). The mean square between groups was (80.913) and within groups (47.145) and significance p-value was (0.182). This means that different levels of qualifications do not affect KAP regarding air pollution, because most of primary school teachers had attended the same courses of science and environmental education and all of the teachers are from one community and face the same conditions.

Similar results were not obtained in the previous studies which could be attributed to the different cultures and methods of teaching environmental subjects.

However, in the study of Sarsur (2005), conducted on 400 students, the result indicated that there was a direct proportional relation between the level of environmental awareness and the attitude with student's grade.

Also, the finding of Nigerian study on the secondary school teachers (n-360), the science and social science teachers were found to be more knowledgeable than their art counterparts.

## **6.8 KAP Regarding Air Pollution Related to Years of Experience**

The results indicate that there are no significant differences. The mean square between groups was (7.947) and within groups was (47.936) and significance value was (0.199) which is not significant. This means those different years of experience does not affect KAP regarding air pollution among primary school teachers in Rafah governorate.

The results showed no variations among school teachers. This may be explained by the fact that the distribution of sample regarding experience (table 5.10 ), showed that 50% of them fall into group of more than 10 years and 50% fall into the other two groups .This means that no high variations exists among the teachers due to years of experience.

Some of the studies do not support this finding, such as the Hong Kong (2002) study of teacher's perceptions of teaching environmental issues. The results indicate that there is an association between their beliefs, attitude and skills of teaching environmental education.

Also, in the NEETF/Roper survey (1998), it was reported that the majority of the American adults lose their feeling toward environment because it was strongly after seven years of survey. This variation may be explained as being due to different culture backgrounds and the environmental education approaches followed in different communities.

# **Chapter Seven**

## **Conclusion and Recommendations**

## **Chapter seven**

### **Conclusion and recommendations**

#### **7.1 Introduction**

In this chapter, the major findings of the present study will be reviewed and answers to the research questions will be given, in addition, recommendations and suggestions for further investigation will be provided.

The study findings may help in increasing and developing KAP among primary school teachers in Rafah area regarding air pollution and conducting suitable environmental education programs to achieve this goal.

#### **7.2 Conclusion**

##### **7.2.1 Knowledge Regarding Air Pollution:**

In general primary school teachers in rafah governorate have high level of knowledge of environmental issues. Regarding air pollution, 79.6% were found to have a high level of knowledge while 20.4% have a low level. This finding reveled that the study population knowledge is strong concerning air pollution.

##### **7.2.2 Attitude Regarding Air Pollution:**

The primary school teachers in rafah governorate have generally high level of positive attitude toward air pollution.

The mean of percentage among the 238 teachers of the study that has positive attitude was 91.88%. However there are many previous studies that reported low attitude toward environmental issues, including that of air pollution.

### **7.2.3 Practice regarding air pollution:**

The results indicate that the level of practice among primary school teachers in Rafah regarding air pollution was low, 58.1 % of them have low level of practice. So it is very important for the government, through an educational program, to invest more to promote environmental education specially that related to practice toward air pollution.

### **7.2.4 Relationship between KAP regarding air Pollution and Other Variables (gender, type of school, qualifications and years of experience).**

There were significant differences in the level of KAP based on gender in favor of female teachers and this result was consistent with many studies across different cultures. In addition, no significant differences are found in the KAP regarding air pollution based on type of school, qualifications and years of experience.

### **7.3 Recommendations**

- 1- Re-evaluation of the academic programs and curriculum in the current educational colleges including school curricula and concepts applied for the air pollution associated with the development of modern science.
- 2-Concentration on teaching methods that encourage the teachers to use the surrounding environment and to visit factories and know how to reduce pollution and mitigate environmental problems.
- 3- Organization of regular training programs and seminars to discuss the problems of the environment and pollution which occur in the community, by the relevant governmental and non governmental institutions and the civil society organization.

