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Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates: Case Control Study

Seham Ahmed Abu Haddaf

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Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates: Case Control Study

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Dedication

I dedicate this study

To my parents souls;

You are the reason of what I am now

To my brother Usama;

To my sisters;

For their patience, moral, and unending scarifies they made through my graduate work, who give me the inspiration and motivation. Without their support, this work could not been done.

Seham Ahmed Abu Haddaf

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

……

Seham Ahmed Abu Haddaf

Date:

……

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Abstract

Universally, hypertension is one of the most prevalent and powerful contributors to the development of serious and potentially fatal complications, thus causing considerable human suffering and enormous health care costs. The purpose of this study is to help filling a critical gap in the research literature by establishing baseline information for hypertension risk factors among UNRWA adults refugee population in Gaza Strip in order to provide recommendations for future interventions.

The study design is a case control study conducted at the main UNRWA health care NCDs services in five localities in Gaza Governorates (three large clinics and two small ones). The study sample included 120 cases with different age groups 30 years or more, who were newly diagnosed as having hypertension in the year 2009-2011, and matched with age, sex, and locality to 120 controls who were chosen among attendance of the same medical centers from NCDs screening clinics and from governmental PHC clinics. The proportional systematic random sample participated with a response rate of 97.5% for both cases and controls. Data was collected by a self-constructed face-to-face interviewed questionnaire. Anthropometric measurements, physical examination, and lab tests were abstracted from patient's file. The researcher collected the data by herself and one assistant who trained well to interview the participants. General measure of reliability and validity such as standardization of methods and procedures were administered. The data was analyzed by using SPSS program version 13.0. Odds ratio, P. value, chi square, and independent sample t-test were statistical tools of measurement of association.

The study revealed that, the most common modifiable risk factors of hypertension were physical inactivity (72.5% among cases vs. 14.2% among controls), obesity (67.5% vs. 29.2%), diabetes mellitus (19.2% vs. 7.5%), diabetes hypertension (19.2% vs. 0%), high-low density lipoprotein (10.4% vs. 6.5%), hypercholesterolemia (8.3% vs. 6.5%), low- high density lipoprotein (38.3% vs. 0.9%), high triglyceride level (16.8% vs. 1.9%), and smoking (8.3% vs. 16.7%). All these factors were associated with hypertension. Whereas, the most common non-modifiable risk factors were age, sex and family history. The study illustrated a strong positive relationship between the presence of family history and the development of the disease. Additionally, the presence of chronic diseases and taking relevant medications were positively associated with hypertension. On the contrary, there is an inverse relationship between hypertension and the level of education. Furthermore, a strong negative association between hypertension and work status was illustrated.

On other hand, regarding food intake, the study revealed that, there was a good awareness of hypertensive patients towards healthy intake of fruits, desserts, tea and coffee, and white meat, whereas, those patients followed unhealthy intake (wrong nutritional conception) of milk/products, grains, vegetables, eggs, fish, lean red meat trimmed from visible fat, legumes, soft drinks, fried and salty food. The study showed most if not all of the identified hypertension risk factors could be preventable. These results may highlight the problem as a public in nature that need community-based intervention programs integrated with health promotion programs.

The researcher recommends; further in-depth larger sample community based studies, and increase awareness about HBP among the clients with the identified risk factors. Public should be encouraged to consume a healthy diet in order to decrease morbidity and mortality from these diseases.

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List of Abbreviations

AHA	American Heart Association
AMI	Acute Myocardial Infarction
ANOVA	Analysis of Variance
ARBs	Angiotensin Receptor Blocker Agents
ASA	American Stroke Association
BMI	Body Mass Index
BP	Blood Pressure
CAD	Coronary Artery Disease
CDC	Centers of Disease Control and Prevention
CHD	Coronary Heart Disease
CHF	Congestive Heart Failure
CI	Confidence Interval
CVD	Cardiovascular disease
DALY	Disability Adjusted Life Years
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
DH	Diabetes Hypertension
DM	Diabetes Mellitus
EMR	Eastern Mediterranean Region
Epi-info	Epidemiological Information Programmed
ETS	Environmental Tobacco Smoke
FPG	Fasting Plasma Glucose
GEM	Gale Encyclopedia of Medicine
GS	Gaza Strip
HBP	High Blood Pressure
HDL-c	High Density Lipoprotein Cholesterol
HF	Heart Failure
IFG	Impaired Fasting Glucose
IHD	Ischemic Heart Disease
JNC	Joint National Committee
Kg	Kilogram
KSA	Kingdom of Saudi Arabia
LDL-c	Low Density Lipoprotein Cholesterol
LV	Left ventricular
MI	Myocardial Infarction
MOH	Ministry of Health
NCD	Non Communicable Disease
NEAP	Net Endogenous Acid Production
NGOs	Non Governmental Organizations
NHLBIDCI	National Heart Lung and Blood Institute Diseases and Conditions Index
NSRC	Natural Standard Research Collaboration
OGTT	Oral Glucose Tolerance Test
	Oral Hypoglycemic Agents
OR	Odds Ratio
PAHO	Pan American Health Organization
PCBS	Palestinian Center Bureau of Statistics

PHCs	Primary Health Care Centers
PPPG	Postprandial Plasma Glucose
QOL	Quality of Life
RR	Relative Risk
SBP	Systolic Blood Pressure
SHS	Secondhand Smoke
SPSS	Statistical Package for Social Science
TC	Total Cholesterol
TG	Triglycerides
TNHBPEPCC	The National High Blood Pressure Education Program Coordination Committee
TSR JNC PDET HBP	The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
UNEP	United Nations Environment Programs
UNRWA	United Nation Relief and Work Agency
UPMRC	The Union of Palestinian Medical Relief Committee
US	United States
USDA	U.S. Department of Agriculture
U.S. DHHS	U.S. Department of Health and Human Services
VLDL	Very Low Density Lipoprotein
WB	West Bank
WHO	World Health Organization

Chapter I

1.1 Introduction

The rapid rise of Non-Communicable Diseases (NCDs) represents one of the major health challenges to global development in this century (World Health Organization-WHO, 2005). This growing challenge threatens economic and social development as well as the lives and health of millions of people (WHO, 2005). Currently NCDs are estimated to have contributed for approximately 59% of global deaths and 43% of global disease burden (WHO, 2005). This is projected to increase to 73% of deaths and 60% of disease burden by 2020 (WHO, 2005). Four of the most prominent NCDs – cardiovascular disease (CVDs), cancer, chronic obstructive pulmonary disease and diabetes; are linked by common preventable risk factors related to lifestyle (WHO, 2011[a]). These factors are tobacco use, unhealthy diet, physical inactivity and obesity (WHO, 2011[b]). Actions to prevent these diseases should therefore focus on controlling the risk factors in an integrated manner. Intervention at the level of the family and community is essential for prevention because the causal risk factors are deeply entrenched in the social and cultural framework of the society.

CVD is the most important single cause of NCDs; it includes coronary heart disease (CHD) (heart attacks), cerebrovascular disease (stroke), raised blood pressure (HBP), peripheral artery disease, rheumatic heart disease, congenital heart disease, and heart failure (HF) (WHO, 2011[a]). Worldwide burden of CVDs is substantial; it causes 17.5 million deaths every year and one in three deaths in the world caused by CVDs (WHO, 2011[b]). Additionally, the Eastern Mediterranean Region (EMR) is facing a growing epidemic of CVDs provoked by ageing population and socioeconomic changes.

Hypertension is a major risk factor for CVDs and a major contributor to premature deaths. Globally, 51% of stroke and 45% of ischemic heart disease (IHD) deaths are attributable to high systolic blood pressure (SBP) (WHO, 2004[a]). At any given age, the risk of dying from HBP in low and middle-income countries is more than double in high-income country (WHO, 2004[a]). In high-income countries, only 7% of deaths caused by HBP, which occurs under the age of 60, in the African Region this increased to 25% (WHO, 2004[a]). Additionally, WHO has estimated that, HBP causes one in every eight deaths, making hypertension the third leading killer in the world (Khatib and El-Guindy, 2005).

Globally, there are one billion hypertensive cases and four million people die annually as a direct result of hypertension (Khatib and El-Guindy, 2005). It is estimated that by 2010, 1.2 billion people had suffered hypertension worldwide (Hassanein, 2006). While, in 2003, worldwide hypertension is estimated to cause 7.1 million premature deaths and 4.5% of the disease burden (64 million disability adjusted life years - DALY). The proportion of global disease burden attributable to hypertension is substantial (Williams and Wilkins, 2003). Furthermore, in the EMR, the prevalence of hypertension disease averages 29% and it affects approximately 125 million individuals, while the incidence of hypertension in this region is 26% (WHO, 2011[c]). Of greater concern is that, cardiovascular complications of HBP are on the increase, including the incidence of stroke, end-stage renal disease and HF (WHO, 2011[c]).

Hypertension disease is a silent killer, as many as 20% of people with hypertension are not aware that they have the condition (Han, 2011). It is considered as the leading cause of death in Palestine exactly as it is in the whole world. This involves male and female with a proportion of 2.7% and 3.8% respectively (Ministry of Health-MOH, 2005). This really requires a competent plan to address this important and serious issue (MOH, 2005). Furthermore, risk factors of hypertension are elements associated with an increased the likelihood of this disease that will develop in later time. These factors can be categorized as modifiable (controllable) or non-modifiable (non-controllable). Controllable risk factors for hypertension include diet especially too much salt, alcohol, lack of exercise, cigarette smoking and obesity; all raise BP and their effects accumulate with age (WHO, 2004[a]). Non-controllable risk factors include gender, age, and family history of hypertension. The more risk factors a person has, the greater the vulnerability of having hypertension. Moreover, risk factors modification remains the key in preventing illness and decreasing the incidence of deaths associated with hypertension. Primary prevention of hypertension involves intervention before the onset of the disease. Therefore understanding the causative factors and prevention are essential to improving public health in all countries.

1.2 Research Problem

Hypertension is a major cause of illness, disability and death in Palestine, which cause an increase in personal, community and health care costs. It is the eighth leading cause of death in total population (4.8%), while it is the ninth leading cause of death in males and females, 2.7% and 3.8% respectively (MOH, 2005). It is the fifth leading cause of CVDs

associated deaths, 12.9% of the total cardiovascular mortality, with a rate of 13.0 per 100,000 (MOH, 2005).

There is little published information on the hypertension disease risk factors among the Palestinian population. Hence, this study was conducted to address this information gap; to identify in specific the most common hypertension risk factors among UNRWA primary health care (PHC) adult registered patients suffering from essential hypertension in Gaza Strip (GS) and may highlight the problem as a cornerstone in the prevention and treatment of HBP.

1.3 Justification of the study

Globally, NCDs are increasingly recognized as a major cause of morbidity and mortality. The World Health Report 2005 had indicated that, NCDs account for almost 59% of deaths and 43% of the global burden of disease. These diseases place a heavy burden on people's health, health care systems as well as threatening economical and social development; this issue has initiated a policy of health education and health promotion programs globally to address the common risk factors related to heart diseases or mainly to hypertension.

Nevertheless, hypertension is a general health problem affecting rich and poor people under different types of conditions. It is an important public-health challenge worldwide. Globally, 26·4% of the adult population in 2000 had hypertension (26·6% of men and 26·1% of women), and 29·2% were projected to have this condition by 2025 (29·0% of men and 29·5% of women) (Kearney et al., 2005). The estimated total number of adults with hypertension in 2000 was 972 million, 333 million in economically developed countries and 639 million in economically developing countries (Kearney et al., 2005). It is estimated that in coming years the burden of mortality due to hypertension will continue to increase worldwide.

According to literature, dramatic socioeconomic changes in the second half of the 20th century which has resulted from a great tide of urbanization, rising in living standards and changes in lifestyle and the profile of risk factors that many communities are experiencing. This is reflected by a rise in the average age for both men and women and led to change the pattern of related diseases load, as people are suffering from emerging epidemics of NCDs, mainly hypertension, CVD, DM, and cancer (Pontaza et al., 2007).

Hypertension diseases affect an average of about one quarter of the population in the EMR (12% -35%), while pre-hypertension (BP 120-139/ 80-89 mmHg) doubles the risk for developing hypertension and should be treated essentially with lifestyle modifications (Khatib and El-Guindy, 2005). Primary prevention of hypertension provides an opportunity to interrupt and prevent the continuing costly cycle of managing hypertension and its complications. In the USA, the total cost of hypertension was estimated at $37 billion in 1999 with $26 billion in direct medical costs and $11 billion in lost earnings (American Heart Association-AHA, 2000). Lowering BP reduces stroke by 35%-40%, myocardial infarction (MI) by 20%-25% and HF by more than 50% (WHO, 2004[b]). Hypertension disease is influenced by many risk factors, which are connected to the lifestyle. Global modifiable risk factors of hypertension are either preventable or controllable either by health education or health promotion programs. Identifying risk factors for hypertension leads to specific preventive interventions that may favorably affect public health of 65 million individuals in the US (Zhang et al., 2009)**.**

In Palestine, hypertension related disease becomes one of the major health problems. It is the eighth leading cause of death among Palestinians in 2005 (MOH, 2005). Adult and geriatrics are most vulnerable to risks of hypertension and need more care to prevent the development of hypertension. Socioeconomic changes in our regions particularly in GS lead to major changes in life style towards sedentary lifestyle and increase the incidence and morbidity of HBP. In GS, there is little published information on the hypertension disease risk factors among the Palestinian population. Therefore, this study may highlight the problem as a public in nature that need community-based intervention programs integrated with health education programs.

1.4 Aim of the study

The aim of this study is to identify the most common hypertension risk factors among UNRWA PHC adult registered patients suffering from essential hypertension in GS and to provide recommendations help in developing preventive health education and health promotion programs.

1.5 Objectives

1. To identify hypertensive risk factors among UNRWA PHC patients in Gaza Governorates.

2. To determine the avoidable factors related to hypertension.
3. To recognize different food habits and their relation to hypertensive patients
4. To determine the relationship between blood profiles such as plasma glucose, triglyceride (TG), total cholesterol (TC), low-density lipoprotein (LDL-c), high-density lipoprotein (HDL-c) and hypertension in the study population.
5. To provide recommendations and suggestions to prevent and control hypertension

1.6 Research Questions

1. What are the main risk factors of hypertension among UNRWA PHC patients in Gaza Governorates?
2. Is there an association between cigarette smoking and the occurrence of hypertension?
3. What is the relationship between blood profiles such as plasma glucose, TG, TC, LDL-c, HDL-c and hypertension in the study population?
4. Does familial predisposition to hypertension increase the susceptibility to the development of disease?
5. Is there a relationship between hypertension and level of education among UNRWA PHC patients in Gaza Governorates?
6. Is there a relationship between hypertension and physical inactivity among UNRWA PHC patients in Gaza Governorates?
7. Is there a relationship between hypertension and eating habits among UNRWA PHC patients in Gaza Governorates?
8. Is there a relationship between hypertension and socio-economic status among UNRWA PHC patients in Gaza Governorates?
9. What is the joint effect of body mass index (BMI) and increased hypertension incidence?
10. Is there a relationship between hypertension and excess psychosocial stress among UNRWA PHC patients in Gaza Governorates?
11. Are hypertension risk factors in the Palestinian people similar to those in other countries?

1.7 Context of the study

The demographic, socioeconomic, and political situations may force us to provide health services by specific way to suit these situations. NCDs service is one that is most affected by this situation (Mc-Girk, 2009).

1.7.1 Demographic context

Palestine Authority is limited into two geographically separated areas, GS and West Bank (WB). The total area of both is 6257 km^2, which represents 22% of historical Palestinian area (United Nations Environment Programs-UNEP, 2003). In 2010, the total population of Palestinian in WB and GS is about 4,108,631 (1,561,906 in GS and 2,546,725 in WB) with population density 682 capita per km^2 (Palestinian Center Bureau of Statistics - PCBS, 2010[a]). The percentage of the refugee population in the Palestinian Territory is 44% of the total Palestinian population, which is distributed by the region at 29.7% in WB and 67.4% in GS (PCBS, 2010[a]).

GS is a narrow land, located on the south of Palestine on the coast of the Mediterranean Sea (MOH, 2005). It is a high crowded area with approximately 1.6 million (PCBS, 2010[a]) live in 378 km^2 (UNEP, 2003). The estimated density is about 4,279 people per square kilometer (PCBS, 2011[a]). The population is concentrated in seven town, ten small villages and eight refugee camps; 70% of them are very poor. This high population density creates an increased in refugee camps, which added a burden on the health system including UNRWA and could affect PHC services (UNRWA, 2009[a]).

GS is divided into five governorates, North of Gaza, Gaza city, Mid-Zone, Khanyounis and Rafah. The percentage of the population under 15 years old in GS is 41.1% and 2.9% of age 65 years and more (PCBS, 2010[a]). According to UNRWA (2009[a]), the number of registered Palestinian refugees in 2008 was 1,073820. About 71.6% is the proportion of refugees in GS, while the percentage of children below 14 years is 38.5% and the percentage of population 40 years and above is 21.2%.

The epidemiological transitions in Palestine, as well as transitions in food consumption patterns and life style, have aggravated the burden of disease in the Palestinian Territory, as people are suffering from emerging epidemics of NCDs mainly diabetes, hypertension, CVDs, cancers, and others. At the same time, there is a continuous suffering from the traditional infectious diseases and environmental challenges. Risk factors common to NCDs are prevalent amongst the Palestinian population such as tobacco consumption, diet rich in saturated fat and in simple sugars with the decreased consumption of fibers, whole grain foods, and complex carbohydrates, which lead to the increased prevalence of these illnesses (Husseini et al., 2009[a]).

1.7.2 Socioeconomic characteristic

GS is considered as poor area with low income. The economic situation is usually unstable due to frequent closure and the restriction of private commercial imported and exported materials. Political conflict increases the economic and financial burden. The scarcity of work opportunity leads to drop in the standard of living. There is no dependable social welfare system in GS, and employment is the main source of household income (MOH, 2004). Additionally, in the Occupied Palestinian Territory; rising poverty, deterioration in the quantity and quality of food, and the rapid deterioration in socio-economic and political conditions has added a new sense of urgency; as rising food prices, falling incomes, and increasing unemployment jeopardize food security. In GS, the situation is dire with 56% of population classified as food insecure compared with 25% in WB (Abdul-Rahim et al., 2009). Nevertheless, siege, political, socio-economical, and demographic characters may affect badly many health problems and prevents access to health services. Constant exposure to life-threatening situations in a conflict setting is an additional specific social determinant of health, which can lead to disease (Giacaman et al., 2009; Stewart-Brown, 1998; WHO, 2008[a]). Moreover, because of recurrent occupation, stress is inherited in the life of the Palestinians particularly in GS increasing the prevalence of hypertension among the Palestinian community (Waterston et al., 2009; WHO, 2009[a]).

1.7.3 Health care system

The current Palestinian health system is made up of fragmented services that grew across different regimes. Palestinian health services were neglected and starved of funds with shortages of staff, hospital beds, medications, and essential services; forcing Palestinians to depend on health services in Israel (Yudkin, 2009). Additionally, economic deterioration and increasing poverty made Palestinians dependent on aid. External aid accounts for 32% of the gross national income (Carter, 2009; World Bank, 2008). Furthermore, dependence on aid impedes planning because of the unpredictability of funds and delays in translation of pledges into disbursements (Batniji et al., 2009; Leaning et al., 2003).

The response of Palestinian was to create services through Palestinian health care infrastructure independent of the Israeli military. However, the first Official National Health Plan was published in 1994. It aimed to regulate the health sector and integrate the activities of the four main health-care providers: Governmental sector led by the Palestinian MOH; United Nation Relief and Works Agency sector (UNRWA); Non

Governmental Organizations sector (NGOs), and Private sector (for-profit health sector) (Mataria et al., 2009). MOH is the main health care provider; it provides primary, secondary, and tertiary care. It serves as regulatory body for the Palestinian health system. MOH owned and supervised 413 PHCs constituted 56.5% from the total PHC (MOH, 2005). While UNRWA continued to be the main comprehensive PHC provider for Palestinian refugees and continued to promote a comprehensive life cycle approach to health with a strong focus on PHC and prevention. UNRWA operates 137 PHCs scattered in Palestine (UNRWA, 2010), health facilities in GS are 20 (UNRWA, 2009[b]). UNRWA offers health services free of charge for all refugees. In 2007, UNRWA treated approximately 34,000 hypertensive and 23,000 diabetic patients in GS, with a prevalence rate of 17% and 12% respectively of adult population (WHO, 2009[a]). Among these patients, about 7,000 were receiving insulin therapy, 22,000 were taking hypertension drugs, and 23% of patients with hypertension and/or with diabetes were considered to be at high risk of complications and deaths (WHO, 2009[a]). The NGOs is non-profit sector owns and operates 265 mini PHCs in Palestine (214 centers in WB and 51 centers in GS) (MOH, 2005). Finally, a private sector (profit) owned and operates hundreds of private settings by medical specialists, physicians, dentists, pharmacists, lab technicians and provides the three levels of care (MOH, 2005).

1.8 Operational Definitions

1. Blood pressure (BP): Is the force of blood pushing against the walls of arteries (blood vessels). Each time the heart beats, it pumps blood through blood vessels, supplying the body's muscles, organs and tissues with oxygen and nutrients that they need to function. Over the course of a day, an individual's BP rises and falls transiently many times in response to various stimuli (Natural Standard Research Collaboration-NSRC, 2008).

2. Hypertension: Is defined as SBP (top number) of l40 mmHg or greater and/or diastolic blood pressure (DBP) (bottom number) of 90 mmHg or greater in subjects who are currently taking medication to lower HBP. While measuring the BP, first appearance of sound is used to define SBP, the disappearance of sound is used to define DBP (Fryar et al., 2010).

3. **Hypertensive patient**: Any patient diagnosed as hypertensive and the diagnosis is confirmed by a specialized physician (Fields et al., 2004).

4. UNRWA clinic: Any clinic being run and under the authority of UNRWA

5. Primary health care center (PHCs): Center that serves as first point of contact with a health professional and provides outpatient medical and nursing care (WHO, 2010).

6. Overweight: According to WHO criteria, overweight is defined as a BMI {BMI = Weight (kg) /height (m^2)} equal to or more than 25 kg/m^2 (WHO, 2011[d]).

7. Obesity: According to WHO, obesity is defined as a BMI equal to or more than 30 kg/m^2 (WHO, 2011 [d]).

8. **Tobacco smoking:** Is the act of smoking tobacco products, especially cigarettes and cigars (Wordiq, 2010)

9. Current smoker: Someone who smokes tobacco both daily and occasionally at the time of the survey (Wordiq, 2010)

10. Ex smokers: Who had previously smoked but had quitted more than 3 months before the study (Al-Asadi, 2010).

11. Never smokers: Those who either have never smoked at all or have smoked less than 100 cigarettes in their lifetime (Qian et al., 2011)

12. Low fruits and vegetables consumption: Those who consume less than five combined servings of fruits or vegetables per day of the week (WHO, 2010)

13. Diabetes mellitus (DM): Fasting blood glucose level ≥126 mg/dl, or random blood glucose level ≥ 200 mg/dl, or medication with anti-diabetic drugs (Khatib and El-Guindy, 2005)

14. Total cholesterol (TC): According to the AHA, TC below 200 mg/dl is considered normal and at lower risk for heart disease, 200-239 mg/dl is borderline-high risk and TC of 240 mg/dl or above is at higher risk (Kimberly, 2010).

15. Physical activity: It could be defined as how hard your body is working during aerobic activity (Centers of Disease Control and Prevention-CDC, 2010); it is classified as vigorous, moderate, light daily activity or inactive (Al-Asadi, 2010).

- **Physical inactive:** No type of exercise practiced (Al-Asadi, 2010).
- **Light daily activities**: Such as shopping, cooking, or doing the laundry. It doesn't count toward the guidelines due to the body isn't working hard enough to get heart rate up (CDC, 2010).
- **Moderate-intensity physical activity**: Means you are working hard enough to raise your heart rate and break a sweat; as pleasure walking, climbing stairs, gardening, yard work, moderate-to-heavy housework, dancing and home exercise (CDC, 2010).
- **Vigorous-intensity physical activity:** Means you are breathing hard and fast and your heart rate has gone up quite a bit. If you're working at this level, you won't be able to say more than a few words without pausing for a breath as jogging or running, swimming, bicycling — done three or four times a week for 30-60 minutes — are best for improving the fitness of the heart and lungs (CDC, 2010).

16. Level of education

The researcher classified the educational level into three categories:

- **Low educational level:** This level includes any person who did not enter school, or had been study in primary and preparatory school.
- **Medium educational level:** This level includes persons who had been completed secondary school, and study 2-3 year diploma.
- **High educational level:** This level includes persons who had been completed a university degree and /or college of advanced education.

17. Risk factor: Also called health risk, is defined as a factor that raises the probability of adverse health outcomes (WHO, 2009[b]).

18. Poverty line: According to PCBS, the poverty line and deep poverty line for the reference household (two adults and three children) stood at 2,237 NIS (609 US$) and 1,783 NIS (478 US$) respectively (PCBS, 2010[b]).