4-Holding training courses, symposia and lectures on pollution and environmental problems that affect the lives of people in various colleges and universities in linking it to the surrounding environment.

5-Encourage the university students to do researches and studies dealing with environmental issues arising in the community by recent developments and technology in the world communities.

6- Establishing community awareness program to advocate for positive environmental behaviors among the public to insure improving our community and protecting our environment from further deterioration.

#### **7.4 Further research recommendation**

According to the study results and limitations, the researcher recommends the following suggestion for further researches:

1- Further research is necessary to measure the level of KAP among teachers from different stages in Rafah governorate to be more generalized and more representatives.

2- Further study should also be undertaken to analyze the impact of teacher's level of KAP on their environmental behavior.

3- Study the affect of environmental concepts program among university students.

4- Study the relationship between the environmental pollution and student's achievement among secondary school students.

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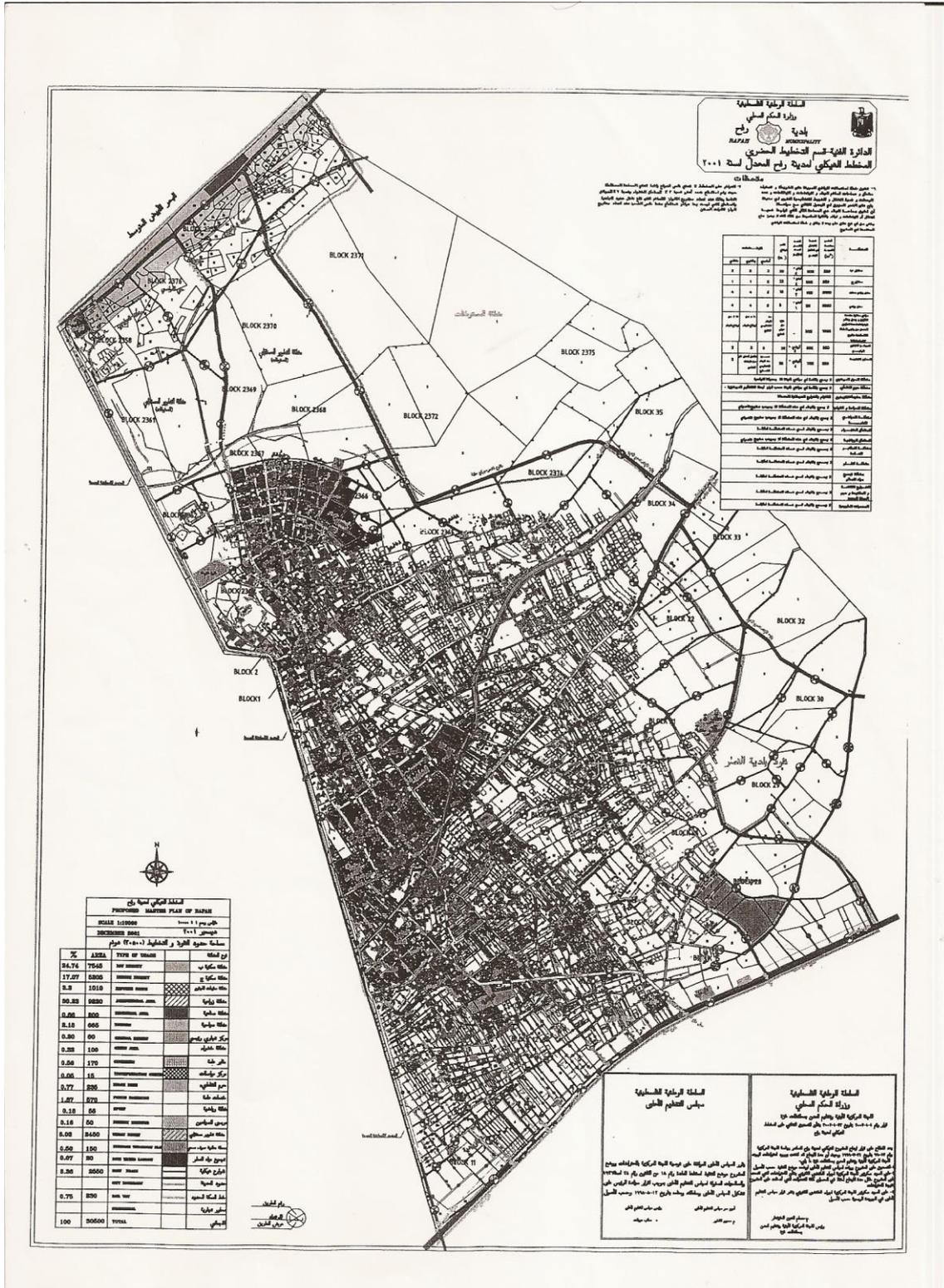
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# Map of Rafah



Annex1



Date: 18 / 12 /2006

التاريخ: 2006/ 12/ 18

Mr./ Kamal El-Dahudi

السيد: كمال الداودي

I would like to inform you that the committee  
has discussed your application about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم  
حول:-

**Knowledge, attitude, and practice among  
primary school teachers of UNRWA and  
Governmental schools regarding air pollution  
in Rafah governorate 2006.**

In its meeting on December 2006  
and decided the Following:-  
To approve the above mention research study.

و ذلك في جلستها المنعقدة لشهر ديسمبر 2006  
و قد قررت ما يلي:-  
الموافقة على البحث المذكور عاليه.

Signature

توقيع

Member

عضو

Member

عضو

Chairperson



Conditions:-

- ❖ Valid for 2 years from the date of approval to start.
- ❖ It is necessary to notify the committee in any change in the admitted study protocol.
- ❖ The committee appreciate receiving one copy of your final research when it is completed.



الرقم : م.ت.ر 27 / أ .

التاريخ : 2007/02/18

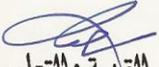
السادة / سرورو المدراس ومديراتها المعنية  
الاهتمام،،  
تحية طيبة وبعد،،،

الموضوع : تسهيل مهمة باحث

يرجى تسهيل مهمة الباحث / كمال الداودي ، بتعبئة الاستبانة من قبل معلمي المرحلة الأساسية الدنيا في  
مدرستكم ، وذلك حسب الأصول ، مع العلم بأن البيانات تستخدم في أغراض البحث العلمي فقط .  
المدارس المعنية :

العقاد الدنيا بنات	رفح الدنيا بنين	طه حسين العليا بنين
المسمية العليا بنات	بيننا الدنيا بنين	بيننا العليا بنين
المواصي المشتركة	عقبة الدنيا بنين	عقبة العليا بنين
	أمنة الدنيا بنين	غسان العليا بنات
	دير ياسين الدنيا بنات	جنين العليا بنات

واقبلوا التحية ،،،

  
مدير التربية والتعليم  
سعيد إبراهيم حرب



وزارة الصحة

كلية الصحة العامة

جامعة القدس

School of Public Health

القدس - فلسطين



2007/1/23

السادة / مديري مدارس رفح ومديري  
الامانة للتعاون مع الباحث على  
الايكوداد لله مع صناد البحث  
للطلاب  
19.2.07

الأخت/ محاسن محيسن  
مديرة برنامج التربية و التعليم بوكالة الغوث  
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب كمال الداودي

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

"Knowledge, attitude and practice among primary school teachers of UNRWA and governmental regarding air pollution Rafah Governorate,2006"

كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار صحة البيئة علماً بأن الطالب قد حصل على موافقة لجنة هلسنكي لأخلاقيات البحوث و ستكون المعلومات متوفرة لدى الباحث فقط. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات الخاصة.