Chapter II

Literature Review

Hypertension poses one of the greatest public health challenges for the 21st century, with particularly alarming trends in several parts of the world.

This chapter starts with the explanation of the conceptual framework of the study. Definitions, classification and consequences of hypertension are presented. Then prevalence of hypertension; internationally, regionally and locally is also discussed. Moreover, the risk factors associated with hypertension are explored based on the review of the related literature.

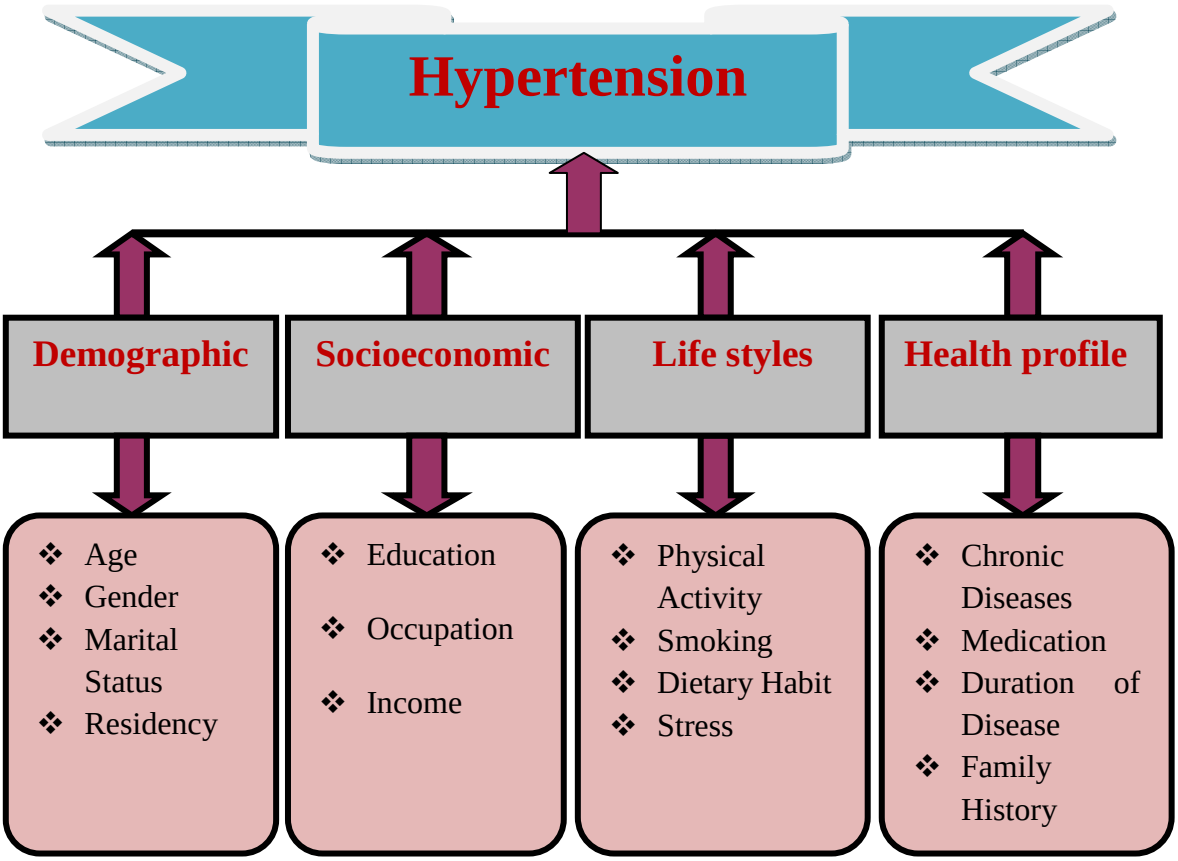

Figure (2.1): Conceptual framework for determinants of hypertension

2.1 Framework of the study

The researcher constructed the conceptual framework that addresses the major aspects of the study after reviewing the available literature about the concept under investigation. The researcher described the most common factors that could be associated with hypertension and selected some of these factors, which may affect hypertension in the

community such as, demographic and socioeconomic factors, lifestyle, and health profile. Cases and controls were matched for age, sex and locality.

- **Demographic variables**

Several studies highlight the association of various demographic factors with hypertension disease. These factors include age, gender, marital status, and place of residency (Rampal et al., 2008).

- **Socioeconomic variables**

An exhaustive review of studies provided strong relationship between socioeconomic status including educational levels, occupation, and income with hypertension among both men and women (Al-Asadi, 2010).

- **Life styles**

The available information comes from too many studies illustrated that hypertensive patients could lower BP by making lifestyle changes which include; practicing regular exercise, quitting smoking, losing weight, reducing fat intake, reducing salt intake, and managing stress (Khatib and El-Guindy, 2005).

- **Health profile**

Hypertension substantially increases morbidity and impairs quality of life (QOL). Several studies have established that hypertension is associated with increased in prevalence of many serious conditions such as stroke, IHD, MI, and HF. In addition, it is consistent among review that hypertension tend to run in families (WHO, 2004[b]). People with hypertensive relative are more likely to develop the disease compared with negative family history (UCSF Medical Center, 2011). Therefore, family history of hypertension is a strong predictor for future hypertensive events.

2.2 Blood pressure definition

Measuring BP is no more than measuring the pressure required to force blood through blood vessels (Federal Bureau of Prisons, 2004). "BP" is the force of blood pushing against the walls of the arteries as the heart pumps out blood. If this pressure rises and

stays high over time, it can damage the body in many ways (National Heart Lung and Blood Institute Diseases and Conditions Index - NHLBIDCI, 2008[a]).

2.2.1 Systolic blood pressure (SBP): The top number; measures the force while the heart pumps. Normal healthy SBP is 120 mmHg or below (Federal Bureau of Prisons, 2004).

2.2.2 Diastolic blood pressure (DBP): The bottom number; measures the force at rest - that is in between heart pumps. A normal healthy DBP is 80 mmHg or below (Federal Bureau of Prisons, 2004).

While the DBP stays at about the same level all the time, SBP changes frequently depending on day-to-day activities and stress. An occasional elevated number may not indicate HBP. It takes several repeatedly elevated pressures to diagnose hypertension. When BP is too high (either systolic or diastolic or both) and remains high, blood cannot flow freely through the arteries and the heart has to pump harder (Federal Bureau of Prisons, 2004).

2.3 Definition of hypertension

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of HBP (JNC VII PDET HBP) provides a classification of BP for adults aged ≥18 years. The classification is based on the mean of two or more properly measured seated BP readings on two or more office visits. Normal BP is defined as levels <120/80 mmHg. SBP of 120–139 mmHg or DBP 80–89 mmHg is classified as pre-hypertension. These patients are at increased risk for progression to hypertension. Hypertension is defined as SBP ≥140 mmHg or DBP ≥90 mmHg (Khatib and El-Guindy, 2005).

BP, like height and weight, is a continuous biological variable with no cut-off point separating normotension from hypertension. The continuous relationship between the level of BP and cardiovascular risk makes any numerical definition and classification of hypertension somewhat arbitrary. Therefore, a definition of hypertension is usually taken as that level of arterial BP associated with doubling of long-term cardiovascular risk (Khatib and El-Guindy, 2005).

2.4 Classification of hypertension

Hypertension can be mild, moderate, or severe. However, these terms do not truly refer to the severity of the overall risk to the patient but simply to the extent of the BP elevation at the time of the assessment. The severity also depends on the overall cardiovascular risk of the patient due to concomitant risk factors such as age, gender, smoking habits, plasma lipids, and associated organ damage (Alwan, 1996).

The JNC VII PDET HBP classify BP as normal, pre-hypertension, hypertension stage 1, hypertension stage 2, and isolated systolic hypertension (Khatib and El-Guindy, 2005).

Normal BP: Is a SBP of less than 120 mmHg and a DBP less than 80 mmHg (<120/80 mmHg) (Khatib and El-Guindy, 2005).

Pre-hypertension: Is when the SBP and DBP is higher than the normal, but not high enough to be considered HBP (140/90 mmHg). Pre-hypertension is a SBP between 120 and 139 or a DBP between 80 and 89. For example, BP readings of 138/82, 128/70, or 115/86 are all in the "pre-hypertension" range (Khatib and El-Guindy, 2005).

Stage 1 hypertension: Is a SBP between 140 and 159 mmHg and a DBP between 90 and 99 mmHg (Khatib and El-Guindy, 2005).

Stage 2 hypertension: Is a SBP of 160 mmHg or higher, and a DBP of 100 mmHg or higher (Khatib and El-Guindy, 2005).

Isolated systolic hypertension: As people become older, the DBP will begin to decrease (<90) and the SBP begins to increase (≥140), which may lead to HBP. This disorder is called isolated systolic hypertension (Khatib and El-Guindy, 2005).

Both increased systolic and DBP can increase the risk for congestive heart failure (CHF, or problems with the heart pumping blood to the body), heart attack, kidney disease, stroke (neurological damage to the brain due to a lack of oxygen), and erectile dysfunction. The condition may be complicated by amputation of the legs, and blindness (Alwan, 1996).

2.5 Standard method of measuring BP (Standardized technique) (Alwan, 1996)

BP is measured by using a mercury sphygmomanometer. There are several sources of inaccuracies. These include technical inaccuracies, some of which are avoidable, the

inherent variability of BP, and the tendency for BP to increase in the presence of a physician or less markedly a nurse, commonly known as "white-coat" hypertension. A false diagnosis of hypertension is generally reached due to hasty measurements, incorrect techniques, or the tenseness of the patient. Before measurement commences the patient should be seated for several minutes in a quiet room. The arm muscles should be relaxed and the forearm supported such that the cubital fossa is at heart level (fourth intercostal space). Care should be taken to avoid tight sleeves. BP may also be measured with the subject supine or standing, and in each position the arm should be supported at heart level. A cuff of suitable size is applied to the exposed upper arm. A cuff for adults must have a bladder 13-15 cm wide and 30-35 cm long to encircle the average arm. Larger cuffs are needed for fat arms and smaller cuffs for children. Inadequate cuff size may result in overestimation of the true BP. The cuff is rapidly inflated until the manometer reading is about 30 mmHg above the level at which the pulse disappears, and then slowly deflated approximately 2 mmHg at a time. During this time, the Korotkoff sounds are auscultated through a stethoscope placed over the brachial artery. The pressure at which repeated and clear sounds are first heard is the SBP. The DBP is the pressure at which the sounds disappear (phase V). The use of muffling sounds (phase IV) gives significantly higher DBP values and is to be avoided. If the BP is greater than 140/90, it should be repeated and both values should be recorded. Both systolic and DBP should be measured at least twice over a period of no less than three minutes; all the readings should be recorded and the mean value for both systolic and DBP should be used. It is also recommended that on the first visit the BP should be measured on both arms. In elderly and diabetic people with confirmed hypertension, measurement with the patient in the lying position and again after standing for one to five minutes should also be performed on initial assessment in order to rule out postural hypotension.

2.6 Causes of hypertension

2.6.1 Primary hypertension (no identifiable cause)

Over 95% of cases of hypertension with no specific cause can be identified. These cases are diagnosed as having primary (or essential) hypertension (Alwan, 1996).

2.6.2 Secondary hypertension (identifiable specific causes)

In a small minority of people with hypertension, a specific cause can be identified; these patients are diagnosed as having secondary hypertension (or less commonly, inessential hypertension). It is a type of hypertension, which by definition is caused by an identifiable underlying secondary cause. It affects only 5% of hypertensive patients. Adequate attention should be paid to these curable or reversible causes of hypertension (Alwan, 1996).

The major causes of secondary hypertension are renal (e.g. renal parenchymal disease, renovascular causes, and rennin producing tumors), drugs (e.g. oral contraceptives, corticosteroids, liquorice and carbenoxolone, sympathomimetics, and non-steroidal anti-inflammatory drugs), endocrine (e.g. acromegaly, cushing syndrome, primary hyperaldosteronism, congenital adrenal hyperplasia, phaeochromocytoma and carcinoid), coarctation of the aorta and aortitis, pregnancy-induced hypertension (NSRC, 2008).

2.7 Cardiovascular risk factors

The WHO Expert Committee on Hypertension Control recently stratified patients with hypertension into risk groups for therapeutic decisions. They found that, the risk of CVDs in patients with hypertension is determined not only by the level of BP but also by the presence or absence of target organ damage or other risk factors, which independently modify the risk for subsequent CVDs. In addition, their presence or absence is determined during the routine evaluation of patients with hypertension (e.g., history, physical examination, laboratory tests). Based on this assessment and the level of BP, the patient's risk group can be determined. Lewington et al., (2002) indicated deaths from both IHD and stroke among one million adults in 61 prospective studies; they found, deaths increases progressively and linearly from levels as low as 115 mmHg SBP and 75 mmHg DBP upward. For every 20 mmHg systolic or 10 mmHg diastolic increase in BP, there is a doubling of mortality from both IHD and stroke and this present in individuals ranging from 40-89 years of age. In addition, longitudinal data from the Framingham Heart Study (2001), indicated that, BP values between 130–139/85–89 mmHg are associated with a more than twofold increase in relative risk (RR) from CVD as compared with those with BP levels below 120/80 mmHg (Vasan et al., 2001). Similarly, WHO reported that, 45% of cardiovascular deaths among those older than 30 years can be attributed to raised BP,

16% to raised cholesterol and 13% to raised blood glucose; the estimated combined effect of these three risks is about 48% of CVDs (WHO, 2009[b]).

2.8 Risk Stratification

2.8.1 Risk Group A

Risk group A includes patients with no clinical CVD, target organ damage, or other risk factors but with high-normal BP or stage 1, 2, or 3. Persons with stage 1 hypertension in risk group A are candidates for a longer trial (up to one year) of vigorous lifestyle modification with vigilant BP monitoring. Pharmacologic therapy should be added if goal BP is not achieved. For those with stage 2 or 3 hypertension, drug therapy is warranted (TSR JNC PDET HBP, 2004).

2.8.2 Risk Group B

Risk group B includes patients with hypertension with one or more of risk factors who do not have clinical CVD or target organ damage or DM. This group contains the large majority of patients with HBP. If multiple risk factors are present, antihypertensive drugs should be considered as initial therapy. Lifestyle modification and management of reversible risk factors should be strongly recommended (TSR JNC PDET HBP, 2004).

2.8.3 Risk Group C

Risk group C according to the clinical opinion of the JNC VI that, some patients who have high-normal BP as well as renal insufficiency, HF, or DM should be considered for prompt pharmacological therapy. Appropriate lifestyle modifications always should be recommended as adjunct treatment (TSR JNC PDET HBP, 2004).

2.9 Evaluation of hypertensive patients

For evaluation of a hypertensive patient, a comprehensive history should be obtained. Careful physical examination with focus on signs suggesting secondary hypertension and target organ damage is done, and routine laboratory tests are recommended. Further extended evaluation depends on the initial findings and results.

2.9.1 Risk factors

According to WHO (2005), these risk factors are identified as follow;

Level of SBP and DBP, gender (for males aged 55 years and more, and for females over 65 years), smoking, dyslipidaemia, family history of premature CVDs (for men aged less than 55 years, and for women aged less than 65 years), dietary habits/obesity particularly abdominal obesity, amount of exercise, and C-reactive protein ≥1 mg/dl (Khatib and El-Guindy, 2005).

2.9.2 Associated clinical conditions

Hypertension is the most important risk factor for morbidity and mortality. If inadequately treated, hypertension increases the risk of vascular damage. It increases hardening of the arteries thus predisposes individuals to several complications include; CVDs (transient ischemic attack, stroke, hemorrhage), heart disease (angina, MI, HF), renal disease (diabetic nephropathy, serum creatinine >1.5 mg in men, >1.4 mg in women, protienuria >300 mg/24 hours), peripheral vascular disease, and advanced retinopathy (hemorrhage, exudates, papilloedema) (Khatib and El-Guindy, 2005).

2.9.3 Diabetes mellitus (DM)

The cut-off value for confirmation of diagnosis of diabetes is a fasting plasma glucose (FPG) level ≥ 126 mg/dl on at least two consecutive tests within one week (UNRWA, 2009[b]). FPG falling between 100-125 mg/dl were classified as impaired fasting glucose (IFG). In order to establish the diagnosis of diabetes or otherwise, patients should be required to perform another FPG test within a week. If the value is still between 100-125mg/dl, then oral glucose tolerance test (OGTT) should be performed. Diabetes is diagnosed if plasma glucose is elevated to be ≥200 mg/dl two hours after the challenge (UNRWA, 2009[b]).

2.9.4 High risk groups

These groups are classified as a high risk for hypertension:

Smokers, previous MI, DM, evidence of organ damage, elderly, family history, hyperlipidaemia (Khatib and El-Guindy, 2005).

2.9.5 Laboratory tests

Although the minimum laboratory investigation needed is a matter of debate, the type and extent of investigations will vary from one place to another according to the availability of resources and the development of the guidelines. Laboratory investigations should be

directed at providing evidence of additional risk factors, searching for secondary hypertension and assessing presence or absence of target organ damage. They include routine tests, recommended tests, and specific tests for extended evaluation of hypertensive complications and causes of secondary hypertension (Chobanian et al., 2003; Zanchetti et al., 2003).

These laboratory tests are identified as urine analysis, haematocrit, blood glucose, serum potassium and sodium, ECG (S V1+R V5 or RV6), serum cholesterol, serum creatinine or blood urea nitrogen.

2.10 Indicators

Several indicators are used to highlight hypertension disease risk factors among adults as a cornerstone in the prevention and treatment of this disease including:

1- Primary variables and respective indicators

A- Classification of BP

BP was classified using the international criteria by using the criteria of WHO to define hypertension. Normal BP is defined as levels <120/80 mmHg. SBP of 120–139 mmHg or DBP 80–89 mmHg is classified as pre-hypertension. Hypertension is defined as SBP ≥140 mmHg or DBP ≥ 90 mmHg (Khatib and El-Guindy, 2005).

B- Classification of glucose (American Diabetic Association, 2005)

DM was diagnosed in accordance with the criteria established by the American Diabetes Association:

- FPG ≥126 mg/dl
- 2 hour plasma glucose ≥200 mg/dl

2- The secondary variables (Pontaza et al., 2007)

- Overweight: 25-29.99 kg/m^2, Obesity grade I: 30-34.99 kg/m^2, Obesity grade II: 35-39.99 kg/m^2, Obesity grade III: ≥ 40 kg/m^2;
- Waist: Men ≥102 cm, Women ≥88 cm;
- TC: Desirable < 200 mg/dl, Borderline 200-239 mg/dl, High ≥240 mg/dl;
- LDL-c: Optimal <130 mg/dl, Borderline 130-159 mg/dl, High ≥160 mg/dl;
- HDL-c: Optimal ≥ 60 mg/dl, Borderline 40-59 mg/dl, Low <40 mg/dl;

- TG: Normal <150 mg/dl, Borderline 150-199 mg/dl, High ≥200 mg/dl;
- Smoking habit: Current smoker smokes one or more cigarettes/day;
- Family history of DM, hypertension, stroke, hypercholesterolemia, and AMI;
- Socio-demographic data: Educational level, current employment, place of residence, ethnic group;
- Physical activity: Inactive/sedentary refers to no physical activity beyond baseline activities of daily living. Low/Insufficient activity refers to less than 150 minutes/week of moderate-intensity physical activity. Medium activity refers to 150 to 300 minutes/week of moderate-intensity activity. High activity is more than 300 minutes/week of physical activity (Leavitt, 2008).

2.11 Magnitude of the problem

The increasing prevalence of NCDs is a serious challenge, where the success in extending life expectancy is translated into a real threat to global health. Furthermore, the process of urban development and changes in lifestyle and the profile of risk factors that many communities are experiencing will also tend to increase the NCDs load. In contrast, NCDs start slowly and often asymptomatically but last longer. Many patients have to live with NCDs for the rest of their lives. It is estimated that in coming years the burden of mortality due to NCDs will continue to increase worldwide. Cardiologists are facing more elderly with CVDs mainly hypertension (Pontaza et al., 2007).

2.11.1 Globally (International hypertension disease)

In 2004, WHO began sounding the alarm about worldwide epidemic of hypertension. There was an estimated one in every eight deaths worldwide from hypertension, making hypertension the third leading killer in the world. Globally, there are one billion people with hypertension, and 4 million people die annually as a direct result of hypertension. The high prevalence of hypertension worldwide has contributed to the present pandemic of CVDs **(**WHO, 2004[b]).

However, as inferred from the literature, there are important regional variations in BP distributions even taking into account potential differences in the technique of BP measurement. For example, in both sexes for all ages >45 years, average BP levels are highest in populations from Eastern Europe and Russia. Average levels are also particularly high in the Middle East, North Africa, and parts of Sub-Sahara Africa (Lawes

et al., 2006). In 2025, the worldwide prevalence of hypertension is predicted to increase by 9% in men and 13% in women. This result from the ongoing increase in population size and changes in the age distribution of the population, specifically, a larger proportion of the world population is expected to be older by 2025 (Casas et al., 2005).

By comparison, a literature search of the Medline database supports the notion of hypertension transition in the world. The reported prevalence of hypertension varied around the world, with the lowest prevalence in rural India (3.4% in men and 6.8% in women) and the highest prevalence in Poland (68.9% in men and 72.5% in women). Awareness of hypertension was 46% and varied from 25.2% in Korea to 75% in Barbados. Treatment varied from 10.7% in Mexico to 66% in Barbados, and control varied from 5.4% in Korea to 58% in Barbados (Kearney et al., 2004). Additionally, Kearney et al., (2005) mentioned that, about one in four adults worldwide would be classified as hypertensive. Currently, this equates to about one billion individuals, and is expected to grow to >1.5 billion (≈30% of the global population) by 2025 as a consequence of the ongoing increases in both total population size and the proportions within populations reaching older ages. The majority of adults in higher and lower-income populations have non-optimal BP. In higher-income regions, the figure of hypertensive individuals is predicted to grow by 70 million people from 2000 to 2025, whereas in lower-income regions, the number is predicted to rise up to 500 million over the same period (Perkovic et al., 2007).

United States (US): Fields et al., (2004) conducted their study to estimate the prevalence of hypertension among US adults by age and sex using data from the National Health and Nutrition Examination Survey in 1999 to 2000. The study found at least 65 million adults had hypertension. The total hypertension prevalence rate was 31.3%. About 81% of US adults with hypertension were aged 45 years or older. At least 48 million non-Hispanic white adults, ≈9 million non-Hispanic black adults, ≈3 million Mexican American, and 5 million other adults had hypertension. While, Wolz et al., (2000) mentioned that, the trend of hypertension is increased by ≈30% for 1999 to 2000 compared with at least 50 million for 1988 to 1994 ($P<0.001$). These trends were associated with an increase in obesity, aging and growing population (US Department of Health and Human Services - USDHHS and CDC, 2003; Wright et al., 2004). Additionally, Chobanian et al., (2003) revealed that, at young ages, the prevalence of hypertension was higher in men than in women compared

with older people, which was higher in women (35 million) than in men (30 million). This may be due to postmenopausal status and differences in sex-specific life expectancy may contribute to this phenomenon. In addition, Casas et al., (2005), mentioned that, nearly one in three American adults had HBP. Approximately two-thirds of people over age 65 years had HBP. Of those people with HBP, 71.8% were aware of their condition, 61.4% were under current treatment, 35.1% had it under control.

India: The overall burden of BP related diseases is rapidly rising in countries such as India as a consequence of the aging population, increasing urbanization, and increases in age-specific rates of conditions such as stroke. A number of studies have been conducted in different geographical areas, in urban as well as rural area among adults (20 years and more), found that, 16% of IHD in the country is attributable to hypertension. While 21% of peripheral vascular diseases and 24% of AMI cases could be attributed to elevated BP. Attributable risk due to hypertension was found to be 29% for stroke (whoindia.org, 1995-2002).

China: Hypertension is an important public health problem in rural China with a rapidly increasing prevalence noted in recent years. A cross sectional study was conducted in rural Shandong Province, China, in 2007 using multistage cluster sampling. A total of 16,364 rural residents aged 25 years and more were interviewed and examined. The study revealed that, overall 43.8% of the population had hypertension. Among hypertensive patients, only 26.2% were aware of their hypertension, 22.2% were currently undergoing antihypertensive treatment, and 3.9% achieved BP control. Lack of knowledge about hypertension and the importance of BP control were associated with poor compliance with non-pharmacological and pharmacological treatments (Li et al., 2010).

Sub-Saharan Africa: In sub-Saharan Africa, communicable diseases continue to have the greatest disease burden but it is estimated that in the next few decades NCDs will outstrip communicable diseases as major cause of death (Kengne et al., 2007). This is illustrated by a combination of demographic changes, increasing urbanization and associated changes in levels of risk factors like tobacco smoking, alcohol consumption, obesity and physical inactivity. Studies conducted in Cameroon in 1994 and 1998 showed that, age, obesity and hypertension were significantly associated with hyperglycemia, the prevalence rates of hypertension and diabetes in the adult urban men were 17.6% and 6.2% in 1998, compared with 8.3% and 1.1% in 1994 (Kengne et al., 2007).