موافقتكم دعماً للمسيرة الأكاديمية

و تفضلوا بقبول فائق الاحترام ،،،

S. Shara

د. سوزان شعشاعه

عميد كلية الصحة العامة المساعد

كلية الصحة العامة / غزة  
رقم الصادر: 6  
تاريخ الصادر: 2007/1/23

نسخة: الملف

موافقة على اجراء استبيان حول دراسة المعرفة والتوجهات والمواقف لدى مدرسي المدارس الابتدائية وكالة  
وحكومة المتعلقة بتلوث الهواء في محافظة رفح .

انا الطالب / كمال مطلق الداودي ادرس في برنامج ماجستير الصحة العامة - مسار البيئة التابع لجامعة القدس- ابو ديس وفي اطار البرنامج المذكور يجب تنفيذ بحث لتقديره كاطروحة التخرج ولهذا الغرض فقد وافقت الجامعة على دراسة المعرفة والتوجهات والمواقف لدى مدرسي المدارس الابتدائية وكالة وحكومة المتعلقة بتلوث الهواء في محافظة رفح . ومن المتوقع ان تساعد المعلومات المزمع جمعها في هذه الدراسة مقدمى الخدمات في دوائر عديدة لتخطيط الخدمات ذات العلاقة بشكل اكثر جدوى ومنفعة للمجتمع الفلسطيني بصفة عامة والعاملين في مجال التعليم والطلبة بصفة خاصة . يتطلب تعبئة الاستبيان بين ٢٠- ٣٠ دقيقة لاتمامه ، علما بأن كافة المعلومات التي سيتم جمعها ستستعمل لاغراض البحث العلمي فقط وستبقى سرية ولن يسجل اسم اي مشترك في الاستبيان ويستخدم رقم مسلسل لكل استبيان . الاشتراك في هذا الاستبيان طوعي وللمجيب - المجيبة الخيار في عدم اجابة اي سوال او اسئلة ، على اي حال بما ان رايتك مهم فنحن نأمل ان تشارك - تشاركي في هذه الدراسة ، مقدرا جدا اشتراككم في الدراسة . الدراسة ممولة من الباحث فقط وقد حصل الباحث على الموافقة من جميع الجهات المعنية وانا على الاستعداد للاجابة على اي سؤال حول هذا الاستبيان

شاكـرين لـكـم حسن تعاونكم معنا...

توقيع المدرس .....

التاريخ : .....

استبيان حول التعرف علي مدي المعرفة،التوجهات والممارسات لدي مدرسى المدارس الابتدائية المتعلقة بتلوث الهواء في محافظة رفح.

اولا: معلومات شخصية

١ - الرقم المسلسل:

٢ - المدرسة :

وكالة

حكومة

٣ - العمر : ----- سنة

٤ - الجنس  ذكر  أنثى

5- الحالة الاجتماعية: متزوج أعزب مطلق أرمل

6 - مكان السكن:

مدينة

قرية

معسكر

7- المؤهل العلمي :

دبلوم

بكالوريوس

ماجستير أو دكتوراه

8- عدد سنوات الدراسة الخبرة في مجال التعليم

5 فأقل

6 – 10

أكثر من 10

9- هل تعمل في مجال تخصصك

نعم لا

10- إذا كانت الإجابة نعم اذكر التخصص .

11- دخل العائلة الشهري

2000 – 1000

3000 – 2000

4000 – 3000

أكثر من 4000 ش

12 – نوع المنزل :

باطون مسلح

اسبست

أخري : حدد:-----

13- عدد الغرف في المنازل :

غرفة واحدة

غرفتين

3 غرف

أكثر من 3

14- عدد الأفراد الذين يعيشون في المنزل :-

أقل من 5

10

أكثر من 10

15- العمر الزمني للمبني المنزل :

أقل من 5 سنوات

10

15 - 10

20 - 15

أكثر من 20

## ملاحظة : السؤال ذو الاجابة المتعددة قد يحتمل اكثر من اجابة :

### المعرفة:

1- هل سمعت عن مصطلح تلوث الهواء ؟

نعم                      لا                      إذا كانت الإجابة نعم

2- من أين حصلت علي هذه المعلومات حول تلوث الهواء ؟

- المدرسين في المدارس
- المحاضرات
- الأصدقاء
- الراديو والتلفزيون
- المطبوعات والمنشورات.