Finland: Three independent cross-sectional population surveys were conducted in 1982, 2002 and 2007 with age-stratified samples of men and women aged 25-64 years from the national population register. The prevalence of hypertension was from 63.3 to 52.1% among men and from 48.1 to 33.6% among women (P<0.001 for both sexes) (Kastarinen et al., 2009). However, during the past 5-year period (2002-2007), a decline was observed only in women in southwestern Finland (P=0.003). Furthermore, previously observed significant increases in the proportions of treated and controlled hypertensive individuals did not continue among men during 2002-2007 despite the evident progress in all aspects of hypertension care in 1982, still present in 2007. Only 68% of all hypertensive individuals were aware of their condition, among them only 52% were treated with antihypertensive drugs and 37% of the drug-treated patients had normal BP (Kastarinen et al., 2009).

Indonesia: WHO stepwise approach (2002) for collecting surveillance data for NCDs was used to collect prevalence data for hypertension and their risk factors. The estimated prevalence of hypertension during the survey was 8.9% (95%CI 5.1–12.5). This prevalence greatly varied according to sex and age group, and 50% of males or females above 55 years old had HBP. After adjusting for age using the WHO New World Population, this prevalence was 20.8% (95%CI 19.1–22.5) (Ng et al., 2006[a]). Similarly, the protocol of the WHO Stepwise approach was used in 2001 to estimate the prevalence and distribution of risk factors for NCDs, to identify the risk-factors burden among Indonesia rural and urban populations; the study showed that, smoking prevalence was high among men (53.9%) in both rural and urban populations; it was almost non-existent among women. A higher proportion of the urban population and the richest quintile of the rural population had HBP. Moreover, they were classified as being overweight or obese when compared with the poorest quintile of the rural population. Richest quintile who lived in the rural area were 1.5 times more likely to have raised BP and eight times more likely to be overweight than the poorest. Clustering of risk factors was higher among richest that live in the rural area compared with the poorest, and just 20-30% lower compared with the urban population (Ng et al., 2006[b]).

2.11.2 Eastern Mediterranean Region (EMR)

Hypertension becomes a serious medical problem in developing countries like those in EMR. It is emerging as a considerable challenge to public health and an important cause

of morbidity and mortality like other regions worldwide. This result is according to a study conducted by WHO Stepwise data from the selected countries in the EMR (2003-2007). The study showed that, there were marked variations in the incidence of hypertension in the region. The highest prevalence of hypertension was reported from Iraq (40.4%) followed by Bahrain with a rate of 38.2%, while the lowest prevalence of hypertension was reported from the Islamic Republic of Iran (14.8%), followed by Kuwait and Oman (20.5%). The prevalence of hypertension in Egypt was 26.7% and in Jordan 26% in comparison to Saudi Arabia 21.3%, and Sudan 23.6% (WHO, 2011[e]).

Additionally, Hassanein (2006), mentioned that, the prevalence of hypertension averages in the EMR was 29% and it affects approximately 125 million individuals, while the incidence of hypertension in this region was 26%, whereas the awareness rate among the hypertensive people has been consistently low, up to 70% of people with elevated BP not aware of their condition. Of greater concern, the development of serious and potentially fatal complications, which are on the increase including the incidence of stroke, end-stage renal disease and HF, thus causing considerable suffering and enormous health costs. Therefore, there is a pressing need for action to control this problem. The region includes also large differences in population size, wealth and health expenditure, which is associated with changes in the levels of risk factors like obesity, overweight and hypercholesterolemia (WHO, 2009[b]).

Kingdom of Saudi Arabia (KSA): A community-based study was conducted to determine the prevalence of hypertension among Saudis of both gender between the ages of 30-70 years in rural as well as urban communities during a 5-year period between 1995 and 2000. The study found that, hypertension is increasing in prevalence in KSA affecting more than one fourth of the adult Saudi population. The prevalence of hypertension was 26.1% in crude terms. For males, the prevalence of hypertension was 28.6%, while for females, the prevalence was significantly lower (23.9%, $P<0.001$). The urban population showed significantly higher prevalence of hypertension (27.9%) compared to 22.4% in rural ($P<0.001$). The prevalence of coronary artery disease (CAD) among hypertensive patients was higher compared to normotensive (8.2% vs. 4.5%, $P<0.001$). Increasing weight showed significant increase in prevalence of hypertension in a linear relationship (AL-Nozha et al., 2007). This is consistent with the study conducted by WHO Stepwise

data in 2007, the prevalence of hypertension in KSA was 21.3%, and obesity was 68.8%, while hypercholesterolemia was 19.15% (WHO, 2011[e]).

Egypt: Egypt has undergone dramatic socio-economic changes in the second half of the 20th century, which has resulted from a great tide of urbanization and a rise in living standards. This is reflected by a rise in the average age for both men and women, and a change in the pattern of diseases. While there is a decline in infectious and rheumatic heart disease prevalence, there is an epidemic of CAD and its risk factors such as hypertension, diabetes and smoking. According to official statistics, CVD accounted for 12.4% of all deaths in Egyptians in 1970, whereas in 1998 it was responsible for 47% of the nation's mortality (Ibrahim, 2003). Additionally, a retrospective study conducted in a general cardiology clinic to study the relative contribution of systolic vs. diastolic HF and the prevalence of risk factors among Egyptians population. The study found that, 66% had systolic HF, while 34% had diastolic HF. Mean age was 60±10 and 63±11 years respectively (P=0.13). Systolic CHF patients had significantly more CAD, while those with diastolic failure were mostly hypertensive (P<0.01 for both). There was no significant difference in the incidence of DM, cerebrovascular accidents or arterial fibrillation between the two groups. Patients with systolic failure required more hospitalization (P<0.05), and had a mortality rate of 17.6% vs. 11.3% for patients with diastolic HF (P=0.3) (Ibrahim, 2003). In addition, according to the National Hypertension Project in Egypt, the estimated prevalence of hypertension in adult Egyptians was 26.3% in 1999. This high number may be due to the increased in the levels of risk factors such as diabetic (9.3%), and this figure rises to 20% in high socio-economic sections in the cities. Approximately 40% of adult males are smokers (Ibrahim, 2003). In addition, WHO Stepwise data (2006), mentioned that, the prevalence of hypertension in Egypt was 26.7%. The rising figure may be due to the high prevalence of overweight and obesity (66%), while hypercholesterolemia was 19.4% (WHO, 2011[e]).

2.11.3 Locally (Gaza Strip)

In 2006, the rate of reported hypertension in Palestine was 8·1% at age 40–49 years, 22·6% at 50-59 years, and 35·2% at 60 years and older (PCBS, 2007[a]). Additionally, in two population-based cross-sectional studies done in 1996–98, the rate of hypertension ranged from 21·5% to 25·4% in adults aged 30–65 years in two communities in the WB (Abdul-Rahim et al., 2001). In addition, data gathered by UNRWA showed that, the rate of

hypertension was 14·3% in people aged 40 years and older in WB, and 17·4% for registered Palestinian refugees in GS (UNRWA, 2007[a]). While, by the end of 2008, there were more than 177,000 diabetic and hypertensive Palestinian refugee patients under supervision of the five Fields of UNRWA's area of operations. The estimated prevalence rates of DM and hypertension among refugee persons utilizing UNRWA health services aged 40 years and above were 10.7% and 16.4% respectively (UNRWA, 2009[b]). In addition, data collected from UNRWA health care facilities reveal that approximately one third of non-communicable disease patients under supervision, Agency-wide suffer from the double burden of diabetes and hypertension. Studies have shown that achieving acceptable control is more difficult and the probability of developing adverse outcomes including end-stage complications, disability and premature death is higher among patients who have both diseases (UNRWA, 2009[c]).

In contradictory to that, the magnitude of hypertension diseases burden in MOH Annual Report (2004) on the health status in Palestine, revealed that, there is no or poor national data available on the overall incidence and prevalence of hypertension diseases. In general, we depend on mortality data to estimate the impacts of these conditions. The current system counts mainly the visits of the patients to PHCs, which does not reflect the real prevalence or incidence. Additionally, there is fragmentation in reporting and managing system regarding CVDs, and inability to estimate the direct and indirect cost and resources required as drugs, policy, and decision making regarding prevention and treatment.

Despite of deficient statistical data available on trends of hypertension disease burden, and the prevailing political situation, which negatively affect all aspects of our lives, there is a real effort being done on the national level. These efforts organize and implement a unified strategy in an attempt to create organizational capacities and bridge gaps in the inherited health care system from the Israeli occupation to control of these diseases in Palestine, which thought on the increasing especially among older age (MOH, 2004).

Hypertension disease mortality in Palestine

Hypertension disease is the eighth leading cause of death among total population in Palestine (4.8%) in the year 2005, while it was the ninth leading cause of deaths in males and females (2.7% and 3.8% respectively). In addition, hypertension disease is the fifth

leading cause of CVDs deaths, 12.9% of the total cardiovascular mortality with a rate of 13.0 per 100,000 (MOH, 2005). According to MOH (2006), CVDs, principally heart diseases are the first leading cause of death among population in Palestine in the year 2005. There was gender variation with a proportion more predominant among males than females (30.2% vs. 25.9%) of total CVDs mortality. IHD is the leading of CVD mortality (36.1%) with a rate of 36.4 per 100,000 populations. Mortality among males is higher than females (57.7% vs. 42.3%). Cerebrovascular disease is one of the highest leading causes of death in general population (11%), it is the third in males (9.9%) and the second in females (12.4%), it represented the third leading cause of death of total CVD mortality (29.5%).

2.12 Prevalence of risk factors

Although the exact cause of HBP is unknown, there are certain traits, conditions, or habits that may increase the risk for hypertension. These conditions are called risk factors (NHLBIDCI, 2008[b]). Each risk factor has its own causes, that many have their roots in a complex chain of events over time consisting of socioeconomic factors, environmental and community conditions, and individual behavior. Some elements in the chain - such as cholesterol - act as a relatively direct cause of the disease. Some risks located further back in the causal chain act indirectly through intermediary factors. These risks include physical inactivity, alcohol, smoking or fat intake. For the most distal risk factors - such as education and income - less causal can be attributed to each risk. Health risks are in transition as patterns of consumption markedly change around the world, and populations contain higher proportions of older people. So modifying the background of these causes is more likely to have amplifying effects (WHO, 2009[b]).

The five leading global risks for mortality in the world are HBP (12.8%), tobacco use (8.7%), high blood glucose (5.8%), physical inactivity (5.5%), overweight and obesity (4.8%) (WHO, 2004[b]). Tobacco is one of the leading risks for both high and middle-income countries. In high-income countries, it accounts for ≈ 11% of the disease burden and 18% of deaths. Alcohol, overweight, and HBP are leading causes of healthy life years lost where each being responsible for 6–7% of the total (WHO, 2004[b]). Therefore, risk factors are considered as well-known predictors for future hypertension events (Chan, 2005; Niskanen, 2004; Sharma et al., 2006). They are more prevalent in patients with hypertension than in non-hypertensive people, these differences may be attributed to socio-cultural differences or to psychosocial variability (Yan, 2003).

Oklahoma: A study was conducted by Han (2011) showed that, most respondents with hypertension were aged 45 years or older (84.2% vs. 46.3%) and overweight or obese (63%, 70.2% Vs 59.8%). Almost two-thirds of the respondents with hypertension were married, and more than half had lower levels of education.

Sub-Saharan Africa: Kengne et al., (2007) conducted their study among adults aged (15–99) years. They found that, hypertension was more common among illiterate less than primary school (60%), smoking habits were six times more frequent in men and 85% of participants reported alcohol consumption. Sedentary lifestyles at work and at leisure time were prevalent. Women displayed high prevalence of obesity. The prevalence of hypertension increased with age in both sexes. The risk of hypertension significantly increased with clustering of risk factors (P=0.001) like age, obesity, low physical activity and positive family history of hypertension and in men (P=0.008).

China: The International Collaborative Study of CVD in Asia conducted (2000-2001) to estimate the prevalence of hypertension in the general adult population in China. The study results indicated that, hypertension is highly prevalent in China (27.2%), the prevalence increased with advanced age, occurring most often in people aged (65 to 74) years and in men. The percentages of those that are aware, treated, and controlled are unacceptably low (GU et al., 200*2*). Additionally, Sun et al., (2007) estimate the prevalence of pre-hypertension and hypertension in the rural adults of Liaoning province of China. The study revealed a high prevalence of pre-hypertension and hypertension. The prevalence of hypertension was 37.8%, women seem to develop hypertension most often than men (38.6% vs. 37%).

Portugal: Macedo et al., (2005) conducted their study regarding the prevalence of hypertension and its risk factors among Portuguese adult population aged 18-90 years, revealed that, 42.1% had hypertension. The prevalence of hypertension increases with age occurring most often in people over age 35 years. Men seem to develop it most often than women. The prevalence of hypertension in the three age groups studied (younger than 35 years, 35-64 years, and older than 64 years) was (26.2, 54.7 and 79%) in men and (12.4, 41.1 and 78.7%) in women respectively.

United States: In the US, about 72 million people have HBP, which are about one in three adults (NHLBIDCI, 2008[a]). In addition, Data from the National Health and Nutrition

Examination Surveys (2005-2006), revealed that, 29% of all US adults 18 years and older had hypertension, 28% had pre-hypertension, and 78% were aware of their condition. The prevalence of hypertension was nearly equal between men and women. Overall, 68% of hypertensive adults were using antihypertensive medication, among them 64% achieved BP less than 140/90 mmHg (Ostchega et al., 2008). Additionally, the prevalence of hypertension among African Americans in the US is among the highest in the world (AHA and ASA, 2011). Non-Hispanic black women have two times higher prevalence of diabetes than non-Hispanic white women, 77.7% are overweight and obese, while 70.8% of non-Hispanic black men are overweight and obese (AHA and ASA, 2011). Physical inactivity is more prevalent among African Americans than Caucasians. Among non-Hispanic blacks, only 29.3% are considered regularly active. Additionally, 22.9 % of black males and 18.8% of black females smoke cigarettes. This increased a person's risk for stroke by two to four times (AHA and ASA, 2011).

Risk Factors in EMR

Hypertension diseases affect on the average about one quarter of the population in the EMR (12% -35%). Pre-hypertension doubles the risk for developing hypertension and should be treated essentially with lifestyle modifications (WHO, 2004[a]). Risk factors in countries of the region include smoking (16%-35%), diabetes (7%-25%), overweight (40-70%), dyslipidemia (20- 45%) and physical inactivity (70%- 85%) (WHO, 2004[a]). Lowering BP reduces stroke by 35%-40%, MI by 20%-25% and HF by more than 50% (WHO, 2004[a]). Preventive efforts should concentrate on treating obesity, DM, healthy nutrition, cessation of smoking and physical activity.

Iran: In 2005**,** a survey of risk factors of NCDs was conducted among Iranian adult population to estimate the total prevalence of hypertension. Approximately 25% Iranians aged 25–64 years had hypertension; additionally, 46% had pre-hypertension. Among hypertensive patients, 34% were aware of their elevated BP; 25% were taking antihypertensive medications. Hypertension and pre-hypertension were associated with age, male gender, obesity, hypercholesterolemia, and diabetes (Esteghamati et al., 2008).

Jordan: A cross-sectional study was conducted between February and July 2006 to assess the frequency of metabolic syndrome among patients with hypertension aged between 25–80 years attending family practice clinics in the university of Jordan Hospital. The study

found that, 65% of hypertensive patients had metabolic syndrome. DM was the most frequent component of metabolic syndrome in males, while LDL-c and high waist circumference ranked first and second component of metabolic syndrome in females. About 15.1% of the patients reported current tobacco smoking, 79.1% physically inactive and 51.6% were obese (Yasein et al., 2010).

Egypt: A cross-sectional national survey in six Egyptian governorates investigated the role of environmental and demographic factors as risk factor for hypertension. The study revealed that, 26% had hypertension. Hypertension was more prevalent in the following groups: unemployed (49.7% vs. 25.3%), socially isolated- living alone (59.7% vs. 29.9%), low educated (34.1% vs. 24.2%), and obese (39.8% vs. 26.5%). Hypertension prevalence increased progressively with age, and it was more prevalent in urban than rural areas (Ibrahim, 1996)**.**

Iraq: A case control study was conducted in Iraq to examine the prevalence of hypertension risk factors among Iraqi population aged 26-74 years. The study showed that, a higher prevalence of risk factors among case than control with positive and significant relationships. Hypertension risk factors prevalence was physical inactivity 79.6 vs. 65.2, obesity 37.1% vs. 30.3%, family history of hypertension 64.3 vs. 48.9 and DM 26.2 vs. 14.9 (Al-Asadi, 2010). Smoking is also a risk factor for hypertension but in contradictory, Al-Asadi (2010) found that, the percentage of ex-smokers among the hypertension group was greater than control group (11.3% vs. 3.6%). This might because, patients with hypertension recognized the harmful effects of smoking or had been advised by a physician to quit smoking. Additionally, employees can learn to utilize more relaxed working styles if demands and deadlines at work and fear of job loss are diminished to a more acceptable level (Singer et al., 1986 as mentioned in Al-Asadi, 2010). Therefore, intervention such as counseling and behavior therapy to identify objectionable behaviours and replace them with healthier type of behaviour, and health education to avoid stressful situations may reduce the need for more harmful antihypertensive medication (Al-Asadi, 2010).

KSA: A report of WHO (2006), revealed that, epidemiological data indicated an alarming rise in trends relating to incidence and prevalence of DM and hypertension in KSA. Trends of hypertension disease in inpatients hospital admission records increased from 644, 353 in (1994) to 1, 055, 583 in (2002), while the prevalence of DM was over 15% in

adults with increasing from 1, 019, 652 in (1994) to 1, 596, 927 in (2002). In response to these marked increased in these diseases, Saudi MOH established a NCDs unit in 2003. A diabetes centre has been established in each region to mainstream diabetic care at all levels of the health system that aimed to reduce future diabetic complications, which currently projected to take up to 40% of hospital services in future decades. Smoking remains a major problem with 20% of the adult population (males over 15 years at 38%, and females 2%). A national anti-smoking campaign is under way, and it considered the first city in the Healthy Cities Project is now smoke-free in public places.

Additionally, Al-Hamdan et al., (2010) mentioned that, overall prevalence of hypertension was 11.5%. Hypertension prevalence increases with increasing age and BMI. There were significant gender and age differences. Females had significantly higher prevalence than males (12.8% compared to 10.2%). There were also significant regional differences. The highest prevalence was in the central region and the lowest was in the southern region (15.3% compared to 7.6%). Prevalence of hypertension was also significantly higher in illiterates and post university educated, retired, and unemployed subjects. It was lowest among students. Subjects with very low or very high family income tended to have higher hypertension. Hypertension was significantly higher in subjects with diabetic, hypercholestremic, ever smoking, physically inactive and higher BMI. About 74% of patients were on prescribed treatment, and less than 7% were getting advice from traditional healers or taking herbal medications. Females used prescribed treatment, dietary control, and herbs significantly more than males, while males quitted smoking as a treatment modality significantly more than females. Older patients used treatment, medications, dietary control, and weight reduction significantly more than younger patients. The central region patients used weight reduction and exercise significantly more than the other regions.

Risk factors for hypertension among Palestinian refugees outside the Occupied Palestinian Territory

The reduction of communicable disease incidence combined with a longer life expectancy and modifications in lifestyle have led to a change in the refugees' morbidity profile with the emergence of NCDs. The highest detection rate of DM in Palestinian refugees older than 40 years accessing NCD clinics run by UNRWA was noted in Syria (10·8%), and the highest prevalence of hypertension in Lebanon (20·2%). These rates are service based and

therefore lower than the expected prevalence rates in the EMR, which almost 26% of hypertension and 7·7% of diabetes (Sabatinelli et al., 2009). Additionally, the global change in eating habits and lifestyles is leading to higher physical inactivity and to higher caloric intakes of fat and carbohydrates accompanied with a persistent lack of micronutrients among the Palestinian refugees who live outside the Occupied Palestinian Territory. Obesity is highly prevalent reaching 53·7% in women in Jordan, while the lowest prevalence was found in Lebanon (men 23·6%, women 40·6%) (Sabatinelli et al., 2009). On other hand, Mousa et al., (2010) conducted their study to evaluate NCDs screening activities among 7762 refugees for hypertension and type II diabetes in Jordan, Syrian Arab Republic, Lebanon, GS and WB. About 9% of screened people were diagnosed with hypertension and diabetes. Differences in risk factors detection and screening outcome related to differences in lifestyle. Being older than 40 years, obese, or with a positive family history of diabetes or CVD increased the risk of presenting with hypertension and or hyperglycemia (3.5, 1.6 and 1.2 times respectively).

Risk factors for hypertension in Palestine

A study conducted by Husseini et al., (2009[b]) mentioned that, CVDs are the major causes of morbidity and mortality in the Occupied Palestinian Territory resulting in a high direct cost of care, high indirect cost in loss of production, and much societal stress. The rates of the classic risk factors for atherosclerotic disease mainly hypertension, DM, tobacco smoking, and dyslipidemia are high and similar to those in neighboring countries. The urbanization and continuing nutritional change from a healthy Mediterranean diet to an increasingly Western-style diet is associated with reduced activity, obesity, and a loss of the protective effect of the traditional diet. The response of society and health-care system to this epidemic is inadequate. Additionally, there is scarcely published information on hypertension disease risk factors in Palestinian population. However, a brief look in the survey results provided by MOH Annual Report of Health Status, alarmingly the magnitude of hypertension disease burden as considered one of the major causes of death among Palestinian especially older age (MOH, 2006). Furthermore, El-Dabbakeh (2000), conducted a case control study to identify the most common CHD risk factors among adult population with different age groups in GS. The study showed that, the most common identified CHD risk factors were physical inactivity (53%), hypertension and obesity (43% for each), family history (38%), DM (34%), high LDL-c (34%), elevated TC level (33%), smoking (29%), low HDL-c (27%), hyperuricemia (25%), and elevated TG level (14%).

Another study conducted by Abu-Tawilla (2001), to explore the prevalent risk factors for AMI in GS community. The study revealed that, AMI dominantly attacks males (75.1% for males vs. 24.9% for females). The most common AMI risk factors were overweight and obesity (80.4%), tobacco smoking (51.7%), DM (37.9%), family history for CAD (34.4%), hypertriglyceridemia (28%), hypertension (27.4%), and hypercholesterolemia (20%). Another survey conducted by Abdel-Rahim et al., (2003) found that, the prevalence of obesity was 36.8% and 18.1% in rural women and men respectively compared to 49.1% and 30.6% in urban women and men respectively.

A more recent survey carried out by the Heart Institute and Epidemiology Unit, Hadassah-Hebrew University Medical Center to evaluate the coronary risk characteristics among Palestinian and Israeli women with CAD in Jerusalem. The study finding reflect that, Palestinian Arab women in Jerusalem appear to have more diabetes and exhibit lifestyle factors (lower socioeconomic status, suffered more passive smoking and were less physically active) that generally increase the risk for CHD than Jewish women (Jabara et al., 2007). A combined observational and analytical cross sectional study conducted by UNRWA in NCD clinics in five fields to find out the rate of risk factors associated with CVDs among patients with diabetes and hypertension. The study revealed that, most of the identified CHD risk factors were obesity (61.5%), hypercholesterolemia (37.8%), HBP (30.7%), diabetes (46.7%), physical inactivity (46.8%) and smoking 16.3% (UNRWA, 2006).

Additionally, another study was conducted by Reziq (2006), illustrated that, the main associated factors of hypertension disease were medication, diet, and physical activity. The same study results showed that, the education status affects clients' health and as much as the level of education increased, the compliance status increased. Similarity, Khellah (2010) revealed that, adult Palestinian people aged 19-59 years are at risk of chronic diseases since 11.1% of the sample populations were hypertensive, while only 4% of the population were hyperlipidemic especially in people who live in Gaza city. The result also showed that, 6.7% of the interviewees were diabetic with type 2 DM with approximately equal distribution between Gaza city and North Gaza, while 5.1% of the people in North Gaza were obese according to their doctor diagnosis, 22.4% of the sample population were smokers with a percentage higher in Gaza city. Moreover, approximately 43% of the population was exposed to the smoking environment and 12.1% answered that they have a

diet regimen, among of them 7.3% was following a low salt diet, 5% was following a low fat diet and 2.2% was following a diet special for DM. About 63% of the surveyed adult had sedentary lifestyle while about 30% was following very light work.

On other hand, a case control study was conducted by Elyazjy (2011), aimed to assess the nutritional status of CAD among adult population in GS. The study showed that, male subjects represent 76.2%, while female represents 23.8%. The highest percentage among cases was noticed among age group 60 and more (52.3%), with a percentage higher in Gaza city (40%), unemployed (58.5%). Also regarding to monthly income the same study revealed that, the highest prevalence of CAD was among population above poverty line. While the most common risk factors identified were lack of physical activity (67.7%), obesity (51.5%), history of hypertension (41.5%), family history of CAD (43.8%), history of DM (40%), history of high blood cholesterol level (57%), high LDL-c (27.7%), low HDL-c level (55.4%), high TG level (22.3%), current smoking (43.8%), and passive smoking (41.1%). Also regarding to risk of IHD by food intake, there was a good awareness from CAD patients towards the intake of bran, desserts, eggs, fish, fruits and vegetables, legumes, nuts, rice, salty foods, soda beverages, and vegetable oils, whereas, those patients followed unhealthy intake of coffee, green tea, lean red meat, sweetened fruit juice.

2.13 Contributing risk factors for hypertension

2.13.1 Diabetes Mellitus (DM)

Type 2 DM, accounts for about 90%-95% of all diagnosed cases of diabetes (NSRC, 2008). Risk factors for type 2 DM as changes in diet and reductions in physical activity levels increase resistance to insulin, which in turn rises blood glucose. Genetics play an important role in whether individuals with similar diets and physical activity levels become resistant to insulin (NSRC, 2008). Due to the epidemic nature of diabetes, WHO considered the prevalence of DM as a basic health indicator. Globally, 6% of deaths are caused by high blood glucose, among of them 83% occurring in low and middle-income countries in comparison with lowest rate in high-income countries and the WHO Western Pacific Region. Raised blood glucose causes all diabetes deaths, 22% of IHD, and 16% of stroke deaths (NSRC, 2008). Additionally, a WHO report (2005), revealed that, the association of DM and hypertension is more than that predicted by chance. About 50% of type 1 patients and 80% of type 2 DM have hypertension. The development of

hypertension also increases all the complications of diabetes (Khatib and El-Guindy, 2005). In addition, there has been a recent rapid increase in the prevalence of diabetes, particularly type 2 in the EMR; this might be related to the significant social and economic changes in the region with rising rates of obesity, smoking and sedentary lifestyle. The prevalence rate in adults varies between 7% and 25% (WHO, 2004[a]). While Preidt (2011[a]) illustrated that, CDC says diabetes now afflicts 26 million Americans, while another 79 million people in US have pre-diabetes. The CDC estimates another 7 million people have undiagnosed diabetes. By 2050, one in three people in the US may have diabetes if current trends continue. Additionally, Preidt (2011[b]) mentioned that, CDC found diabetes rates continue to soar among racial and ethnic minorities. Among adults, diabetes rates were about 16% for American Indians and Alaska Natives, 12.6% for blacks, nearly 12% for Hispanics, and 8.4% for Asian Americans, in comparison to 7 % for whites. Fully 50 % of people 65 years and older have pre-diabetes, and nearly one third have diabetes. According to the CDC, diabetes is the seventh leading cause of death in the US and now costs $174 billion a year. In addition, experts in CDC mentioned that, there is one very big reason for type 2 diabetes' continuing rise among Americans - weight gain. The percentage of US adults who are overweight or obese has risen dramatically. Additionally, other experts explained that, one of the reasons the incidence of diabetes has been increasing in the last few years is because the American Diabetes Association lowered the guidelines to increase exercise and decrease carbohydrate intake (Preidt, 2011[b]).

In Palestine, DM also seems to be a serious health problem among the Palestinian population especially in middle-aged population. This fact may be concluded from global estimates of the WHO and by extrapolation from similar ethno-genetically population of neighboring countries. In 2000, the prevalence rate of DM is about 9%. It is around the reported rate in Egypt and Tunisia (9%) and less than in KSA (12%) and in Oman 13% (MOH, 2003). In 2002, the incidence of diabetic patients with obesity was 58.7 % out of total diabetic cases (43% males and 69.5% females), while the proportion of overweight diabetic patients was 27.4 % (36.6% in males and 21.1% in females) (MOH, 2005). Additionally, data reported from AL-Rimal Diabetic Clinic revealed that, out of the total new reported cases of diabetic, about 44.3% aged between 50-64 years and only 4% of cases aged less than 30, males constitute about 51% (MOH, 2005). In addition, the number of diabetic Palestinian refugee patients (including those with hypertension) was 14,726 by the end of 2002 under the supervision of UNRWA in GS, among of them 4.3%

aged 40 years and more in 2000 and 4.7% in 2001(MOH, 2003). This supports the result of the data collected by UNRWA health care facilities in 2009, revealed that, approximately one third of NCD patients suffer from the double burden of diabetes and hypertension. The same study mentioned that achieving acceptable control is more difficult and the probability of developing adverse outcomes including end-stage complications, disability and premature death is higher among patients who have both diseases. CVDs are the most common disorders associated with diabetes and/or hypertension, mainly due to atherosclerosis of coronary arteries, and increased load due to elevated BP. More than 65% of people with diabetes and/or hypertension die from heart disease or stroke, while 10-20% of all people with diabetes have nephropathy (UNRWA, 2009[c]). Additionally, a cross sectional survey of urban Palestinian population of 492 men and women aged 30-65 years, revealed that, the prevalence of DM was 12% of the surveyed population in 2001 (Abdul-Rahim et al., 2001 as mentioned in MOH, 2005). This is consistent with the result found by PCBS of the Demographic and Health Survey, showed that, 2.2% of the reported cases suffered from DM in 2004. This percentage increased to 21.2% among elderly aged 65 years, while it was 11.1% among age group of 40-64 years and 0.4% among age group 18-39 years (PCBS, 2004 as mentioned in MOH, 2005). By contrast, World Health Statistics Annual Report in 1998 mentioned that, the estimated prevalence of DM in Egypt, Jordan, and Syria is 2,000–12,000 per 100,000. The situation in the WB and GS is probably similar since many of the same risk factors (unhealthy diet, obesity, and sedentary lifestyle) are present (Rionda and Clements, 2000).

2.13.2 Physical inactivity

Physical inactivity is a term used to identify people who do not get the recommended level of regular physical activity. The AHA recommends 30-60 minutes of aerobic exercise three to four times per week to prevent CVDs**,** improve health, maintain fitness, some cancers and type 2 diabetic, delay many of the effects of aging, enhance emotional well-being, and improve body image and self-esteem (Department of Health, 1999). Physical activity also controls body weight, so according to WHO (2005), BP is lowered by 1.6/1.1 mmHg for every kg of weight loss (Khatib and El-Guindy, 2005). Exercise combined with behavioral therapy might even help manage the symptoms related to fatigue, distress, cognitive problems and mental health functioning. The actual activity in the brain is promoted by regular aerobic exercise. Exercise also improves problem solving and other brain-related abilities (Gale Encyclopedia of Medicine - GEM, 2008[a]). People, who are

inactive, tend to have higher heart rates - harder heart work with each contraction - and stronger force on arteries (Mayo Clinic, 2010). Physical inactivity is a significant risk factor for CVD; it is estimated to cause around 35% of CHD mortality in US (NSRC, 2008). Approximately 60% of all Americans aged 18 years and older reported that they are physically inactive. It ranks similarly to cigarette smoking, HBP, and elevated cholesterol (NSRC, 2008). Additionally, a Report of American Surgeon General on Physical Activity and Health recommended the minimum level of physical activity required to achieve health benefits was a daily expenditure of 150 kilocalories in moderate or vigorous activities. This recommendation agrees with the guidelines established by the CDC and American College of Sports Medicine. It is also consistent with the consensus statement from the National Institutes of Health, recommending adults to accumulate at least 30 minutes of moderate activity most days of the week **(**Department of Health, 1999).

Physical activity occurs across different domains, including work, transport, domestic duties and during leisure. In low-income countries, most activity occurs during work, chores or transport, while in high-income countries, most activity occurs during leisure time. According to the WHO Stepwise survey in 2003-2007, revealed that, the highest prevalence of low physical activity was reported in Sudan (86.8%) followed by Egypt (70.4%), while the lowest score registered in Syrian Arab Republic (31.15%), followed by Jordan (51%). In Iraq, the prevalence of low physical activity was 56.7%, KSA 67.7% in comparison to Kuwait 64.7%, Oman 69.9%, and Islamic Republic of Iran 67.5% **(**WHO, 2011[e]).

Physical inactivity is estimated to cause around 21–25% of breast and colon cancer burden, 27% of diabetes and 30-50% greater risk of developing HBP (Department of Health, 1999). Physical inactivity is more prevalent among women, blacks and Hispanics, older adults and the less affluent. People with less than 12th grade education are also more likely to be sedentary. In addition, people who are physically disabled, injures that limit movement, adolescents, and overweight all have elevated levels of sedentary behavior (Department of Health, 1999). Additionally, behavioral risk factors surveillance system mentioned that, 59% of the New York population in 1996 reported a sedentary lifestyle (58% of men vs. 60% of women) (Department of Health, 1999). The non-white population had a 6% higher level of sedentary lifestyle. Moreover, 20% of the population meets the criteria for regular and sustained activity levels (21% of men vs. 19% of women)

(Department of Health, 1999). Additionally, the upward trend in hypertension burden is due to do not enough national rates of self-reported moderate or vigorous physical activity at recommended frequencies among US adults during leisure time (≤33%) (GEM, 2008[a]). Similarly, the AHA (2003) released a statement saying that, exercise was beneficial even for patients awaiting heart transplants. Women who participated in strenuous physical activity over a number of years could reduce their risk for breast cancer (GEM, 2008[a]). Another research showed that, men and women aged 40-50 years who exercised moderately for 60-90 minutes a day were less likely to catch a cold than those who sat-around (GEM, 2008[a]). Physical inactivity has a major economic impact through the loss of income, and productivity when disabling diseases result. It was estimated that physical inactivity cost the nation $5.7 billion due to hospitalizations and other related health care costs (Department of Health, 1999).

2.13.3 Smoking and oral tobacco use

The risk of CVD in smokers is proportional to the number of cigarettes smoked and how deeply the smoker inhales, and it is apparently greater for women than men. The risks of pipe and cigar smokers seem to fall between those of non-smokers and cigarette smokers (RR 1.3, 95%CI 1.1 to 1.5) for IHD, with a dose response relation (Padwal et al., 2001). Smoking's negative effect is probably the single most powerful lifestyle measures. It is the most preventable risk factor. Globally, it increases the risk of death from lung cancers (71%), heart disease and stroke (10%), and chronic respiratory disease (42%). On average, smoking costs 13 years of life to a male smoker and 14 years to a female smoker (UCSF Medical Center, 2011). Additionally, environmental tobacco smoke (ETS) and smoking during pregnancy also harm others. Secondhand smoking (SHS) is the smoke that fills restaurants, offices or other enclosed spaces when people burn tobacco products such as cigarettes and water pipes. There is no safe level of SHS. Smoke-free laws protect the health of non-smokers (Scollo et al., 2003). SHS causes 600,000 premature deaths per year (WHO, 2011[f]). In 2004, children accounted for 28% of the deaths attributable to SHS (WHO, 2011[f]). In adults, SHS causes serious CVDs and respiratory diseases, including CHD and lung cancer. In infants, it causes sudden death, while in pregnant women; it causes low birth weight (WHO, 2011[f]). Exposure to smoke - SHS - increases the risk even for non-smokers, despite this; it is common throughout the world. A number of countries have legislation restricting tobacco advertising, and regulating who can buy and use tobacco products, and where people can smoke (UCSF Medical Center, 2011).

According to WHO (2004[b]), smoking is responsible for about 12% of male deaths and 6% of female deaths in the world, while almost one in every eight deaths among adults aged 30 years and over. On other hand, total tobacco-attributable deaths are projected to rise to almost 10% of all deaths globally in 2030 (WHO, 2008[b]). Furthermore, as inferred in the literate, smoking is currently a very important determinant of CVDs mortality among men in all regions of the world and among women in industrialized countries. The proportion of CVDs deaths caused by smoking exhibited large variations among different regions in the world. CVDs mortality among men smokers were from ≤10% of total CVDs mortality in Sub-Saharan Africa and parts of Latin America and the Western Pacific to ≥23% in industrialized regions of Europe and North America, while among women smokers were from ≤5% of total CVDs mortality in the developing world to >20% in North America (Yusuf et al., 2001). Smoking also caused large numbers of deaths from cerebrovascular disease in several developing regions. This interregional variation occurs because the shape and maturity of the smoking epidemic is highly affected by region-specific socioeconomic and cultural determinants of smoking and because background mortality varies across populations (Yusuf et al., 2001). Additionally, cigarette smoking can repeatedly produce a temporary rise in BP of approximately 5-10 mmHg. This effect may be most prominent with the first cigarette of the day in habitual smokers (NSRC, 2008). However, research indicated that, regular smokers have lower BP than non-smokers; this may be due to weight loss associated with smoking. Experts agree that, smoking should be avoided in any person with HBP because, it can substantially increase the risk of secondary CVDs complications such as atherosclerosis, enhance the progression of kidney disease, and increases the chances of men having erectile dysfunction (NSRC, 2008).

According to WHO, smoking is increasing in many low and middle-income countries, while slowly decreasing in many high-income countries. Additionally, death rates for smoking caused diseases are lower in low-income countries. This reflect the lower past smoking rates in low-income countries (7.2%) in comparison with the higher past smoking rates in high-income countries 17.9% (WHO, 2004[b]). Furthermore, according to WHO Stepwise data of risk factors from selected countries in the EMR (2003–2007) to highlight the current situation of smoking found that, the highest level was in Jordan (29%) followed by Syrian Arab Republic (24.7%), while the lowest level registered in Oman (9.3%) followed by KSA (11%). The prevalence rate of smoking in Iran was 13%, Sudan 12%, Egypt 18%, Kuwait 20.6% and Iraq 21.6% (WHO, 2011[e]). Additionally, a study

conducted in Bahrain by Abdul- Wahab et al., (2002) mentioned that, the prevalence of smoking habit was 29.5% of the male subjects aged 19 years and more reported to be regular smokers compared to 18.6% of the females. The percentage of male smokers was almost the same among all male age groups (19-29, 30-39, 40-49, 50-59, 60-69 and 70+). However, the percentage among females was less by 7% up to age of 39 years, and it increased thereafter. Almost 88% of male smokers were either illiterate or received less than high school education compared to 99.5% in the females. As for type of smoking, 72.1% of the males reported to smoke cigarettes and 96% of the female reported to smoke shisha. In addition, Majid et al., (2005) mentioned that, the health benefits of smoking cessation occur faster for CVDs than other diseases. This is in agreement with other studies mentioned that, policies that prevent and reduce smoking should be immediate for motivating global tobacco control efforts such as the Framework Convention on Tobacco Control so large benefits for reducing cardiovascular mortality (Cohen et al., 2004; Pruss-Ustun et al., 2004; Rehm et al., 2004; USDHHS, 2001).

In Palestine, data from MOH Annual Report (2003), mentioned that, the prevalence of smoking among individual 12 years and above was 22.1% (18.6% in GS and 23.9% in WB; 40.7% among males and 3.2% among females). Additionally, Obaid (2010) revealed that, smoking was not very common among elderly since only 11.3% of respondents were smokers but this did not mean absence of the problem since about 36% were smoking in the past and 29.7% were living with smokers. For smokers, 54.8% had smoked for 31-60 years, and 40% had smoked more than one packet per day.

2.13.4 Overweight and obesity (High BMI)

Body weight and incidence of CVD are positively associated in both sexes after adjustment for other risk factors, but obesity is a more potent risk factor in women than men and in younger than older people (Padwal et al., 2001). The prevalence of obesity is increasing throughout the world in both affluent and poorer countries, and it becomes a world health problem because of its association with increased morbidity from many chronic diseases. Chronic overweight contributes also to osteoarthritis – a major cause of disability. Additionally, although there are genetic components to obesity, the increased prevalence of obesity cannot be attributed solely to a change in the genes. An increase in the incidence of the obesity can be attributed to environmental factors, which lead to increased energy intake and or to decrease in physical activity that have resulted in a positive energy balance

(Gibney et al., 2006). On other hand, WHO (2009[b]) mentioned that, more than one billion people worldwide were overweight and more than 300 million were obese in 2005. Overweight and obesity are increasing worldwide due to changes in diet and increasing physical inactivity. Rates of overweight and obesity are projected to increase in almost all countries to 1.5 billion people will be overweight in 2015. Globally, 44% of diabetes burden, 23% of IHD burden and 7–41% of certain cancer burdens are attributable to overweight and obesity (Chobanian et al., 2003). Obesity is one of the major risk factors for hypertension. A weight loss of ≈10 kg is associated with ≈5-10 mmHg reduction in SBP (Chobanian et al., 2003). In both South East Asia and Africa, 41% of deaths caused by high BMI occur under age 60 compared with 18% in high-income countries. Average BMI is highest in Americas, Europe and EMR (NSRC, 2008).

Additionally, WHO terms obesity as a worldwide epidemic; and the diseases, which can occur due to obesity are becoming increasingly prevalent (GEM, 2008[b]). On other hand, overweight is the only NCD risk factor that has been measured in Guatemala at the national level (Marini and Gragnolati, 2003). Additionally, a study conducted in Guatemala by Torun et al., (2002) revealed that, 34% of women aged 15-49 years were overweigh in 1999, while in 2000, the National Survey on Living Conditions revealed that, the prevalence of overweight in adult women was 48% compared with 34% among men. Another study conducted in middle–class urban workers in Guatemala found that the prevalence of overweight was 26% in women compared to 42% in men (Pontaza et al., 2007). Additionally, a study conducted in EMR by WHO Stepwise survey (2003-2007) found that, Kuwait showed the highest prevalence of overweight and obesity (75.4%) followed by KSA (68.8%), while Oman has the lowest score (29.6%) followed by Iran (42.8%). The prevalence rate of overweight and obesity in Sudan was 53.9%, Egypt 66% in comparison to Syrian Arab Republic 56.3%, Jordan 57% and Iraq 66.9% (WHO, 2011[e]).

In Palestine, the Union of Palestinian Medical Relief Committee (UPMRC) screened 2,482 people through their mobile clinics for obesity, hypertension, diabetes and dyslipidemia. The preliminary result showed that, overweight and obesity were present in 77%, among of them 47% were obese, while hypertension prevalence was 31%, diabetes 18% and dyslipidemia 49%. These results were associated with older age included men and women between 35-65 year (UPMRC, 2001 as mentioned in MOH, 2005). Similarity, Husseini et al., (2009[a]) conducted a cross sectional study in two Palestinian communities in WB

among adults aged 30–65 years showed high rates of obesity. Rates in the urban population were higher than those in rural community. Obesity was highest in urban women and lowest in rural men. Additionally, Al-Majdalawi (2008) revealed that, the prevalence of obesity was higher among refugees' women; women lived in nuclear family, non-worker women, women more than 35 years, and low educated women. Also regarding to monthly income the same study revealed that, the highest prevalence of obesity among population above poverty line (38%), while 40.1% have relative obese. Similarity, a cross-sectional study conducted by Stene et al., (2001) in a prototypic semi-rural Palestinian village in the central WB. The study showed that, the prevalence of obesity among the study population was very high compared to most other countries in the world particularly among women (37.5% among women vs. 18.8% among men). The prevalence of abdominal obesity was 62.5% among women compared to 14.8% among men. BMI seemed to be the more important correlate of BP, whereas waist-hip ratio seemed to be the more important correlate of serum TG compared to the other obesity measures. This is in agreement with the study conducted by Obaid (2010) in Gaza city and North Gaza, revealed that, obesity is a major problem among the elderly people since 80% of participants were overweight and obese. While El-Dabbakeh (2000), mentioned that, people who have excess body fat are more likely to develop heart disease. The data of the study revealed that, overweight and obesity were highly prevalent among cases (43%) compared to controls (31%).

2.13.5 Lifestyle and dietary habits

Some risk factors for getting hypertension can be changed while others cannot. Age, sex, and race are risk factors that a person cannot do anything about. Some people inherit a tendency to get hypertension. People with family members who have hypertension are more likely to develop the disease. People with these risk factors can avoid or eliminate the other risk factors to lower their chance of developing hypertension. A report of a clinical trial mentioned that, adults with hypertension could be lowered BP as much as 38% by making lifestyle changes and participating in the DASH diet (Dietary Approaches to Stop Hypertension), which encourages eating more fruits and vegetables (GEM, 2008[c]). Lifestyle changes that may reduce BP include reducing salt intake, reducing fat intake, losing weight, getting regular exercise, quitting smoking, reducing alcohol consumption, and managing stress. These non-pharmacological measures can be sufficient to control BP or to decrease the amount of required medications and to prevent, treat or remove

associated risk factors. Therefore, a structured program of lifestyle measures should be an integral component to overall management plan for the hypertensive. Such measures should be used before considering drug treatment, especially in those with mild hypertension (TSP JNC PDET HBP, 2004).

Non-healthy diet; may directly affect the development of atherosclerosis, the underlying cause of CVD. Diet also affects blood cholesterol levels, body weight, BP, and blood glucose level; changing these lifestyle habits including the way people eat, has known to be effective in managing these risk factors. Obaid (2010) revealed that, high percent of elderly Palestinian people (63.4%) were asked by their doctors to follow special diet due to prevalence of chronic diseases, out of them 87.8% were asked to follow low fat diet, 86.3% were asked to follow low salt diet, and 86.7% were asked to follow diabetic diet, but the compliance was only 34.6%.

Sedentary lifestyle, particularly prevalent in affluent societies such as in the US, can contribute to weight gain. Psychological factors, such as depression and low self-esteem may in some cases, also play a role in weight gain and heart diseases including hypertension. Similarity, recent studies indicated that the amount of fat in a person's diet might have a greater impact on weight than the number of calories contains**.** Eating habits and patterns of physical activity also play a significant role for weight a person gains (GEM, 2008[b]). Additionally, a high quality cohort study of middle-aged men followed for 16 years showed that, physical fitness is a graded and independent predictor of CVDs mortality (Padwal et al., 2001).

Meat (lean red and white), fried food, milk/products

Fat is considered as an undesirable constituent of human diets. It has been linked to obesity and CVDs, but it plays an important role in meeting nutrient requirements, and certain types of fat offer protection from heart disease. Fat, particularly the type of fat rather than the total amount consumed seems to be the most important macronutrient in relation to BP regulation. A recent multicenter intervention trial has shown a significant reduction of systolic and DBP (an average of 3 mmHg) when moderate amounts of saturated fat were replaced with monounsaturated fat (Gibney et al., 2006). Meat is the biggest source of protein, is common in the average diet of most developed countries. Virtually all the food we consume, both plant and animal contains some protein. On a worldwide basis, the most

important sources of protein are cereals. Sanders and Emery (2003), mentioned that, the recommended daily intake of protein was 0.75 g/kg body weight of adults. Replacing fatty meat and meat products with lean meat and fish is emphasized, as using dairy products with a decreased fat content, and using vegetable oils sparingly in place of animal fats. In adults, the lower limits for fat-intake (15% total energy intake) are set to ensure an adequate intake of fat-soluble vitamins and essential fatty acids, and to help meet energy needs. An upper limit (30-35% energy intake) is set to help decrease the risk of obesity. Limits are set on the amount of saturated (usually less than 10% energy), and trans fatty acids (less than 2% energy), present in the diet as high intakes of these fatty acids have been linked to an increased risk of CVDs. Similarity, USDHHS and U.S. Department of Agriculture - USDA (2005), recommended that, total fat intake should be between 20-35 percent of calories for adults, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils. When selecting and preparing meat, and milk/products, make choices that are lean, low fat, or fat free trim away visible fats, broil, roast, or boil instead of frying. Lean red meat trimmed from visible fat is a rich source of protein and magnesium. High intake of saturated fats, trans fats, and cholesterol increases the risk of unhealthy blood lipid levels, which in turn, may increase the risk of CHD. A low intake of fats and oils (less than 20% of calories) increases the risk of inadequate intakes of vitamin E and of essential fatty acids and may contribute to unfavorable changes in HDL blood cholesterol and TG.

Olive oil is beneficial for health due to both its high content of monounsaturated fatty acid (omega-9 oil), and antioxidants substances (particularly vitamin E and phenols) because it is less processed. Studies have shown that olive oil offers protection against heart diseases by controlling LDL "bad" cholesterol levels while raising HDL "good" cholesterol levels. So people who consumed 25 ml - about 2 tablespoons - of olive oil daily for one week showed less oxidation of LDL-c and higher levels of antioxidant compounds particularly phenols in the blood (Willett, 1990).

Dairy products (preferable fat free) are the main sources of calcium, potassium, magnesium, zinc, iron, riboflavin, vitamin A, folate, and vitamin D, which are essential components of bone and can protect from osteoporosis. Adult and children should not avoid milk/product because of concerns that these foods lead to weight gain. There are many fats free and low fat choices without added sugars that are available and consistent

with an overall healthy diet plan which recommended 2-3 serving of milk/product daily (serving=one cup of milk or equivalent) (USDHHS and USDA, 2005).

Eggs

Eggs are a nutritious, inexpensive and convenient food but they are rich in cholesterol (about 230-270 mg/egg). The Department of Health recommends the general population no rise in cholesterol intake (Truswell, 2003). Additionally, Hu et al., (1999) suggested that, consumption of up to one egg per day is unlikely to have substantial overall impact on the risk of CHD or stroke among healthy men and women. The apparent increased risk of CHD associated with higher egg consumption among diabetic participants. While Krauss et al., (1996) mentioned that, to avoid elevations in blood cholesterol and reduce CHD risk, the public has been advised to consume no more than 300 mg/day of cholesterol and limit consumption of eggs, which contain about 213 mg of cholesterol per egg. However, Hu et al., (1999) revealed that, eggs contain many other nutrients besides cholesterol, including unsaturated fats, essential amino acids, folate, and other B vitamins. Therefore, consumption of eggs may raise HDL-c levels and decrease blood glycemic and insulinemic responses. Additionally, USDHHS and USDA (2005) mentioned that, people should consume less than 10% of calories from saturated fatty acids and less than 300 mg/day of cholesterol, and keep trans fatty acid consumption as low as possible.