3-من فضلك اختر التعريف الصحيح لتلوث الهواء؟

- تواجد المواد الكيماوية في الهواء الجوي
- تواجد المواد الكيماوية في الهواء الجوي بكميات ولفترات طويلة .
- تفاعل المواد الكيماوية الموجودة في الهواء مع بعضها البعض
- زيادة في كمية المواد الكيماوية في الهواء الجوي يؤدي الحاق الاذي بالانسان والبيئة

4- من وجه نظرك ما هي مصادر / أسباب تلوث الهواء برأيك ؟

- أبخرة المصانع
- عوادم السيارات
- حرق الإطارات
- البرك والمستنقعات
- غبار المحاجر
- الإشعاع

5- ما هي المشاكل البيئية المترتبة علي تلوث الهواء برأيك ؟

تدني جودة الهواء

الأمطار الحامضية

الانحباس الحراري

تآكل طبقة الأوزون

6- ما هو اثر ملوثات الهواء علي صحة الإنسان برأيك ؟

أمراض متعلقة بالجهاز التنفسي

السرطان

التسمم

نقص المناعة وزيادة التعرض للازمات

ولادة مبكرة

7- ما هي ملوثات الهواء الأساسية برأيك ؟

أول أكسيد الكربون

المواد العضوية الطيارة

اكاسيد النيتروجين

ثاني أكسيد الكبريت

8- ما هو تعريفك لظاهرة الانحباس الحراري ؟

تغير في الطقس

ارتفاع في درجة حرارة الأرض

زيادة تركيز مجموعة من الغازات في الغلاف الجوي



15- هل تعتقد بوجود علاقة بين التدخين السلبي والتهابات الجهاز التنفسي؟

نعم لا لا اعرف

16- هل تعلم بوجود أي قوانين بحماية البيئة؟

نعم لا لا اعرف

17 – هل تعلم أي شي عن التعليم البيئي؟

نعم لا لا اعرف

18 – هل التعليم البيئي جزء من المنهاج الدراسي في المدارس الابتدائية؟

نعم لا

برجاء اختر درجة الموافقة علي الفقرات التالية حسب رأيك :

الاتجاهات

درجة الموافقة					الفقرة
أعراض بشدة 1	أعراض 2	بدون رأي 3	أوافق 4	أوافق بشدة 5	
					1- توجد مشكلة تلوث هواء في المنطقة
					2- اعتقد بوجود مشكلة تلوث هواء في المنطقة مستقبلا
					3- اعتقد إن تلوث الهواء داخل المنزل يسبب المرض
					4- اعتقد أن تلوث الهواء الخارجي يسبب المرض
					5- عوادم السيارات تؤثر على صحة المجتمع
					6- محطات تقوية الارسال للهواتف النقالة تؤدي بالضرر على صحة الإنسان
					7- الزيادة الكبيرة في عدد الطلبة داخل الصف يؤثر علي جودة الهواء
					8- حرق إطارات السيارات بجانب المدرسة و الشوارع العامة يؤثر على صحة الإنسان
					9- حرق حاوية النفايات بجانب المدرسة والشوارع يؤثر علي صحة الإنسان
					10- انبعاثات المصانع تؤثر علي جودة الهواء
					11- وجود برك المجاري ومحطات معالجة المجاري يؤثر علي جودة الهواء
					12- اعتقد أن تلوث الهواء بالإمكان الحد منه
					13- اعتقد أن وسائل الإعلام تتحدث عن موضوع تلوث الهواء
					14- اعتقد انه يجب زيادة توعية طلبة المدارس حول موضوع تلوث الهواء
					15- اعتقد أن المعلومات المتعلقة بتلوث الهواء يجب توافرها في المراحل المدرسية
					16- اعتقد انه من الضروري معاقبة الذين يسببون تلوث الهواء حسب القانون
					17- من الضروري وجود أدوات خاصة للتعامل مع تلوث الهواء
					18- من الضروري التعاون مع اللجان المختصة في مجال تلوث الهواء
					19- اعتقد انه يجب أن يكون هناك أماكن خاصة للتدخين في الأماكن العامة
					20- من الواجب عمل قوانين وتشريعات للحد من تلوث الهواء
					21 - اعتقد بوجود علاقة بين تلوث الهواء والمسافة بين المدرسة والطريق العام
					22 - اعتقد بوجود علاقة بين حدوث تلوث الهواء ونوع الطباشير المستخدم في الكتابة