Fish

Controversy has arisen among the public and in the media regarding the health effects of fish intake. Substantial evidence indicates that fish consumption reduces CHD mortality, the leading cause of death in developed and most developing nations. The Department of Health recommends at least twice a week, preferably fatty fish. It should not be fried in saturated fat (Truswell, 2003). Fish contain omega-3 fatty acids, mercury, and selenium as well as polychlorinated biphenyls and dioxins, all have anti-arrhythmic effects which may be partly mediated by effects on BP or heart rate, TG-lowering, anti-inflammatory, and diastolic responses. The magnitude of benefit is substantial, with 36% lower risk of cardiac death with consumption of 1-2 servings of fatty fish per week compared with no intake (Mozaffarian, 2009). Similarity, Chan and Cho (2009), mentioned that, omega-3 fatty acids are abundant in fish oil, and it has strongly linked to lower rates of CVDs, lower TG levels, preventing arrhythmias, reducing inflammation, inhibiting platelet aggregation, and lowering BP, all of which should reduce cardiovascular risk. The recommended

consumption from fatty fish in healthy people is at least twice a week. The recommendation for people with CAD is one gram of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) per day. Additionally, USDHHS and USDA (2005), recommended that, total fat intake should be between 20-35 percent of calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.

Grains (bread, rice, potato, pasta)

Whole grains have a high content of nutrients that are related to beneficial health effects; they are rich with fiber, vitamin E, vitamin B-6, minerals, antioxidants, and phytoestrogens (Jensen et al., 2004). Several studies suggested that a daily intake of 3 servings of whole-grain foods is associated with a reduced risk of CHD, reduce the risk of several chronic diseases and may help with weight maintenance. All age groups should consume at least half the grains as whole grains to achieve the fiber recommendation (USDHHS and USDA, 2005). Jensen et al., (2004) suggested a strong inverse association between whole-grain intake and risk of fatal and nonfatal CHD, and suggested that, the bran component of whole grains could be a key factor in this relation among US male health professionals. While Banerjee et al., (2004) revealed that, additional components in whole grains (bran or fiber) might contribute to favorable metabolic alterations that may reduce long-term weight gain and inversely related to CVDs among US men.

Fruits and vegetables

Fruits and vegetables are low in fat, and contain pectin and other fibers, flavonoids and other antioxidants, and they contain folate, vitamins and minerals. Expert Committees in Britain and USA recommend five servings of different vegetables and fruits per day (400g/day average weight) (Truswell, 2003). The AHA and other national agencies also recommend a diet that includes ≥5 servings of fruits and vegetables daily. These recommendations are based primarily on the belief that fruit and vegetable intake may reduce CVD risk through the beneficial combinations of micronutrients, antioxidants, phytochemicals, and fiber. Additionally, Liu et al., (2000) conducted a large prospective cohort study among American female health professionals. Data suggested that, women with high fruits and vegetables intake were older, smoked less, and exercised more than were women with low fruit and vegetable intake. Fruit (2-4 serving/day) and vegetable (3-5 servings/day) intake was inversely associated with a higher prevalence of diabetes,

hypertension, and high cholesterol, and were associated with lower risk of CVD, especially MI. Similarity, Samman et al., (2003) mentioned that, the risk of CHD is inversely associated with the intake of vegetables in U.S. men, and a higher intake of fruits and vegetables is associated with lower risk of MI in women. In addition, fruits and vegetables are recognized as a source of a number of nutrients that may interact to reduce LDL-c, BP (lower Na/K ratio), and homocysteine (folate), and to improve antioxidant status, and endothelial function. Additionally, USDHHS and USDA (2005), revealed that, four and one half cups (nine servings) of fruits and vegetables are recommended daily for the reference 2000-calorie level, with higher or lower amounts depending on the caloric level. Fruits and vegetables provide a variety of micronutrients and fiber. They are good sources of vitamins A and C, folate, and potassium. In the fruit group, consumption of whole fruits (fresh, frozen, canned, dried) rather than fruit juice for the majority of the total daily amount is suggested to ensure adequate fiber intake. Fruit and vegetable consumption is one element of a healthy diet. It intake varies considerably among countries; reflecting economic, cultural and agricultural environments. Insufficient intake of fruits and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of IHD deaths, and about 9% of stroke deaths worldwide. In another hand, rates of deaths and DALYs attributed to low fruit and vegetable intake is highest in middle-income European countries and in South-East Asia (NSRC, 2008). Another study revealed that, dietary interventions to reduce diet-dependent net acid load (e.g., increase intake of fruits and vegetables, decrease intake of meat and cheeses, and increase the ratio of potassium to protein in diets, or treatment with alkalizing supplements) could reduce the risk of hypertension (Zhang et al., 2009). Additionally, a study conducted in the EMR by WHO (2003-2007), revealed that, the prevalence of the intake of fresh fruits and vegetables (≤5serving/day) was highest in Syrian Arab Republic (95.7%), followed by KSA (93.45%); while Oman has the lowest prevalence rate (33.2%) followed by Jordan (57%). The prevalence rate in Egypt was 79%, Kuwait 61% in comparison to 91.4% in Iraq (WHO, 2011[e]).

Legumes

Whole beans, soybeans and other legumes are excellent sources of fiber. A one-cup serving of cooked navy beans contains about 19 grams of fiber. Eating a high-fiber diet can significantly lower the risk of heart attack, stroke and colon cancer (Monique and Gilbert, 2001). Similarity, Bazzano et al., (2001) conducted their study among U.S. men

and women mentioned that, legume consumption four times or more per week compared with less than once a week was associated with a 22% lower risk of CHD and an 11% lower risk of CVD. The study indicated a significant inverse relationship between legume intake and risk of CHD. Additionally, legumes are low in sodium and rich in potassium, calcium, and magnesium that decrease the risk of hypertension. In addition, USDHHS and USDA (2005) revealed that, legumes, such as dry beans and peas are rich in fiber and should be consumed several times per week. They are considered part of both vegetable group, and meat and beans group as they contain nutrients found in each of these food groups.

Sweets and salty foods

Carbohydrate is a major source of energy in most human diets. It forms a greater proportion of the diet in poorer countries, since as people become more affluent they tend to replace carbohydrate with fat. Thus carbohydrate accounts for nearly 80 percent of energy in African diets as a whole, and at least 65 percent in Caribbean diets, but less than 50 percent in European and North American diets (Sanders and Emery, 2003). Diets with low simple carbohydrate are recommended to prevent type II diabetes and heart disease (Sanders and Emery, 2003). On other hand, the daily recommended for carbohydrates intake is 45-65% of total calories. Dietary fiber is composed of non-digestible carbohydrates. Diets rich in dietary fiber have been decreased risk of CHD and improvement in laxation. There is also interest in the potential relationship between diets containing fiber rich food and lower risk of type II diabetes. Decreased intake of foods, especially beverages with caloric sweeteners, is recommended to reduce calorie intake and help achieve recommended nutrient intakes and weight control (USDHHS and USDA, 2005). Additionally, Fung et al., (2009) revealed that, women with a higher consumption of sugar-sweetened beverages or soft drinks were more likely to be current smokers, to have lower levels of physical activity, and to have a higher BMI than those with a lower intake. Regular consumption of sugar-sweetened beverages or soft drinks is associated with a higher risk of obesity, type II diabetes, atherosclerosis and CHD in women, even after other unhealthful lifestyle or dietary factors are accounted for.

Salt (or sodium chloride) may cause fluid retention and thereby cause pressure around the blood vessels, which can lead to hypertension (Mayo Clinic, 2010). Approximately 60% of the essential hypertension may decrease BP by decreasing sodium (salt) intake

(NHLBIDCI, 2008[b]). Similarity, Khatib and El-Guindy (2005) found that, reducing the dietary sodium intake to no more than 100 Meq/L reduces the BP to an average of 4-6 mmHg. Additionally, USDHHS and USDA (2005) mentioned that, on average, the higher an individual's salt intake, the higher an individual's BP. Food labels list sodium rather than salt content. When reading a Nutrition Facts Panel on a food product, people should look for the sodium content. Foods that are low in sodium (less than 140 mg) are low in salt. In addition, people should consume less than 2,300 mg of sodium per day. Individuals with hypertension and older adults aimed to consume no more than 1,500 mg of sodium per day, and meet the potassium recommendation (4,700 mg/day) with food. Most epidemiological studies have shown a positive association between dietary salt intakes, BP levels, and the prevalence of hypertension. Most intervention trials indicated that a reduction in salt intake significantly reduces both systolic and DBP. This effect is more evident in hypertensive, diabetic, obese and elderly subjects, while it is less evident in normotensive people. It is recommended to restrict dietary sodium to not more than 100 mmol/day (2.4 g/day of sodium) (Gibney et al., 2006). Additionally, a study conducted in U.S. by Fung et al., (2008) mentioned that, low intake of sodium was significantly associated with lower risk of hypertension, CHD, and stroke in women.

Drink frequency variables

Tea and coffee are beneficial when used in small amounts, but excessive amounts are detrimental to kidney action and may aggravate a tendency to HBP (Mehra and Lashkari, 1992). Coffee contains caffeine that increases BP, cardiac output, and circulating catecholamine. Caffeine is a nonselective adenosine receptor-blocking agent, thus blocking the beneficial effects of adenosine during myocardial ischemia. A study conducted in Kuopio by Happonen et al., (2004) revealed that, the proportion of smokers increased with increasing coffee intake. Among coffee drinkers, intake of total and saturated fatty acids and daily total energy increased while leisure-time physical activity decreased with increasing coffee consumption, serum LDL-c concentration increased dose-dependently with increasing coffee intake. BP was highest in the light drinker category. The heavy consumption of caffeine-containing coffee (daily amounts exceeding 800 ml) causes a substantial increase in the risk of AMI in middle-aged men free from symptomatic CHD. In contradictory, a study conducted in Finland by Kleemola et al., (2000) mentioned that, there is no association between coffee drinking and the risk of non-fatal MI. CHD mortality was highest among non–coffee drinkers, while the prevalence of smoking and the

serum cholesterol level increased with increasing coffee drinking. The DBP was slightly higher among light coffee drinkers (1-3 cups daily) than among non-drinkers.

Sugar-sweetened beverages, or soft drinks, include carbonated and noncarbonated beverages that contain sugar-based caloric sweeteners and are flavored with fruit juice. USDHHS and USDA (2005), mentioned that, people should choose and prepare foods and beverages with little added sugars or caloric sweeteners, such as amounts suggested by USDA Food Guide and the DASH Eating Plan. Since, the greater the consumption of foods containing large amounts of added sugars, the more difficult it is to consume enough nutrients without gaining weight. Similarity, a study conducted among U.S. women by Fung et al., (2009) revealed that, there is a positive association between soft drinks, and weight gain and obesity. In addition, a higher consumption of sugar-sweetened beverages has been linked to an increased risk of developing type II diabetes and CHD.

Stress is a normal part of everyday life. Responses to stress vary from person to person, but chronic (regular) stress can lead to an increase in the release of the stress hormone cortisol from the adrenal glands (above the kidneys). Scientists think that excess cortisol can lead to an increase in BP, an inability of insulin to control blood sugar (insulin sensitivity), inflammation, and weight gain (NHLBIDCI, 2008[b]). In agreement to this result, high levels of stress can also lead a person to try to relax by eating more, using tobacco or drinking alcohol, this increases the problems with HBP (Mayo Clinic, 2010). In addition, hypertension disease interrupts the QOL of hypertensive patient, makes one feels lack of security and confusion, fears of future complications as well as sense of being isolated from the society. This may affect the hypertensive psychological state and increase of more unknown problems. Additionally, Hamer et al., (2008) conducted their prospective study among British healthy adults' men and women (aged 50.9 ± 13.1years). The study measured psychological distress and behavioral (smoking, alcohol, physical activity) and pathophysiological (C-reactive protein, fibrinogen, HDL-c, TC, obesity, and hypertension) risk factors at baseline. The main outcome was cigarette smoking, physical activity, alcohol intake, C-reactive protein, and hypertension independently associated with psychological distress. The risk of CVD increased in relation to presence of psychological distress in age and sex adjusted models.

In Palestine, The sociopolitical divisions, deterioration in economic situation, the implementation of stricter closures, restricted population mobility, unemployment, deep poverty, lack of freedom of self-expression, limited economic and recreational opportunities contribute to high stress levels among the adolescent and adult populations (Giacaman et al., 2009; Stewart-Brown, 1998; Waterston et al., 2009; WHO, 2008[a]; WHO, 2009[a]). Furthermore, it might increase the burden of related diseases such as development of heart disease in younger age cohorts. The incidence of heart disease is estimated at about 1,200 per 100,000 populations (Rionda and Clements, 2000). This is in agreement by the study conducted by Elayyan (2007) confirmed the fact that, QOL deteriorates as the duration of the disease increases. That means, the total scores of QOL of subjects with duration of disease 2-5 years are higher in comparison with subjects with other durations (6-10, 11-15, 16 and above years). Additionally, there was a significant difference between physical, psychological, social domains and the total scores of QOL according to the duration of the disease. This is consistent with the reality; as the duration of the disease increases, patient's age increases and complications as well as side effects of the medication taken by the patient start to appear, which will affect the patient's QOL negatively.

Alcohol contributes to more than 60 types of disease and injury. Over time, heavy drinking can damage heart, raise BP, as it may cause body to release hormones that increase blood flow and heart rate (Mayo Clinic, 2010). However, there is a wide variation in alcohol consumption across regions. Consumption levels in some Eastern European countries are around 2.5 times higher than the global average of 6.2 liters of pure alcohol per year (NHLBIDCI, 2008[b]). The lowest consumption levels are in Africa and in EMR. The regions with the highest proportions of deaths attributed to alcohol were Eastern Europe (more than one in every ten deaths), and Latin America (one in every twelve deaths) (NHLBIDCI, 2008[b]). Worldwide, alcohol causes more harm to males (6.0% of deaths, 7.4% of DALYs) than females (1.1% of deaths, 1.4% of DALYs) reflecting differences in drinking habits, both in quantity and in pattern of drinking (NHLBIDCI, 2008[b]). Alcohol is responsible for approximately 20% of deaths due to motor vehicle accidents, 30% of deaths due to esophageal cancer, liver cancer, epilepsy and homicide, and 50% of deaths due to liver cirrhosis (NHLBIDCI, 2008[b]).

2.13.6 Ethnicity (race)

HBP can affect anyone; however, it is consistent among literature that blacks of all ages are more likely than whites to have hypertension, but the gap is the widest between ages 55-64. In this age group, the prevalence of hypertension among blacks is twice that of whites. At age 75 and older, more than half (54%) of blacks have hypertension compared to 38% of whites (National Academy on an Aging Society, 2000). Hypertension can occur twice as great in African American adults than in Caucasian or Hispanic American adults (NHLBIDCI, 2008[b]). Additionally, Fields et al., (2004) mentioned that, non-Hispanic white adults constituted the largest component of the total hypertension burden (73.7%).

2.13.7 Age

For adults, there are considerable differences depending on age. Most of the health burden from risk factors for chronic diseases such as CVD and cancers occurs at older adult ages. Men seem to develop it most often between age 35 and 55. Women are more likely to develop it after menopause. Over half of all Americans aged 60 and older have HBP (NHLBIDCI, 2008[b]). Additionally, Kannel (1990), mentioned that, hypertension is more common in individuals aged 65 years and older among who isolated systolic hypertension is particularly common. In North American populations, among those with mild hypertension, the10-year risk of a major CVD event ranges from <1% in individuals aged 25-34 years to >30% in those aged 65-74 years. This is consistent with the result found among US adult in the study conducted by Wolz et al., (2000) found that, adult hypertension prevalence rates increased significantly with age. The total burden of US adults with hypertension (30%) is higher in 1999-2000 compared with 1988-1994 ($P<0.001$). While Fields et al., (2004) mentioned that, approximately 81% of US adults with hypertension aged 45-54 years. Thereafter, hypertension prevalence numbers per age group changed very little. This is in agreement with the study conducted by Rionda and Clements (2000) revealed that, almost 60 % of deaths among Palestinian population in middle-aged adults (40–59 years) caused by CVDs and cancer. However the disease patterns for older adults (60 years and older) were similar to that of the 40–59 age group with 49% deaths resulting from CVDs or cancer but mortality rate on other hand was significantly higher among those whose age group over than 60. Additionally, Obaid (2010) mentioned that, elderly Palestinian people as the vulnerable group usually suffer from chronic diseases such as diabetes (41.3%), hypertension (44%), cardiac diseases (18.3%), high cholesterol (22.3%), and atherosclerosis (12.5%). In addition, most studies agreed that, hypertension is significantly increased with advancing age in both genders with diverse geographical, cultural, and socioeconomic characteristics (Al-Hamdan et al.,

2005; Al-Hamdan et al., 2010; Al-Nozha et al., 2007).

2.13.8 Gender

As inferred in the literature, a higher percentage of men than women have HBP until age 45. From ages 45 to 64, the percentages are similar. After that, a much higher percentage of women than men have HBP. According to the AHA, 49% of women are more likely to develop hypertension after menopause, about 10 years later in life than men but the outcome for women is often worse (Fields et al., 2004). However, each year more women than men die from CVDs. Heart disease is the number one killer of American women, claiming the lives of one in three women, or 500,000 women each year. Two-thirds of all women have at least one risk factor for developing CVDs (60% overweight or obese, 25% physically inactive, >50% over age 45 have HBP, and 40% over age 55 have high cholesterol) (Fields et al., 2004). Additionally, Fields et al., (2004) found that, more women had hypertension, ≈5 million more than men. The number of women with hypertension increased significantly with age ($P<0.001$) compared to the decline in number of hypertensive men after 45-54 years of age. While Lawes et al., (2008) reported that, the prevalence of hypertension varied around the world from 3.4% in men in rural India as the lowest to 72.5% in elderly women in Poland as the highest. In contradictory to that, Al-Hamdan et al., (2010) mentioned that, Saudi females constituted about 51% of the study population. Females in age group 25–44 years were more than males (53.3% compared to 43.1%), while males were more than females in age group 45–64 years (33.5% compared to 24.8%) had hypertension.

2.13.9 Lipid Profile

Lipid profile includes LDL (bad) cholesterol, HDL (good) cholesterol, TG and TC.

LDL-c: contributes to artery blockages (plaques). Most people should aim for an LDL-c level of 100 mg/dl or lower (UCSF Medical Center, 2011).

HDL-c: is a reverse-transport protein; it removes cholesterol from the arteries and takes it to the liver out of the body. High levels of HDL-c lower the risk of developing CVDs. An HDL level of 60 mg/dl and over is considered excellent, providing optimal protection (UCSF Medical Center, 2011).

TG: is the most common type of fat in the body. Many people who have heart disease or diabetes have high TG levels. A normal TG level is less than 150 mg/dl (UCSF Medical Center, 2011).

TC: is a measure of LDL-c, HDL-c and other lipids. The desirable level is less than 200 mg/dl (UCSF Medical Center, 2011).

Hypertension is only one of many risk factors for CVD, patients' prognosis depends more on the sum of their risk factors than on their BP. Guidelines for the management of both hypertension and hyperlipidaemia generally now recommend the use of simplified versions of the Framingham risk equations for formal estimation of risk and specify absolute risk treatment thresholds. The equations have been criticized for not including several atherosclerosis risk factors such as family history, sedentary lifestyle, and obesity (Padwal et al., 2001). Similarly, CVD Life Expectancy Model is a Markov model developed using data from the Lipid Research Clinics Follow-up Cohort, the Canadian Heart Health survey, and Canadian life tables. It has two key advantages over the Framingham risk equations. Firstly, it provides a single estimate for the risk of non-fatal or fatal coronary events and strokes in any one person. Secondly, this model was derived from a cohort of patients with and without overt CHD and thus can be used to predict the potential benefits and cost effectiveness of modifying risk factors both before and after the development of overt atherosclerotic disease (Padwal et al., 2001). Additionally, Padwal et al., (2001) conducted a large population based review cohort study showed that, continuous strong and graded relations between raised serum cholesterol and CAD seen with TC values above 4.65mmol/l. The protective effect of HDL-c seems to be at least as strong as the atherogenic effect of the low-density fraction, particularly in women.

On other hand, it is consistent among literature that diets high in saturated fat, physical inactivity and genetics could increase cholesterol levels (GEM, 2008[c]; Gibney et al., 2006). Recent research showed that levels of LDL and HDL are more important for health than TC. Nevertheless, the risk of elevated TC was calculated because there is more information available about average TC levels in populations worldwide (NSRC, 2008). Cholesterol increases the risks of heart disease, stroke and other vascular diseases, most in the middle-income European countries, and least in the low and middle-income countries in Asia. Globally, one third of IHD is attributable to high blood cholesterol (NSRC, 2008).

According to WHO Stepwise data of risk factors from selected countries in the EMR (2003–2007), mentioned that, the prevalence of hypercholesterolemia (cholesterol level ≥ 5.2mmoL/dl) was highest in Islamic Republic of Iran (43.6%), followed by Kuwait (38.6%), while the lowest level registered in KSA (19.15%) followed by Egypt (19.4%). Also in Iraq, the prevalence was 37.5%, Jordan 36%, Syrian Arab Republic 34%, Oman 27.6%, and Sudan 19.8% **(**WHO, 2011[e]). Additionally, a report of large cohort studies

conducted among young and middle aged men and women. It revealed that, persons with a low CVD risk profile (TC level < 200 mg/dl, BP ≤ 120/80 mmHg, and no current cigarette smoking), have 72%-85% lower mortality from CVD, and 40%-58% lower mortality from all causes compared with persons with one or more of three modifiable CVD risk factors (The National High Blood Pressure Education Program Coordination Committee - TNHBPEPCC, 2002). Similarity, a more recent cross sectional study conducted from February to July 2006 to determine the frequency of the metabolic syndrome and its individual components in men and women with hypertension (aged ≥ 25 years) attending the family practice clinic at Jordan Hospital University. The study showed that 65% of the participants had metabolic syndrome. DM was the most frequent component of metabolic syndrome in males, while low serum HDL-c and high waist circumference ranked first and second components in females (Yasein et al., 2010). While, in the Occupied Palestinian Territory, the rate of reported hypercholesterolemia was 0·7% at age 40-49 years and 3·2% at 60 years and older. The rate of hypertriglyceridemia in adults aged 30–65 years was 34·8% in an urban community compared with 22·6% in a rural community in Ramallah governorate. The magnitude of the problem of dyslipidemia and its treatment in the Occupied Palestinian Territory remains poorly defined (Husseini, et al., 2009[b]).

2.13.10 Family history (genetic factor)

It is consistent among review that HBP tends to run in families. An inherited predisposition risk for developing hypertension disease increases for people having a hypertensive relative who developed the disease early before age 55. If parents developed heart disease later in life, it may be age-related rather than genetic (UCSF Medical Center, 2011). Marriages between cousins (29% of all marriages) and within clans (49%) are also contributing to the perpetuation of genetic disorders. So genes or behavioral may both be needed for a person to be hypertensive (Rionda and Clements, 2000). Genetic susceptibility plays a large role, but this is only permissive, and environmental cofactors can markedly influence the emergence of hypertension. Excessive salt, fat, alcohol, and unrestrained weight gain can bring on hypertension in susceptible persons (Kannel, 1989). Additionally, a study conducted in Iraq by Al-Asadi (2010) mentioned that, family history of hypertension was positively associated cumulative occurrence of the disease ($P<0.01$, OR 1.88) when comparing the prevalence of hypertension among hypertensive patients with positive family history (64.3%) in comparison with negative family history of

hypertension in both sexes (35.7%) (95%CI 1.29 - 2.75). Family history is significantly more prevalent in the hypertension case than control group. Therefore, Family history is a strong predictor for future hypertensive events. In addition, a study conducted by UNRWA's NCD screening activities among refugees screened for hypertension and type 2 diabetes in Jordan, Syrian Arab Republic, Lebanon, GS and WB. The study reported that, people having hypertensive relatives increased the risk of presenting with hypertension and or hyperglycemia before 60 years (P<0.05, 95%CI 1.0–1.5). About 9% of screened people in 2007 were diagnosed with hypertension and diabetes. Positive family history was 1.2 times higher development of hypertension compared with negative family history. This indicated that family history is an independent variable with significant positive association (Mousa, 2010). This is consistent with the study conducted by Abu-Tawilla, (2001) to explore the prevalent risk factors for AMI in GS community. The study found a significant relationship between family history for CAD (34.4%) and the development of the disease.

2.13.11 Level of education

A case control study conducted by El-Dabbakeh (2000) found that, CHD is more common among educated people, where overt differences was noticed among highest educational level, 19% among cases compared to 7.5% among controls. In contradictory, Al-Asadi (2010) conducted his study in Iraq noted that, there was an inverse relationship between hypertension and level of education for people less than high school education; where hypertension among illiterate was 26.7% compared to 17.2% for primary education and 10% for intermediate**.** This result is inconsistent with the result found among people with basic university and more, while the prevalence of hypertension among more than college educational people was 29.4% compared to 26.7% among illiterate (P=0.89). The result did not reach statistically significant level. In addition, another cross-sectional community-based study covering the whole of KSA in (2010), illustrated that, there was a significant association between hypertension, occupation and education status. Illiterate and post-university, unemployed, and subjects doing house duties tended to have significantly higher hypertension prevalence. It was lowest among students. Subjects with very low or very high family income tended to have higher hypertension prevalence, but the differences did not reach statistical significant. Treatment modalities were significantly more associated with lower educational level, while dietary control was significantly more practiced by university graduates (Al-Hamdan et al., 2010). Similarity, in neighboring

Oman, hypertension prevalence was higher among subjects with lower educational level, retired and housewives (Al-Farsi et al., 2006).

2.13.12 Marital Status

As inferred from the literature, hypertension is more common among married than single, widowed and divorced for both sexes. This is consistent with the study conducted in Basra from April to December 2007. The study indicated insignificantly higher prevalence of hypertension among married compared to single and widowed/divorced (89.1, 6.3, 4.5% respectively) (P=0.65) (Al-Asadi, 2010). This supports the study conducted by Abu-Tawilla, (2001), mentioned that, 79.8% of the cases of AMI were married. People who never been married had a lower risk of being AMI (1.6%), while the least (0.6%) were divorced, widowhood represented 18% of cases with 67.9% increase in stage-2 compared to stage-1. Female ratio regarding widowhood was 3:1 higher prevalence compared to male. This reflects more stress on or absence of social integration of female.

2.13.13 Socioeconomic Status

There is a variation within the literature regarding the association between hypertension and socioeconomic status as social class, education, occupation, marital status and income. A study conducted in Germany showed gender differences in the association of hypertension with occupation. In men, the highest prevalence of hypertension was in metal-processing workers, carpenters, painters, and electricians compared to office clerks. In women on the other hand, the highest prevalence was found in technicians, forewomen, scrutinizers, storekeepers, and food processing occupations (Schumann et al., in press as mentioned in Al-Hamdan et al., 2010). These differences may be due to a specific occupational hazard or may be due to several confounders associated with hypertension such as education and income, which may be closely related to occupation (Al-Hamdan et al., 2010).

Additionally, another study conducted in Japan showed the association of hypertension with occupation. In men, the level of job strain (the ratio of psychological job demands to job control) correlated with the prevalence of hypertension. Job strain was significantly related to hypertension (OR 1.18; 95%CI 1.05-1.32), The stratified analyses showed significant excess risks in the subordinate groups compared with managers, blue collar workers, less educated workers, and the older age groups. This association was not

significant in women (Tsutsumi et al., 2001). Similarity, according to WHO (2009[c]), mentioned that, occupational risks alone account for 1.7% of DALYs lost worldwide. In addition, there is increasing evidence from industrialized countries to link CHD and depression with work-related stress. Other studies conducted in Jamaica reported that, in both men and women, the income distributions and hypertension were non-linear, indicating elevated levels in low as well as in high-income groups (Mendez et al., 2003). Additionally, many studies pointed that, low and high incomes might be associated with psychological tensions, which may be associated with hypertension. Low socioeconomic status is associated with elevated rates of BP-related CVD (Forman et al., 2009; Grotto et al., 2008). While Al-Hamdan et al., (2010) mentioned that, there was a significant geographical variation in hypertension prevalence in the Central Region of KSA had the highest compared to the Southern Region had the lowest prevalence of hypertension. The Central Region is highly urbanized, industrialized, and developed compared to the Southern Region. The same study showed that hypertension tends to be more among low and high-income subjects, although results did not reach significance level. Geographical variations in the prevalence of hypertension were reported in many studies in different regions of the world. These regional variations in BP may also be related to regional variation in socioeconomic, demographic and dietary habit, in addition to the geographic characters (Rampal et al., 2008; Reynolds et al., 2003).

2.14 Intervention programs

All previous experiences revealed that, the primary goal of management strategies should be planned along with a qualified health care team, hypertension knowledge, treatment and prevention strategies all must be in daily advance. Treatment must be individualized and it must address medical, psychosocial and lifestyle issues. Epidemiological and clinical studies uniformly indicate that reduction of obesity, sedentary lifestyle, and intake of salt and alcohol are all associated with decreased risk of developing hypertension (Khatib and El-Guindy, 2005). Additionally, Chobanian et al., (2003); Whitworth (2003), mentioned that, there has been a growing emphasis in national practice guidelines on the importance of preventing hypertension in order to reduce the public health burden of one half of the CHD and approximately two thirds of the CVD disease burdens of the US individuals. Similarity, National Health and Nutrition Examination Survey (1999–2000) estimated that, identifying risk factors for hypertension lead to specific preventive interventions that may favorably affect public health of 65 million individuals in the US (Zhang et al., 2009).

Furthermore, international guidelines of the WHO Expert Committee on Hypertension Control (Zanchetti et al., 2003) and the National HBP Education Program (Whelton, 2002) have stressed on the importance of primary prevention of hypertension. In addition, Khatib and El-Guindy (2005), explained that, although antihypertensive drug therapy represents one of the major success stories in the prevention of CVD, the pharmacological approach to management has limitations if used in isolation. Environmental factors are major determinants of hypertension. The most important of these factors are; reduce weight, salt intake, alcohol consumption, tobacco use, and improve dietary habits, whereas, increasing exercise is an excellent program for pre-hypertensive individuals with a family history of hypertension and those with a predisposition to develop obesity or diabetes.

Additionally, according to Whelton (2002); American Public Health Association (2002–2004); Cutler and Stamler (2003), revealed that, the recent recommendation is that the food industry should reduce sodium in the food supply by 50% over the next decade. This type of approach, if implemented, would reduce HBP in the population. Moreover, according to WHO illustrated that, integrated community-based intervention programs can be cost effective due to synergetic effect. It is able to diffuse information successfully, and has potential for influencing environmental and institutional policies and it has close collaboration with national health authorities to sustain primary prevention (Angell, 2004; Khatib and El-Guindy, 2005; Saha, 2001). Similarly, the Eastern Mediterranean Approach to NCDs (EMAN) aimed to reduce the major risk factors for CVDs and their social and economic determinants by primary prevention, control, and development of standards of care and cost effective case management through community based program (Khatib and El-Guindy, 2005). On other hand, a recent randomized trial study (2009), suggested that, there is a potential link between diet-dependent net acid load (also known as the estimated net endogenous acid production - NEAP) and risk of incident hypertension among US women. The study revealed that, dietary interventions to reduce NEAP (e.g., increase intake of foods that supply alkali, e.g., fruits and vegetables; decrease intake of foods that have a high acid load, e.g., meat and cheeses; and increase the ratio of potassium to protein in diets or treatment with alkalizing supplements) could reduce the risk of hypertension. The prospective analysis suggested that a lower diet NEAP is independently associated with lowering the risk of incident hypertension, lower BMI, more physically active, and

had lower intakes of alcohol, folate and magnesium. NEAP is positively correlated with protein intake, and negatively correlated with potassium intake (Zhang et al., 2009).

This is consistent with that done in countries of the EMR where they stress to prioritize hypertension as a serious, prevalent and costly national public health problem, its true epidemiological and economic burden should be determined in every country. They emphasize that countries need to design national strategies to confront hypertension as part of an integrated approach to prevention and care of NCDs. This will address hypertension jointly with other major related and preventable risk factors. At the same time, it is necessary to support health care systems to develop cost-effective services for primary prevention and control of hypertension in primary health care settings; public education to increase community awareness about hypertension. In addition, a strategy to integrate nutrition, physical activity and cessation of smoking into the community approach to primary prevention and care of hypertension (Khatib and El-Guindy, 2005).

Additionally, primary prevention of hypertension provides an opportunity to interrupt and prevent the continuing costly cycle of managing hypertension and its complications (AHA, 2000). This supports the results of the study conducted by Prevention of Hypertension Centers on Avoiding or Eliminating Known Risk Factors. The study revealed that, even persons at risk because of age, race, or sex or those who have an inherited risk, could lower their chance of developing hypertension by making the same changes recommended for treating hypertension (reducing salt intake, reducing fat intake, losing weight, getting regular exercise, quitting smoking, reducing alcohol consumption, managing stress) (GEM, 2008[c]). Pharmacological therapy could be added if the BP is still uncontrolled after attempting these measures. Antihypertensive drugs are generally be categorized into three groups, diuretics; adrenergic inhibitors that act centrally, peripherally, or as receptor blockers; vasodilators that act directly via calcium channel blockade, angiotensin converting enzyme inhibitor (ACEI), or angiotensin receptor blockade (ARBs) (Khatib and El-Guindy, 2005). A meta-analysis of 18 long-term randomized trials found that both B-blocker therapy and treatment with high-dose diuretics were effective in preventing stroke (Goldstein et al., 2001). Similarly, WHO developed a global strategy to focus on assessing the pattern and trends of risk factors of major NCDs, the national capacity for prevention and control, promoting the development of evidence-based strategy to reduce unhealthy behaviors and major risk factors, implementing cost-effective and equitable interventions

for the management of common NCDs (WHO, 2007). In addition, the KSA is considered one of the rapidly growing countries that have been affected by the lifestyle changes

reflected the change in disease pattern (Al-Hamdan et al., 2005). Therefore, it decided to

carry out a base-line survey of NCD risk factors. Hypertension was one of the major diseases covered in the survey. The comprehensive approach emphasizes on prevent, early detect, and control the disease through preventing, reversing, or reducing the risk factors. This should start as early as possible among school students. Emphasis should be on the importance of healthful lifestyle behaviors. All healthcare providers particularly in PHCs should check BP for all clients properly and repeatedly, enquire about risk factors, and offer advice concerning lifestyle and medications, particularly encouraging regular physical activity, and proper nutritional practices and avoiding smoking. Public health policies should be forced to provide a favorable environment for hypertension control by regulating food industry, providing facilities for physical activity and smoking cessation services (Al-Hamdan et al., 2010).

Furthermore, WHO introduced the six MPOWER packages of tobacco control measures to further counter the global tobacco epidemic and to help countries to implement the WHO Framework Convention. The six MPOWER measures are; monitor tobacco use and prevention policies, protect people from tobacco use, offer help to quit tobacco use, warn about the dangers of tobacco, enforce bans on tobacco advertising (WHO, 2011[f]). While Gezairy, WHO Regional Director for the EMR, commented that, there is a need to have uniform tobacco control policies across the region to save peoples from the harms of tobacco, also he urged governments to take note of their national obligations under the Framework Convention and develop effective tobacco control policies. This report gives direction for countries in taking immediate steps to harmonize tobacco control measures and ensure strict implementation of evidence-based policies throughout the region (WHO, 2009[c]).

Additionally, other studies concerning awareness, treatment and control of HBP suggested that, primary prevention is not being effectively practiced, there are barriers to prevention

include; cultural norms, insufficient attention to health education by health care practitioners, lack of reimbursement for health education services, lack of access to places to engage in physical activity. Additionally, larger servings of food in restaurants, lack of availability of healthy food choices in many schools, worksites and restaurants, lack of exercise programs in schools, large amounts of sodium added to foods by the food industry and restaurants, the higher cost of food products that is low in sodium and calories. Overcoming these barriers will require a multipronged approach directed not only to high-risk populations but also to communities, schools, worksites and the food industry (Whelton, 2002).

In another hand, since Palestinian refugees are among the most disadvantaged groups of the population; approximately 20% of the Palestinian population is in need of psychosocial support, the percentage rises to 44.9% among the refugee population and 53% among camp populations. Therefore, UNRWA responded to the psychosocial needs of the Palestinian community and implement two psychosocial support programs to ill this critical gap in services, one in GS and the other in the WB (UNRWA, 2007[b]).

Additionally, due to limited financial and human resources, the UNRWA Health Programs uses the 'risk scoring' approaches to deal with hypertension and DM. The intervention strategy consists of three elements. The first is community health education (primary prevention) to promote the importance of a healthy lifestyle including weight control and adherence to a healthy balanced diet, regular physical exercise, and cessation of smoking. While the second element (secondary prevention) is early detection of diabetes and hypertension by screening individuals at risk include overweight or obese people, those with a family history of diabetes, hypertension, cerebrovascular or CVD, and people over the age of 40. The third element (tertiary prevention) concentrates on effective case-management of patients suffering from DM and hypertension to achieve acceptable BP, glycaemia and lipids control, and to educate patients on all aspects of self-care (UNRWA, 2007[b]).

Chapter III

Methodology

This chapter presents the study methodology. The chapter includes study design, description of the study population, and ethical considerations. In addition, it presents the study instruments, piloting, data collection process, data prescribing, and data analysis. Finally, it presents limitation of the study.

3.1 Study design

The design of this study is a case-control design; case control studies give the researcher the chance to check the history of past exposure to a risk factor or the presence of a characteristic among cases and controls. The investigator is looking backward from the disease to a possible cause. A case control study is relatively inexpensive and enables the researcher to meet the study objective in a short time. It is also practical, simple, requires few subjects, efficient, and it studies several risk factors for a single disease (Van Stralen et al., 2010). However, disadvantage of case control study is that, recall bias, control selection is a difficult process, matching for many variables make it difficult to find appropriate control. Additionally, we cannot explore possible association of disease with any variable on which cases and controls have been matched. It also cannot measure disease rate or RR.

3.2 Study setting

The study was conducted at the main UNRWA centers in the NCDs services in Gaza Governorates for cases selection. One clinic was selected from each different level in each different geographical area to reflect representative results.

Same number of controls was chosen among attendance the same medical centers of cases from NCDs screening clinics, and from governmental PHC clinics. They have suffered of illnesses other than hypertension (have same characteristics of cases except they are free from hypertension).

3.3 Study population

The study population consists of a sample of patients from both genders with hypertension. The hypertensive patients aged 30 years and more, newly diagnosed as having hypertension of the year 2009-2011, and selected randomly by random sample selection

approach from NCDs services of the main UNRWA health care in five localities in Gaza Governorates. A further, same numbers of controls were chosen from the same medical centers (from UNRWA NCDs screening clinics) and from governmental PHC clinics, who were seeking treatment for illness other than hypertension for themselves or their families. Controls – were matched for age, gender and place of residency.

3.4 Sample size

The researcher used Epidemiological Information Program (Epi-enfo), statistical calculator for case control study to calculate the sample size at 95%CI with power 80% and based on one control for each case. The calculation was completed keeping into consideration the expected frequency of risk factors among hypertensive was 50% and among the normal population 30%, the total number of proportional systematic random samples is composed of 206 subjects (Annex 11). To overcome non-respondents, the researcher decided to take 240 persons, divided into 120 cases and 120 controls from different locations to keep one to one case to control ratio. Around 19.1% of the population resides in North Gaza governorate, 35% in Gaza city, 14.2% in Mid-Zone, 19.2% in Khanyounis, and 12.5% in Rafah (PCBS, 2010[a]). The proportional sample for each governorate is as follow; North Province 23, Gaza Province 42, Mid-Zone Province 17, Khan-Younis 23, and Rafah 15 cases and the same for controls (table 3.1)

3.5 Selection criteria

3.5.1 Inclusion criteria for clinics

- PHCs of UNRWA sector
- Governmental PHC clinics
- Clinics from different levels which were randomly selected
- Clinics that have been working for more than six months

3.5.2 Exclusion criteria for clinics

- NGO's PHC clinics
- Clinics out the random sample
- Clinics with special situation (psychiatric clinics, military clinics)
- PHC clinics, which did not start working yet, or those starting working for less than six months

3.5.3 Inclusion criteria for sample

Subjects who were eligible to participate in the study were those who meet the following criteria:

3.5.3.1 Cases

- The age is 30 years or more for both males and females
- Diagnosed in the year 2009-2011 as a hypertensive patient
- Diagnosis is confirmed by laboratory testing
- Accompanied clinical manifestation

3.5.3.2 Controls

- ±5 years old males and females compared to cases
- Must be clinically free from hypertension
- Had no history of clinical manifestation of hypertension

3.5.4 Exclusion criteria for sample

3.5.4.1 Cases

- Males and females aged <30 years.
- Pregnancy Induced Hypertension
- Gestational Diabetes
- Any patients outside the UNRWA PHCs
- Any patients diagnosed in the year other 2009-2011

3.5.4.2 Controls

- Person with age under 25 years old
- Registered patients suffered from hypertension
- Any person out the matching criteria compared to cases

3.6 Sample Process

According to Diab (2011); Summour (2010), mentioned that, UNRWA health centers were divided into two categories (large and small) according to the number of services provided and catchment area. GS is divided into five strata as follow; North, Gaza, Mid-Zone, Khanyounis and Rafah. The researcher chose three large and two small UNRWA clinics from different governorates by using proportional stratified random selection. From each

strata the selected large clinics were, Jabalia, Rimal and Khanyounis, while the small clinics were Dair Al-Balah, and Shaboora (Annex 8). Proportional sample was used to select the number of cases and controls from each governorate to ensure that the sample is geographically representative.

Systematic random sample of adult patients diagnosed with hypertension were selected from UNRWA health care NCDs services from each different level in each different geographical area in Gaza governorates. Their age was 30 years and more. Same number of controls who attending the same medical centers for illness other than hypertension (from UNRWA NCDs screening clinic) and from governmental PHC clinics, their age ranged ±5 years old compared to cases. In each clinic, after choosing the samples, interviews were performed with a pretested and validated questionnaire, which contained issues about socio-demographic factors, lifestyles, dietary habits and detailed information on family history and health profile. For all subjects, their BP was measured to the nearest 2mmHg in the right arm after a 5-minute rest in a sitting position by a single mercury sphygmomanometer by a well-trained practical nurse and followed up by staff nurse and medical officers. The criteria for the diagnosis of risk factors and hypertension were based on WHO criteria. Hypertension was diagnosed in presence of BP ≥140/90 mmHg. Risk factors such as smoking, obesity and hypercholesterolemia were identified.

Table (3.1): Distribution of proportional sample for each governorate

District	Population	% of Total	Case	Control
North Gaza	56,539	19.1	23	23
Gaza City	103,732	35	42	42
Mid-Zone	42,758	14.2	17	17
Khan-Younis	57,319	19.2	23	23
Rafah	35,131	12.5	15	15
Total	**295480**	**100**	**120**	**120**

3.7 Data collection procedures

Data was collected by a self constructed face to face interviewed questionnaire, and the inspection of patient's file for measurement of weight, height, BP, in addition to measurement of TC, TG, HDL-c, LDL-c, FPG and PPPG. Data collected by the researcher and one assistant who trained well to interview the participants and fill the questionnaire.

3.7.1 Questionnaire

A face-to-face interviewed questionnaire was structured by the researcher after reading the related literature. It included the following areas:

- Demographic variables including: age, gender, marital status, and place of residency;
- Socioeconomic factors including: educational level, occupation, and income;
- Lifestyles including: physical activity and smoking;
- Health profile including: duration of the disease, history of any other diseases, and type of the treatment;
- Family history of hypertension;
- Dietary habits and type of food and drinks intake;
- Psychosocial factors

The study instrument was built to take information from the participants and the researcher inspection of patient's file in the same time. The developed questionnaire was reviewed by 10 experts. This process is to increase both content and criterion validity of information.

3.7.2 SBP and DBP

SBP and DBP were measured by a well-trained practical nurse and followed up by staff nurse and medical officers when queries about the accuracy of such readings may arise (complaints and condition are not in agreement with the readings). BP was recorded in the right arm after a 5-minute rest in a sitting position by the same mercury sphygmomanometer. BP was measured to the nearest 2 mmHg. The value of the measured BP should be recorded on the patient registration file. Individuals whose BP was found initially ≥ 140/90 mmHg, should have the measurement repeated after at least 10 minutes. The criteria for the diagnosis of risk factors and hypertension were based on WHO definitions. Hypertension was diagnosed in presence of BP ≥ 140/90 mmHg.

3.7.3 Blood testing

Morning fasting blood specimens were collected and analyzed for serum TC, TG, HDL-c, LDL-c, and plasma glucose.

3.7.4 Anthropometric measurement

- Weight of participant
- Height of participant

3.8 Validity of instruments

Validity is defined as the degree to which it actually measures what is designated to measure (Szklo and Nieto, 2000).

The researcher administered two types of validity as follow:

1. Face validity: The questionnaire used for data collection in this study is well prepared by the researcher to ensure high face validity.

2. Context validity index: The researcher designed the study questionnaire for the purpose of the study, after reviewing many studied related to the subject. The validity of the questionnaire has been examined by sending the constructed questionnaire with enclosed covering letter about the objective of the study to 10 experts working in the different health fields in order to give their views on the questionnaire. The researcher made the recommended modifications on the questionnaire according to their suggestions and advice. Standardization of the procedure of the measurement also was done as follows:

3.8.1 Standardization of BP measurement

- BP was measured by a well-trained practical nurse and followed up by a staff nurse and a medical officer when queries about the accuracy of such readings may arise (complaints and condition are not in agreement with the readings). BP was measured to the nearest 2mmHg in the right arm after a 5-minute rest in a sitting position by the same mercury sphygmomanometer to avoid any instrumental influence on the BP readings.
- The first sound heard is considered the systolic while the last one is considered the DBP.
- The value of the measured BP should be recorded on the patient's registration file.
- The patient's registration file should be properly completed and maintained in chronological order according to date and year of registration for each patient suffering from hypertension, DM, or both as soon as the diagnosis is established.
- For monitoring purposes, the criteria for acceptable control are defined as SBP of <140 mmHg and DBP of <90 mmHg in the measurement of the last visit and in one of two measurements taken during the preceding scheduled visits (UNRWA, 2009[c]).

3.8.2 Standardization of weight and height measurement (Molarius et al., 1998)

- Balancing the scale (zero point) with empty scale every day before starting measurements and immediately afterwards.
- Asked the participant to remove shoes and heavy clothes and stand on the scale with no support.
- Read the weight and registered it to the nearest 0.1 kg.
- Used standard measurement tape on standing position and registered the height to the nearest 0.1 cm.
- BMI was computed as the ratio of weight (kg) per height squared (m^2). BMI was classified according to the WHO classification into five categories as follows: <18.5 (underweight), 18.5-24.9 (normal weight), 25-29.9 (overweight) and ≥ 30 (obese).

3.8.3 Standardization of blood sample collection (Mousa, 2005; WHO MONICA Project, 1998)

- Asked the participant to fasting for at least 9-12 hours before testing;
- A 5 ml of the venous blood was collected from each participant for testing serum glucose, TC, TG, HDL and LDL;
- Vein-puncture was collected from participants in a sitting position;
- The tubes that were used to collect the sample were equipped with a stopper material that does not react with blood constituents;
- Blood samples were left at not more than $20^{O}C$ for one hour to clot, or were collected with anticoagulant tube (EDTA or fluoride were added as anticoagulant for serum) before centrifuge.
- The cut-off value for confirmation of diagnosis of diabetes is a FPG level ≥ 126 mg/dl on at least two consecutive tests within one week (UNRWA, 2009[c])**.**
- FPG falling between 100-125 mg/dl were classified as IFG. In order to establish the diagnosis of diabetes or otherwise, patients should be required to perform another FPG test within a week. If the value is still between 100-125mg/dl, then oral glucose tolerance test (OGTT) should be performed. Diabetes is diagnosed if plasma glucose is evaluated to be ≥200 mg/dl two hours after the challenge (UNRWA, 2009[c])**.**
- In diabetic patient; in order to classify a patient in the control group, either of these values; FPG ≤140 mg/dl, 2-hrs postprandial plasma glucose (PPPG) ≤ 180 mg/dl should

be attained at 2 of the last 3 regular visits, provided that no large fluctuations in values are presented (UNRWA, 2009[c]).

3.9 Reliability of the instrument

Reliability is the extent to which the results obtained by a test are replicated if the test is repeated (Szklo and Nieto, 2000). Two steps were used to ensure the study instrument reliability:

- Standardization of the method of data collection was guaranteed
- Training of the data collectors in a same manner on how to use the instruments

3.10 Response rate

The number of respondents was 240. By places of residences, the respondents distributed as; 23 cases in North Gaza, 42 in Gaza city, 17 in Mid-Zone, 23 in Khan-Younis, and 15 cases in Rafah; the same number of respondents for controls. The response rate was 97.5% for both cases and controls. The cases and controls who refused to participate in the study were replaced.

3.11 Data management and statistical analysis

The researcher analyzed the quantitative data by using Statistical Package for Social Sciences (SPSS) program version 13.0. The analyses of data to be conducted were:

- Reviewing the filled questionnaire;
- Coding the questions;
- Data entry model;
- Defining and coding the variables;
- Data cleaning;
- Frequency tables of all the variables were done;
- Cross tabulation of the results.
- OR and 95%CI are the statistical tools of measurement used to check the statistical relationship between the risk factors (independent variables) and the occurrence of hypertension (dependent variable) and to assess the statistical significance of differences.
- An independent sample t-test and chi square were used to investigate the relationship between dependent and independent variables. T-test was used to test the continuous

data, measures the differences between means of dependent variable among independent variables with two categories, while chi square was used to test the categorical data. The statistical level of significance is $P \leq 0.05$.