## الممارسات:

1 - هل تقوم المؤسسة التعليمية بإجراءات لتحسين جودة الهواء في حالة حدوث تلوث للهواء بجانب المدرسة ؟  
نعم لا لا اعرف

2- إذا كانت الإجابة نعم ما هي الإجراءات التي تتخذها في حالة وجود مصدر تلوث هواء في البيئة المحيطة؟

- إبلاغ المسؤولين
- الذهاب إلى مصدر التلوث ومعالجته
- الذهاب إلى الاهالي لمعالجة المشكلة

3- إذا كانت الإجابة لا ، لماذا ؟

- عدم وجود نظام بذلك
- التكلفة
- عدم تعاون المسؤولين

4- هل تشارك بالتخلص من النفايات في المدرسة ؟  
نعم لا

5- إذا كانت نعم ما هي الوسيلة؟

- وضعها في أكياس خاصة
- وضعها في حاويات البلدية
- حرقها في أماكن مخصصة

6- في حالة وجود حرق حاوية النفايات أو إطارات السيارات في البيئة المحيطة أقوم ب ؟

- إطفاءها بالماء
- إبلاغ الدفاع المدني
- بشرح الأضرار للطلاب

7- ما هو أفضل إجراء في حالة حدوث تلوث هواء طارئ؟

- إبلاغ المسؤولين
- إبعاد الطلبة عن مصدر تلوث الهواء بعكس اتجاه الرياح
- معرفة مصدر التلوث
- توعية الطلبة بمخاطر هذا التلوث وطرق معالجته .

8- هل شاركت مع مرشدين ومتقنين صحيين في ندوات حول تلوث الهواء؟

نعم لا

9- إذا كانت لا فلماذا برأيك؟

- لم تكن نشاطات حول هذا الموضوع
- عدم الاهتمام بهذا الموضوع
- لم تكن هناك دعوة للمشاركة

10- هل تدربت عمليا كي تتعرف على تلوث الهواء وأضراره؟

نعم لا

11- هل تناقش موضوع تلوث الهواء مع الطلبة؟

نعم لا

12- هل كتبت عن موضوع تلوث الهواء في المدرسة؟

نعم لا

13- هل ناقشت موضوع التدخين مع الطلبة؟

نعم لا

14- هل تستخدم أيا من الوسائل الإعلامية للتوعية في مجال تلوث الهواء في المدرسة؟

نعم لا

15- إذا كانت نعم فماذا يوجد؟

بوستر

نشرة

مسرحية

إذاعة صباحية

16- هل نوع الوقود المستخدم في طهي الطعام في مطبخك يصدر عنه دخان؟

نعم لا

17- هل يوجد شفاط هواء في المطبخ؟

نعم لا

18- هل تستخدم معطر الهواء؟

نعم لا

19- هل تستخدم طاردا البعوض الكهربائي؟

نعم لا

20- هل تستخدم الدخان لطرد البعوض؟

نعم لا