3.12 Pilot study

To test the appropriateness of the study instrument, to standardize the suitable way for data collection, and to improve the validity and reliability of the study; the researcher conducted a pilot study in Rimal clinic before starting the actual data collection. Piloting sample was included both cases and controls. Obtained data were analyzed using SPSS program to predict the desired results. Minor modifications on the questionnaire were done according to piloting result. The pilot sample of 10 cases and 10 controls was excluded from the study population.

3.13 Ethical and administrative considerations and procedures

The researcher keen committed to all ethical and administrative considerations required to conduct the research. An academic approval was obtained from School of Public Health at Al-Quds University (Annex 3) and an ethical approval was obtained from Helsinki Committee to carry out the study (Annex 2). Additionally, an administrative approval was obtained from UNRWA Chief Field Health Program - Gaza field to conduct the study at UNRWA PHCs (Annex 4).

Every participant was provided with a full explanatory form attached to questionnaire both verbally and written. This form included the purpose of the study, assurance about the confidentiality of the information, and the instructions how to respond to the questionnaire. In addition, it included a statement indicating that the participation is voluntary (Annex 5).

Honesty was maintained during reporting and analysis of the data with respect to confidentiality and respecting of results.

3.14 Limitations of the study

- Data that depend on participant's memory about past events may result in a recall bias (Van Stralen, 2010);
- Limited time available to conduct the study;
- Limited resources including books, journals, budget, and facilities;

- Unstable political situation;
- Continuous electrical current cutting;
- Dietary exposures are more difficult to remember (Colditz, 2009).

3.15 Period of the study

The study was done in the year 2011 after obtaining ethical approvals from Helsinki committee in March 2011, and an academic approval was obtained from the School of Public Health at Al-Quads University in June; an administrative letter was obtained from UNRWA Chief Field Health Program-Gaza Field Office in June. Pilot study was conducted in the latest nine days of June 2011. Actual data was collected in July and completed in August 2011. Data entry was conducted alongside the data collection. Data analysis was conducted in August-September. Research writing and findings dissemination were in September-October 2011.

Chapter IV

Results and Discussion

This chapter clarifies the main results of the study variables that achieve the study objectives in a comparative way between cases and controls and by using odds ratio, p-value, chi square, and independent sample t- test as statistical tools of measurement. This risk factors prevalence study provided an opportunity to establish baseline information by exploring the most common hypertension disease risk factors among adults population in Palestinian community such as demographic factors, socioeconomic, life styles, health profile, and dietary habits. A case-control PHC based study was carried out at the NCDs services of UNRWA in five localities in Gaza Governorates. Our analysis is based on a sample of 240 persons; 120 cases from both genders matched with age, sex and place of residency to same number of controls. The finding based on (240) questionnaires, with response rate of 97.5% for both cases and controls.

In this chapter, the researcher highlights the finding of this study compared with other global and regional studies and attempt to interpret the results of the study and its implication. The result could help in developing preventive health education and health promotion programs.

4.1 Demographic and socioeconomic characteristics of the study population

The sample distribution by gender, age, educational level, occupation, marital status, household income, and place of residency are presented in table 4.1.

As shown in table 4.1, significant differences were noted between cases and controls regarding any of the demographic characteristics studied: education, occupation, and household income. While no significant differences were shown between cases and controls regarding: marital status. Cases and controls were matched for age, sex, and locality.

Table (4.1): Summary table of socio-demographic characteristics of the study population

Variable	Cases		Controls		P. Value
	No.	%	No.	%	
Age (years)					
<40	24	20	36	30	
40-49	28	23.3	37	30.8	
50+	68	56.7	47	39.2	
Sex					
Male	40	33.3	40	33.3	
Female	80	66.7	80	66.7	
Place of residency					
North	23	19.1	23	19.1	
Gaza	42	35	42	35	
Mid-Zone	17	14.2	17	14.2	
Khan-Younis	23	19.2	23	19.2	
Rafah	15	12.5	15	12.5	
Education					
Low educational level	74	61.7	32	26.6	0.000
Medium educational level	23	19.2	29	24.2	
High educational level	23	19.1	59	49.2	
Occupation					
Employed	20	16.7	60	50	.000
Retired	9	7.5	5	4.2	
Unemployed	91	75.8	55	45.8	
Marital status					
Single	5	4.1	7	5.8	.218
Married	98	81.7	105	87.5	
Widower	15	12.5	6	5	
Divorced	2	1.7	2	1.7	
House hold total income					
<1700 NIS	91	75.8	41	34.2	.000
1700-2200 NIS	11	9.2	21	17.5	
>2200 NIS	18	15	58	48.3	

4.1.1 Gender

Table 4.1 shows female subjects represent 66.7%, while male subjects represent 33.3%. The study finding revealed that, females have hypertension more than males. The higher percentage of women than men have HBP until age 40 (28.1% vs. 18.8 %). After that, a much higher percentage of males than females have hypertension.

The rate of hypertension among males and females in this study (33.3% vs. 66.7%) was high and alarm. Comparable with findings in the world, overall, 26·4% of the adult population in 2000 had hypertension (26·6% of men and 26·1% of women) (Kearney et al., 2005). The majority of adults in most higher and lower-income populations have non-

optimal BP (Perkovic et al., 2007). By comparison, Kearney et al., (2004) mentioned that, the reported rate of hypertension varied around the world, with the lowest rate in rural India (3.4% in men and 6.8% in women) and the highest in Poland (68.9% in men and 72.5% in women). On other hand, Kastarinen et al., (2009) reported that, the rate of hypertension among Finland men and women aged 25-64 years was from 63.3-52.1% among men and from 48.1-33.6% among women.

The relatively high rate of hypertension among women than men in the present study is matched with the study conducted in Jordan by Hammoudeh et al., (2006) showed that, men had significantly lower rate of hypertension compared with women who had CHD (38% vs. 63%, $P<0.0001$). Another study done in Turkey by Aygul et al., (2009) revealed that, hypertension in male patients with AMI was 35%, while it was 53% in females. This support the results of the study conducted by Al-Hamdan et al., (2010) mentioned that, females constituted about 51% of the study population. Females in age group 25–44 years were more than males (53.3% compared to 4 3.1%), while males were more than females in the age group 45–64 years (33.5% compared to 24.8%) had hypertension. On other hand, this result consistent with MOH Annual Report (2005) showed that, hypertension disease was the ninth leading deaths in males and females; mortality among women was higher than men (3.8% vs. 2.7% respectively). Additionally, Mehra and Lashkari, (1992) mentioned that, as a group, HBP among women is more than men. In spite of, among men, the rate of hypertension increases until the age of 50 and then levels off, while among women, the rate increases continually with age. Similarity, Sun et al., (2007) revealed that, women in China seem to develop HBP most often than men (38.6% vs. 37%). While Fields et al., (2004) revealed that, 49% of women are more likely to develop hypertension after menopause, about 10 years later in life than men but the outcome for women is often worse. The number of women with hypertension increased significantly with age compared to decline in number of hypertensive men after 45 to 54 years of age ($P<0.001$).

In contractor to that, Lawes et al., (2008) reported that, the rate of hypertension varied around the world among male and female, from 3.4% in men in rural India as the lowest to 72.5% in elderly women in Poland as the highest. On other hand, Macedo et al., (2005) found that, 42.1% of the Portuguese adult population aged 18-90 years had hypertension. Men seem to develop it most often than women. These differences may be attributed to different in age group in both studies; in this study, the age of participants' was ≥30 years,

while Macedo et al study included aged 18 years and older, in addition to socio-cultural differences or to psychosocial variability (Yan, 2003). While Ostchega et al., (2008) found that, the rate of hypertension among US adult aged 18 years and older was nearly equal between men and women. Additionally, Kathryn et al., (2010), illustrated that, the overall rate of hypertension among Canadian adults aged 20-79 years was nearly the same in males (19.7%) and females (19.0%). While the finding in other Arab countries was 28.6% among Saudi males and 23.9% among Saudi females aged 30-70 years had hypertension (AL-Nozha et al., 2007).

The present study indicated that women have a greater risk of HBP than men and they have attack earlier in life. Nearly 56.7% of all cases of hypertension occur between the age group of 50-81 years. This could be by explained the fact that hypertension usually affect women rather than men, and older people tend to show HBP more frequently than younger ones. This may be due to physiological and behavioral differences in sex-specific life expectancy that may contribute to this phenomenon. In addition, sex hormones seem to play a role; so your gender is significant as a woman you are, at greater risk of HBP than men. Past the menopause, a woman's risk is greater (Chobanian et al., 2003).

4.1.2. Age

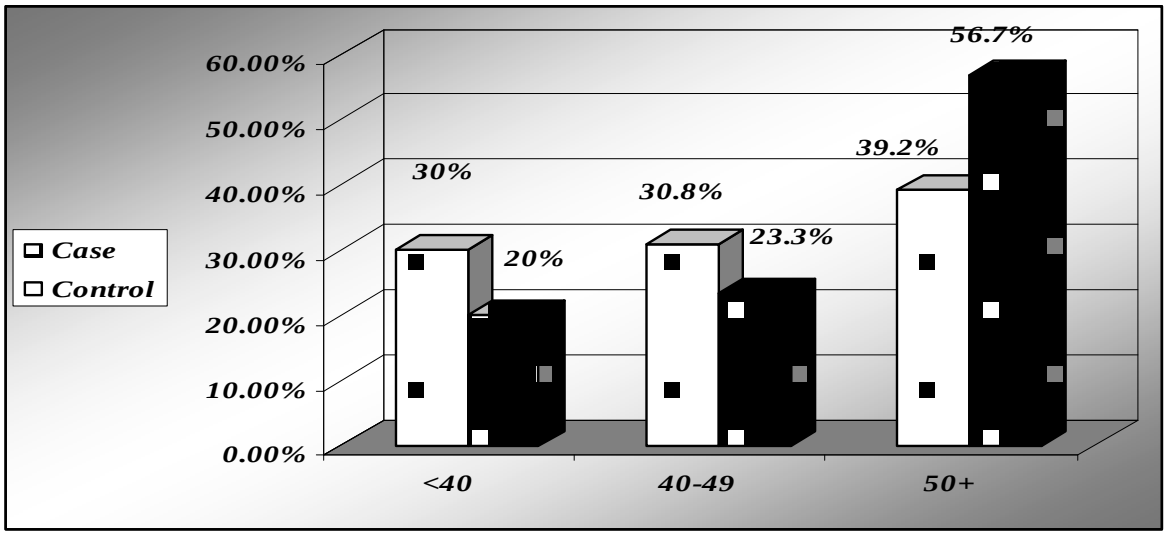

Figure (4.1): Percentage distribution of study population by age group

Figure 4.1 shows the age of the study population divided into three main age groups. Age effect on BP was very clear in increased in both SBP and DBP with increase of age reaching their majority among cases at age group between 50 years and more (56.7%), followed by age group 40-49 years, which represented 23.3%, followed by age group <40

years (20%). The mean age of the case group was 50.9 years (SD 11.5, range 30-81), while that of the controls was 47.9 years (SD 11.1, range 25-76).

Age of participants in this study ranged 30 years and more. The result indicates that, hypertension disease increased strongly with age to more than 56.7% of the cases were aged 50 years and over. Many studies provided strong relationship between age and HBP. In North American populations, among those with mild hypertension, the10-year risk of a major cardiovascular event ranges from <1% in individuals aged 25-34 years to >30% in those aged 65-74 years (Kannel, 1990). This is consistent with the result found among US adult in the study conducted by Wolz et al., (2000). The study found that, adult hypertension rate increased significantly with age. Additionally, Idris et al., (2008) conducted their study among Asian Indian men and women, revealed that, age is a strong independent predictor of CHD risk. Similarity, the rate of hypertension was 25% among Iranian adult population aged 25–64 years (Esteghamati et al., 2008). Additionally, Kearney et al., (2005) mentioned that, hypertension disease is expected to grow in the world to >1.5 billion by 2025 because of increases in both total population size and the proportions within populations reaching older ages.

This is in agreement with the study conducted in Palestine by Rionda and Clements (2000), revealed that, hypertension is a much greater risk factor of cardiovascular events in the elderly than in younger people. Additionally, this is consistent with the study conducted in Palestine in 2006, revealed that, the rate of reported hypertension was 8·1% at age 40-49 years, 22·6% at age 50-59 years, and 35·2% at 60 years and older (PCBS, 2007[a]). While Abdul-Rahim et al., (2001) investigated the rate of hypertension ranged from 21·5% to 25·4% in Palestinian adults aged 30–65 years in two communities in the WB. In addition, this study supported the results of the study done by UNRWA showed that, the rate of hypertension was 14·3% in people aged 40 years and older in WB, and 17·4% for registered Palestinian refugees in GS (UNRWA, 2007[b]). Similarity, Khellah (2010) revealed that, adult Palestinian people aged 19-59 years are at risk of chronic diseases, since 11.1% of the sample populations were hypertensive.

Simply HBP disease increases continually with age. This condition is detected more frequently in the older generation, getting old is a risk factor for CVDs mainly hypertension, as outward symptoms of HBP take a long time to appear. As a group, more women have HBP than men.

4.1.3 Level of education

Concerning to educational level, figure 4.2 shows the distribution of cases and controls by educational levels. The majority of the cases were at low educational level (0-9 years) which represented approximately (61.7%). The figure shows an overt difference between cases (61.7%) and controls (26.6%) within the low educational level; also, an overt difference was noticed within the high educational level, among cases (19.1%) was lower than compared to controls (49.2%).

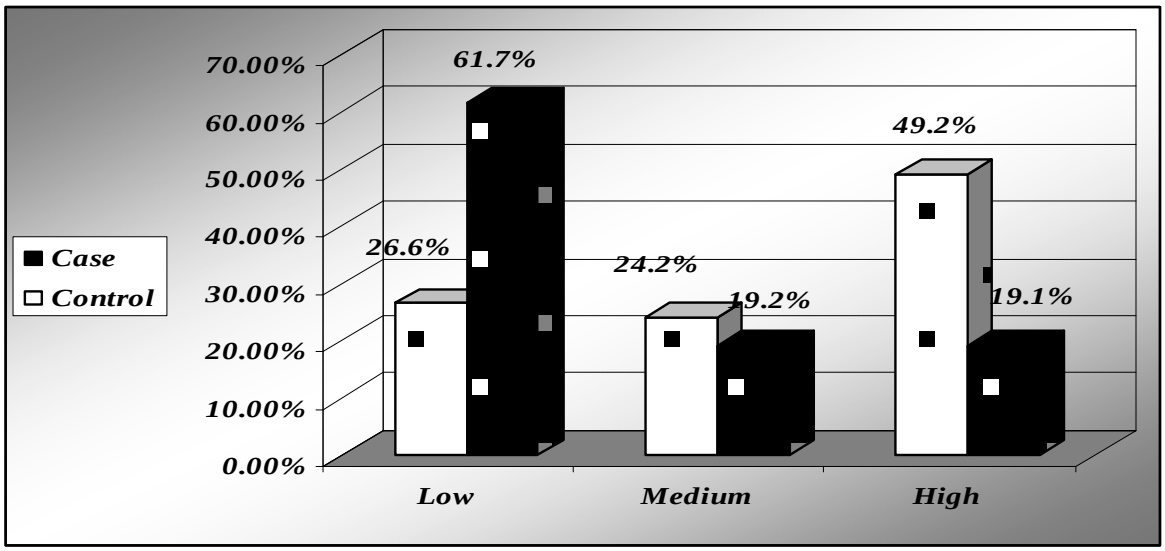

Figure (4.2): Percentage distribution of educational level among cases and controls

Education is closely associated with an individual's health status. It interacts with health process in many levels, which is needed to the ability to understand basic health information. The results in this study reveal that, an inverse relationship between level of education and the development of hypertension, this means that low educated people are at higher risk of catching the disease rather than those who are highly educated. Positive and statistical significant association was found between low educational level and the occurrence of HBP disease (P=0.000). OR was 5.9, with 95%CI (3-11.8). The researcher attributed the higher risk of hypertension among low educational level may be due to certain behavioral factors like lack of physical activity due to the majority of illiterates are unemployed so they sleep more hours, smoking, eating habits, and exposure to stressful events or other lifestyle. Additionally, she refer the higher percentage of low educational level among cases may be due to the natural setting of the study or to the selection criteria of cases and controls since all the study sample were refugees. UNRWA PHCs of NCDs were taken for cases selection, whereas, same number of controls who are registered in the

same medical center of cases taken from both UNRWA PHCs of NCDs screening clinics and governmental PHC clinics.

In addition, the data of this study shows also, approximately one-half of the surveyed adults living in Gaza city (44%) reached the university or higher educational level. This may be due to the economical, social and cultural context of Gaza city, as for example, monthly income rate, which is found to be better in people living in Gaza city that give more chance for their sons to reach the university or higher levels of education compare to other provinces (Table 4.2).

Table (4.2): Percentage distribution of educational level among governorates

Variable	Low		Medium		High	
	NO	%	NO	%	NO	%
North	25	54.4	6	13	15	32.6
Gaza	28	33.4	19	22.6	37	44
Mid-zone	14	41.2	7	20.6	13	38.2
Khan-Younis	23	50	13	28.3	10	21.7
Rafah	16	53.4	7	23.3	7	23.3

Education is an essential component for an important input to health decision-making and planning processes. Person with proper education and counseling can do an appropriate health action. Low educational level or if the information that is available on health is fragmentary or sometimes inconsistent can lead to higher medical care cost. The study results reveal that, hypertension is less frequent in those with higher level of education. This is consistent with some literature and inconsistence with others. Al-Asadi (2010), noted that, an inverse linear association between hypertension and level of education for people less than high school education. This result is inconsistent with the result found among people with basic university and more. Similarity, Al-Hamdan, (2010) mentioned that, there was a significant association between hypertension and educational status among Saudis. Illiterate and Post University educated tended to have significantly higher hypertension. In contrast to this result, in neighboring Oman, hypertension was more common among subjects with lower educational level, retired and housewives (Al-Farsi et al., 2006). Similarity, Ibrahim, (1996) revealed that, hypertension was more among Egyptians with low educational level (34.1% vs. 24.2%). In contrast to this result, El-Dabbakeh (2000), found that, positive and statistical significant association between high educational level and the development of CHD. While Reziq (2006), illustrated that, the

education status affects clients' health and as much as the level of education increased, the compliance status increased.

In most countries of the region, there is a serious lack of effort to educate hypertensive patients and their families. Another important barrier to optimal management is that people with hypertension often do not realize that they have a role to play in controlling their BP. Additionally, many people believe that treatment should be stopped when BP is brought under control. In addition, there are people who refuse to take medications because of the fear of adverse effects. Self-care should be considered a strategy for management of hypertension. Communication with each patient should be established at diagnosis, and continued during follow-up visits. Careful communication, including consideration of prognosis, the advantages of medical care, drugs, or dietary treatment and other non-pharmacological lifestyle measures can be explored at this early stage; this may help to understand the person better and to ensure his/her cooperation and compliance. Beyond the one-to-one setting, the communication/education process can be extended to group education and it should involve spouses and members of the family. Certain people may need the reinforcement that a group can provide in order to implement changes in lifestyle and adhere better to recommended antihypertensive therapy. Community programmed, media campaigns, printed materials and information brochures may facilitate behavioral changes that have been recommended to those with limited educational skills.

4.1.4 Residential area

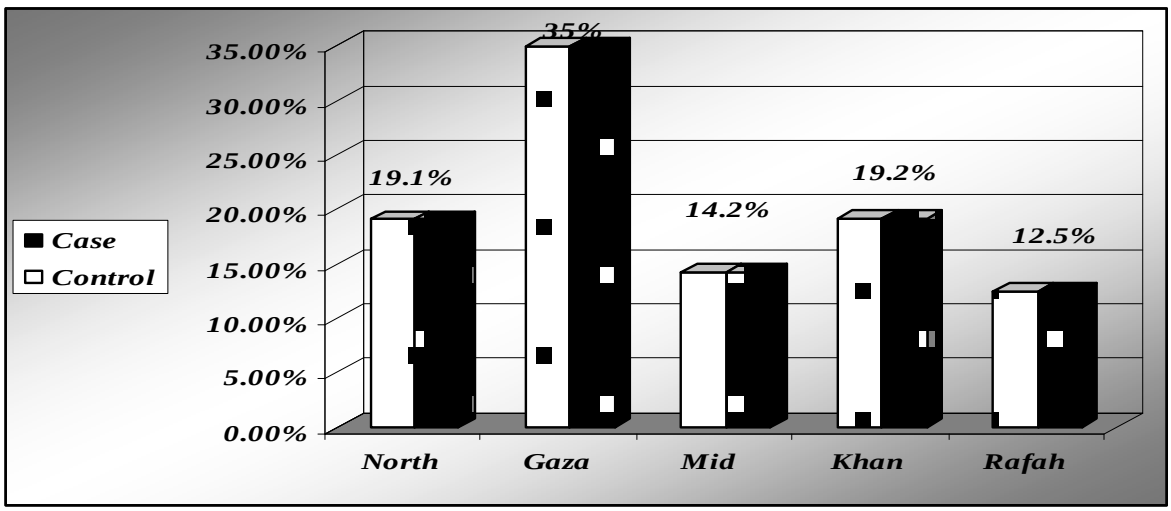

Figure (4.3): Percentage distribution of cases and controls by provinces

Figure 4.3 shows the distribution of cases and controls by provinces. The majority of the cases were from Gaza city (35%), followed by Khan-Younis and North provinces (19.2%, 19.1% respectively), Mid-Zone (14.2%), where Rafah represented the least score (12.5%); same percentage for controls. These results were according to population density of GS.

The total sample in this study is refugee. In GS, refugee population constitutes about 67.4% of the total population (PCBS, 2010[a]). Comparable with the other findings, Mousa et al., (2010), illustrated in their study among refugees in Jordan, Syrian Arab Republic, Lebanon, GS and WB, 9% of screened people were diagnosed with hypertension/diabetes. The researcher concluded that being refugees could be increased the risk of hypertension. She refer that to the siege, bad socio-economic, epidemiological transitions in Palestine, as well as transitions in food consumption patterns and lifestyle have aggravated the burden of poverty related diseases, as people are suffering from emerging epidemics of NCDs, mainly HBP. The scarcity of work opportunity leads to drop in the standard of living. There is no dependable social welfare system in GS; most of the people are under the poverty line.

The researcher attributed the highest risk of hypertension in urban population (Gaza city) to environmental factors including large differences in population size, wealth and health expenditure. In addition, this might be due to economical status, access to the health centers and the health care system, which is better in Gaza city especially in the centralized areas. Furthermore, the process of urban development and changes in lifestyle and the profile of risk factors like obesity, overweight, hypercholesterolemia, and decrease in physical activity through increasing usage of automated transport and advanced technology at home, consumption of quick meals, poor quality of food with high saturated fats, will also tend to increase the NCDs load.

4.1.5 Employment status

Figure 4.4 shows the percentage distributions of work status among the study population. The percentage of unemployed was 75.8% of the total sample among cases and only 16.7% were work. The percentage of cases that are retired was 7.5%. In contrast, the worker among controls (50%), which represented one-half of the population, was higher than among cases. On other hand, the percentage of controls that are unemployed was 45.8% compared with 4.2% who are retired.

Figure (4.4): Percentage distributions of study population by work status

The present study provides that, there is a strong positive association between hypertension and unemployment status (OR= 4.9, 95% CI 2.6-9.5, P=0.000). Employees' males constitute 58.8% compared with 20.6% were employees' females. The study results support some literature and inconsistent with others. For examples, a study conducted in Japan showed gender differences in the association of hypertension with occupation. In men, the level of job strain (the ratio of psychological job demands to job control) correlated with the prevalence of hypertension (OR 1.18; 95%CI 1.05-1.32). The stratified analyses showed significant excess risks in the subordinate groups compared with managers, blue collar workers, less educated workers, and the older age groups. This association was not significant in women (Tsutsumi et al., 2001). In addition, there is increasing evidence from industrialized countries to link CHD and depression with work related stress (WHO, 2009[b]). Similarity, low socioeconomic status is associated with elevated rates of BP related CVDs (Forman et al., 2009; Grotto et al., 2008). Another cross-sectional community-based study was covering whole of KSA. The study illustrated that, unemployed and subjects doing house duties tended to have significantly higher hypertension prevalence, while lowest prevalence of hypertension was found among students (Al-Hamdan, 2010). Whereas, the study conducted in neighboring Oman by Al-Farsi et al., (2006) revealed that, hypertension was higher among subjects retired and wives engaged in domestic duties.

Result in the present study may be referring to the impacts of siege and closure after the second Intifada as a result most of the Palestinian workers in Israeli areas lost their works (PCBS, 2010[b]), Unemployment rate in GS in the end of 2010 was 37.8% (PCBS, 2011[a]). Furthermore, lifelong unhealthy related habits for unemployed subjects were including

physical inactivity, eating patterns, smoking, and sleep more hours. Further studies with large sample are needed to estimate the true prevalence of employment status and to highlight the relationship between it and hypertension disease.

4.1.6 Employment place

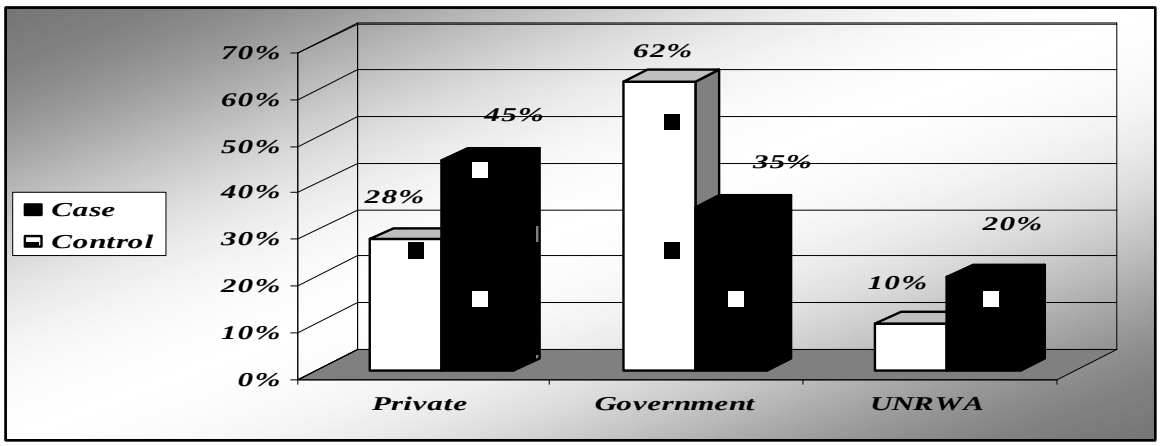

Figure (4.5): Percentage distributions of employment place among cases and controls

The majority of subjects among cases worked at private sector (45%) were higher than the percentage of cases who worked at government (35%). The lowest percentage among cases worked at UNRWA (20%). On other hand, the higher percentage among controls worked at government (62%) compared with 28% of total controls work at private. The lowest score among controls work at UNRWA (10%). This results may be due to natural setting of the study since all the study sample were refugees taken from UNRWA PHCs of NCDs for cases selection, while refugees of both UNRWA PHCs of NCDs screening clinics and government PHC clinics for controls chosen. The researcher concluded that working at private sector could be increased the likelihood of the disease. This may be due to less relaxed working style and more stressful situation in private sector since the demands and deadlines at work and fear of job loss are higher. This is consistent with the study done by singer et al mentioned that, employees can learn to utilize more relaxed working styles if demands and fear of job loss are diminished to a more acceptable level (Singer et al., 1986 as mentioned in Al-Asadi, 2010). Therefore, intervention such as counseling and behavior therapy to identify objectionable behaviors and replace them with healthier type of behavior, and health education to avoid stressful situations may reduce the need for more harmful antihypertensive medication (Al-Asadi, 2010).

In comparison to other studies, no studies were available in hands about the role of work place on HBP. Most studies worldwide compared between work status based on economic, stress situation, and level of education as mentioned previously.

4.1.7 Average monthly income

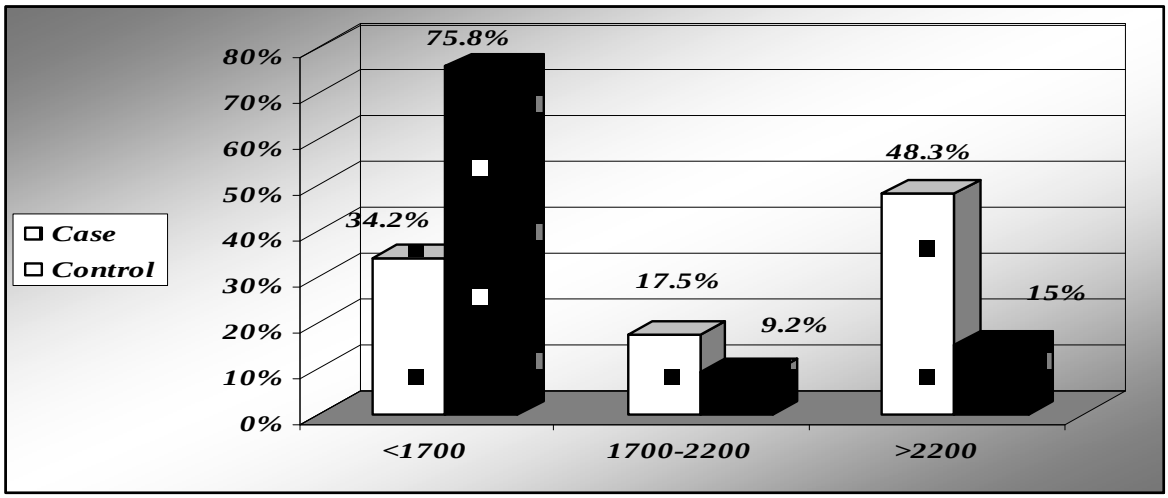

Figure (4.6): Percentage distribution of study population by average monthly income

Monthly income of the study population was divided into three categories as shown in figure 4.6, according to the classification of PCBS (2010[b]). The finding shows that, poor economic situation among cases. Unfortunately, 85% of cases was below poverty line (less than 2200 NIS), they were classified into two groups: 75.8% was less than 1700 NIS (extreme poverty), and 9.2% was average monthly income between 1700-2200 NIS compared with only 15% which was above poverty line (more than 2200 NIS). This indicated that, there is an increase of HBP with the decrease of average monthly income. On other hand, the percentage of subjects with monthly income more than 2200 NIS/month was higher among controls (48.3%) than that among cases (15%). In contrast, the percentage of subjects with monthly income less than 1700 NIS/month was lower among controls (34.2%) compared with cases (75.8%). This indicates a negative and statistically significant association between subject's monthly income (salary) and the occurrence of HBP (P =0.000)**.**

The present study shows highest risk of hypertension among subjects who lived under poverty line (<2200 NIS) with significant relationship between BP and subject's monthly income. There is variation within the literature regarding the association between hypertension and socioeconomic status as income. For example, a study conducted in KSA showed that, hypertension tends to be more among low and high-income subjects,

and this did not reach statistical significance level (AL-Hamdan, 2010). Other studies reported that, in both men and women, the income distributions and hypertension were non-linear indicating elevated levels in low as well as in high-income groups (Mendez et al., 2003). Similarity, other studies indicated that low and high incomes might be associated with psychological tensions, which may be associated with hypertension. Low socioeconomic status is associated with elevated rates of BP related CVDs (Forman et al., 2009; Grotto et al., 2008). Additionally, geographical variations in the rate of hypertension were reported in many studies in different regions of the world, which might be related to regional variation in socioeconomic, demographic and dietary in addition to the geographic characters (Rampal, et al., 2008; Reynolds et al., 2003). Similarity, a study conducted among Indian industrial populations indicated the growing vulnerability of lower socioeconomic group to CVDs risk factors compared with those in the highest socioeconomic group. The same study revealed that, CVDs affect working age adults from lower socioeconomic groups employees and their family members in all participating industries who were eligible for on- or off-site health care, despite levels of awareness and control of CHD risk factors such as hypertension and diabetes were low (Reddy et al., 2007).

The rapid rise of hypertension disease represents one of the major health challenges to economical and social development as well as lives and health of millions of people. The increased risk of hypertension problems noted in Palestinian society is expected to ongoing rise that is to be experienced alongside the developmental transition of the country. The low socioeconomic status for Gaza citizens and continuous Israeli aggression, extension of the separation barrier, check points, and movement restrictions have a negative impact on health, limiting and sometimes preventing access to health care facilities by medical staff and patients (UNRWA, 2000; WB, 2004). Additionally, participants thought that, the researcher might ask about family income because she wants to assist the family. This is agreed with the report of PCBS (2011[b]), which approved that, there are a considerable proportion of the families in GS do not have adequate monthly incomes, and reflects the state of deep poverty in the Palestinian community.

However, there is incompatibility between the researchers still present regarding the connection between HBP and economic status. Some of them show HBP epidemic among highest poverty rates returning to several confounders associated with hypertension such as

tobacco consumption, which is highly prevalent especially among poor. Diet with lower cost and rich in saturated fat, and in simple sugars, with the decreased consumption of fibers, whole grain foods, and complex carbohydrates was more prevalent among people under poverty line. On other hand, other researchers found hypertension common in high-income level referring to consumption of more fast food, soft drink, sweets and desserts with low physical activity through increased usage of advanced technology. Others show that, low and high income may be associated with psychological tensions which may be associated with increased the vulnerability of these illness.

Therefore, a more concerted strategic and multidisciplinary policy approach underpinned by solid research is essential to help explore the relationship between hypertension and income status in more political stable period.

4.1.8 Marital status

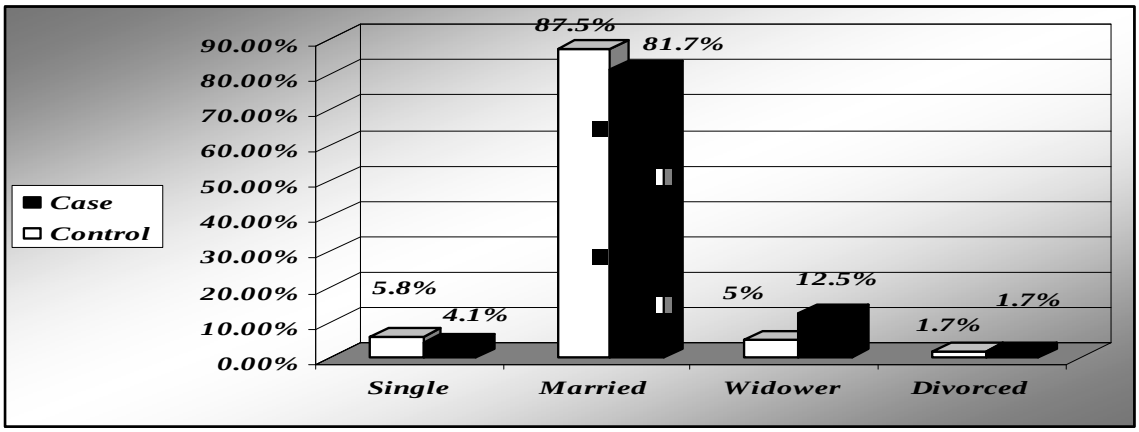

Figure (4.7): Percentage distributions of marital status among study population

Figure 4.7 shows percentage distributions of marital status among study population. There was progressive increase in rate of high systolic and high DBP with social status reaching up to 81.7% of cases was married compared with 87.5% of controls. Moreover, 4.1% were single. While the least (1.7%) were divorced, widowhood represented 12.5% of cases with 2.5% of male compared to 11.9% of female. This reflects more stress on or less social integration of females.

The majority of the surveyed adults were married and that support the results of PCBS (2010[a]) about adult people in GS, and that is normal because of cultural context of GS as poor households and rural areas, which limit the years of schooling, and encourage people

to marry from younger ages. The result behind this cultural heritage is to get more children and that cause many problems in the future (Mensch, 2005).

Comparable with other finding in the world, as inferred in the literature, hypertension is more common among married than single, widowed and divorced for both sexes. This support the study conducted in Basra from April to December 2007. The study indicated insignificantly higher rate of hypertension among married compared to single and widowed/divorced (89.1%, 6.3%, 4.5% respectively, P=0.65) (Al-Asadi, 2010). The positive and insignificant association of this study (P=0.218) also support the results of the study done by Abu-Tawilla (2001), mentioned that, 79.8% of the cases of AMI were married. People who never been married had a lower risk of being AMI (1.6%), while the least (0.6%) were divorced, widowhood represented 18% of cases with 67.9% increase in stage-2 compared to stage-1. Female ratio regarding widowhood was 3:1 higher prevalence compared to male. Similarity, a study conducted in Oklahoma by Han (2011) found that, almost two-thirds of the respondents with hypertension were married.

4.2 Characteristic of hypertension

The study used the international criteria by using the categories set of WHO to define hypertension. Normal BP is defined as levels <120/80 mmHg. SBP of 120–139 mmHg or DBP 80–89 mmHg is classified as pre-hypertension. Hypertension is defined as SBP ≥140 mmHg or DBP ≥ 90 mmHg (Khatib and El-Guindy, 2005). That is to make the study finding comparable to those reported by similar studies worldwide.

As illustrated in the table 4.3, the distribution of hypertension among cases was 56.7% with one-year duration, 22.5%, with two-years duration, and 20.8% with three-years duration, and it was more common among females than males (66.7% vs. 33.3%). Among those who had reported hypertension, 99.2% reported that they are using pills to control their BP; almost 0.8% claimed that they are not using any treatment for hypertension. About 42.8% take only one drug; out of them 50.98% take ACEI, 15.7% take diuretic alone, 23.5% using B-blocker, 5.9% take centrally acting drug, and 3.92% received ca-channel blockers. While 57.2% of hypertensive patients among the cases reported that, they were taking more than one drug to control their BP.

The study shows also high percentage of hypertensive patients among cases (about 100%) were asked by their doctors to follow special advice to lower their HBP, 28.3% prescribed

one advice; among of them 88.24% receiving advice to control their deit, 5.88% take proper handling of stress advice, 2.94% receive exercise advice, 2.94% receiving advice to reducing their weight. While 71.7% take more than one advice. On another hand, the compliance among cases was only 29.2%. Not compliance was 70.8%, and that returned to different factors (table 4.3). Furthermore, the percentage of uncontrol of BP among cases was 82.5%, while the percentage of control was only 17.5%.

Table (4.3): Distribution of hypertension among cases

Variable	Group	No	%
Duration in years of HBP	One year	68	56.7
	Two years	27	22.5
	Three years	25	20.8
Under medication for control of HBP	Yes	119	99.2
	No	1	0.8
Drugs	One drug	51	42.8
	More than one drug	68	57.2
	Total	**119**	**100**
Advice	One advice	34	28.3
	More than one advice	86	71.7
	Total	**120**	**100**
Compliance to follow regime	Yes	35	29.2
	No	85	70.8
What prevent them to comply following regime	Can not proper handling of stress	29	34.1
	Economical	23	27.1
	Like food	12	14.1
	Can not stop smoking	11	12.9
	Can not do exercise	8	9.4
	Not care	2	2.4
	Total	**85**	**100**
% of control of BP among cases	Control	21	17.5
	Uncontrol	99	82.5

Since treatment for hypertension is usually lifelong, the patient and the physician are committed to a long-term association. Treatment should not only aim at lowering BP, but should also be integrated into an overall programme of management of associated risk factors and conditions. Treatment of cases should be individualized and the treatment plan should be tailored to the needs of each case. There is general agreement that five groups of drugs are effective as first line drugs for the treatment of patients with hypertension (JNC V, 1993; Zanchetti, 1993). These are diuretics, B-blockers, ACEI, calcium channel blockers and a-blockers. However, the Regional Consultation on Hypertension Management, held in Lebanon in August 1995, recommended diuretics and B-blockers as

the preferred first line drugs as they can be successfully used initially in the majority of cases. Other classes of drugs such as centrally acting agents (e.g. methyldopa and reserpine) may also be used in certain situations. Combination therapy is usually used when there is no clear response to monotherapy. If a single drug has been partly effective, it may be preferable to add a small dose of a second drug rather than to increase the dose of the first (Chalmers, 1993). Effective combinations utilize low doses of compounds from different drug groups. This permits the addition of different primary actions while minimizing the homeostatic compensations that limit the fall in pressure. Combination therapy also minimizes side effects by allowing the use of drugs in low doses. For reasons of convenience, cost and increased patient compliance, preparations that combine two drugs in a single tablet or capsule may be appropriate for many hypertensive patients once the need for and dose of constituent drugs have been established (Alwan, 1996).

Raised BP changes the structure of the arteries, as a result, risks of stroke, heart disease, kidney failure and other diseases increase. By comparison with other study, Kearney et al., (2004) mentioned that, awareness of hypertension around the world was 46%, and varied from 25.2% in Korea to 75% in Barbados. Treatment varied from 10.7% in Mexico to 66% in Barbados, and control varied from 5.4% in Korea to 58% in Barbados. While Li et al., (2010) revealed that, only 26.2% of the population in rural Shandong Province in China were aware of their hypertension, 22.2% were currently undergoing antihypertensive treatment, and 3.9% achieved BP control. Lack of knowledge about hypertension and the importance of BP control were associated with poor compliance with non-pharmacological and pharmacological treatments. Additionally, Kastarinen et al., (2009) revealed that, only 68% of all hypertensive individuals among Finland men and women aged 25-64 years were aware of their condition, among them only 52% were treated with antihypertensive drugs, and 37% of the drug treated patients had normal BP. Similarity, Esteghamati et al., (2008) illustrated that, among hypertensive patients of Iranian adult population aged 25–64 years; 34% were aware of their elevated BP, 25% were taking antihypertensive medications. Another study was conducted in GS by Reziq (2006), illustrated that, the main associated factors of hypertension disease are medication. Additionally, Khellah (2010) revealed that, 12.1% of the adult Palestinian people aged 19-59 years answered that they have a diet regimen, among of them 7.3% was following a low salt diet, 5% was following a low fat diet, and 2.2% was following a diet special for DM.

4.2.1 BP level means among case and control

Table (4.4): T-test comparing the means of BP reading

Variable	Subject	No	Mean	SD	t	P value
Mean of SBP (1^{st} reading)	Cases Controls	120 120	136.48 111.01	17.799 10.407	13.531	P=.000 95%CI 21.75-29.17
Mean of SBP (2^{st} reading)	Cases Controls	120 120	136.16 110.91	16.879 10.326	13.979	P=.000 95%CI 21.69-28.80
Mean of DBP (1^{st} reading)	Cases Controls	120 120	85.12 74.04	10.785 7.138	9.38	P=.000 95%CI 8.74-13.40
Mean of DBP (2^{st} reading)	Cases Controls	120 120	85.52 73.86	10.918 7.068	9.819	P=.000 95%CI 9.31-13.99

As shown in table 4.4, when comparing the means of BP reading for cases and controls using the t-test, indicated that, the mean of BP was higher among cases than among controls, and the differences between means reach statistical significant (P=0.000). This means that, individuals with high BP level are at higher risk for developing hypertension disease than those with lower BP levels.

Thus, the impact of this disease on the health and economic system is only expected to grow, but the response to these chronic diseases often remains inadequate. On other hand, GS people experiencing bad demographic and socioeconomic factors that hastening the health transition, with sharp escalation of this disease burden. In order to adequate respond to the growing burden of hypertension diseases, a national agenda that supports primary prevention should be adopted. This includes a multi-disciplinary approach from, tobacco control programs, obesity reduction programs, and health promotion programs tailored for specific population groups at risk to long-term investments in national infrastructure that support risk reduction. Barriers to a healthier lifestyle should be detected and controlled for making a national healthier lifestyle accessible for all. Screening for HBP and cardiovascular risk factors, in addition to patients' adherence to the medical management of controlling BP can also be effective in reducing the growing vulnerability of the disease. Further epidemiological surveys with large sample is recommended to delineate the incidence, prevalence, and severity of this disease are key to estimate the cost and resources required, and to design appropriate health prevention and treatment policy strategies.

4.3 Risk factors of hypertension

The most common risk factors identified were, lack of physical activity, obesity, family history, history of DM, history of DH, high LDL-c ≥ 160 mg/dl, high cholesterol level ≥ 240 mg/dl, smoking, low HDL-c < 40 mg/dl, high TG level ≥ 200 mg/dl. Cases and controls were matched for age, sex and locality.

4.3.1 Physical inactivity

Table (4.5): Physical activity of leisure time among cases and controls

Variable	Cases		Controls		OR	P value
	NO.	%	NO.	%		
Physically inactive	87	72.5	17	14.2	29.9 95% CI 12.5-72.9	0.000
Moderately inactive	5	4.2	2	1.7	14.6 95% CI 2.1-125.04	0.000
Moderately active	16	13.3	31	25.8	3.01 95% CI 1.2-7.7	0.01
Physically active	12	10	70	58.3	1	
Total	**120**	**100**	**120**	**100**		

Physical inactivity is a term used to identify people who do not get the recommended level of regular physical activity. As shown in table 4.5 presents the major finding for its related variable. In this survey, information about physical activity was collected by asking the individuals about their physical activity during leisure times. The researcher divided physical activity into four levels, physical inactivity, moderately inactive, moderately active, and physically active. High prevalence of leisure time physical inactivity was noticed among cases (72.5%) than among controls (14.2%), OR was 29.9, with 95% CI (12.5-72.9) when comparing physically inactive with the category of physically active, which in turn reflects positive association between physical inactivity and the increased the risk of HBP (P=0.000). While increased in physical activity was clearly noticed among controls within the other categories (moderately active, and physically active). OR was 0.03 (95%CI 0.01-0.08, P=0.000) when comparing physically active with the category of physically inactive, whereas OR=0.1 (95%CI 0.04-0.24, P=0.000) when comparing moderately active with the category of physically inactive, which reflected a negative and statistically significant association with the occurrence of hypertension disease. This means that the risk of getting hypertension disease increases in people who do not follow minimum physical activity recommendations and inactive lifestyle is a major risk factor for CVDs. This indicates that appropriate regular daily physical activity is a major component

in preventing hypertension, heart, and blood vessel diseases, along with a healthy diet and not smoking.

Exercise can also help in controlling blood cholesterol, diabetes and obesity. People, who are inactive, tend to have higher heart rates- harder heart work with each contraction - and stronger force on arteries. While regular moderate to vigorous exercise promote the prevention of CVDs, improve health, maintain fitness, some cancers and type 2 diabetic and delay many of the effects of aging (Schicheng et al., 2008).

The benefits of exercise did not only improve physical health, but also enhance emotional well-being, improve body image and self-esteem (Department of Health, 1999). Physical activity control body weight and lowered BP (Khatib, and El-Guindy, 2005). The upward trend in hypertension burden is due to do not enough rates of self-reported moderate or vigorous physical activity at recommended frequencies among US adults during leisure time (≤33%) (GEM, 2008[a]). Physical activity improves symptoms related to fatigue, distress, cognitive problems and mental health functioning, actual activity in the brain promoted by regular aerobic exercise (GEM, 2008[a]). The minimum level of physical activity required to achieve health benefits was a daily expenditure of 150 kilocalories in moderate or vigorous activities (Department of Health, 1999). Even 30 minutes of moderate activity is beneficial if done regularly most days of the week and for long term (Department of Health, 1999). Therefore, advice should be given to the public not only to patients to encourage regular physical activity.

Table (4.6): Advice to practice exercise and purpose of it among cases and controls

Variable	Cases		Controls		P value
	NO.	%	NO.	%	
Advice to practice exercise					
- Yes	88	73.3	20	16.7	0.000
- No	32	26.7	100	83.3	
Total	**120**	**100**	**120**	**100**	
Maintain good health	54	61.4	9	45	0.871
Maintain good health + Weight reduction	24	27.3	6	30	
Weight reduction	9	10.2	4	20	
Alternative treatment for health problem	0	0	1	5	
Maintain good health + Alternative treatment for health problem	1	1.1	0	0	
Total	**88**	**100**	**20**	**100**	

On other hand, table 4.6 illustrated that, 73.3% of cases subjects have advice by the health professional to practice exercise; out of them 61.4% to maintain good health, 10.2% for weight reduction, and 27.3% for both maintain good health and weight reduction. In contrast, only 16.7% of controls have recommended practicing exercise.

Physical activity occurs across different domains, including work, transport, domestic duties and during leisure. The result in this study reveals strong significant relationship between hypertension and sedentary activity with P=0.000. Physical inactivity is more prevalent among women (48.1%) than among men (33.8%). The relationship between physical activity and hypertension has been studied by many authors, all found an association between inactivity and HBP. For example, Padwal et al., (2001) showed that, physical fitness is a graded and independent predictor of cardiovascular mortality compared with the group with the lowest fitness ratings. Additionally, El-Dabbakeh (2000), found that, the most common identified CHD risk factors were physical inactivity (53 %). Other study conducted by UNRWA (2006), revealed that, most of the identified CHD risk factor was physical inactivity (46.8%).

It is well known that, physical inactivity is related to obesity. The prevalence of the obesity is increased with the decreased of physical activity. This is going with the study conducted by Kengne et al., (2007) in Sub-Saharan Africa reported that, hypertension was higher among participants with sedentary lifestyles at work and at leisure time. Women displayed high prevalence of obesity. Additionally, Fransson et al., (2006) revealed that, exercise can help control blood cholesterol, diabetes and obesity, as well as help lower BP. The positive and significant association also supports the results of the study done by Amy et al., (2008) mentioned that, higher BMI and physical inactivity were individual predictors of CHD compared with active normal weight individuals. Moreover, Schicheng et al., (2008) indicated that, habitual vigorous activity was not associated with increased risk of subsequent MI in British men with established CHD.

The researcher refers lack of leisure time physical activity among hypertensive Palestinian for many reasons. Firstly, the sociopolitical situation, implementation of even stricter closures on GS, restricted population mobility, unemployment, lack of freedom of self-expression, and additionally, low status of women, deterioration in economic situation, limited recreational opportunities, all might contribute to high stress levels among the adolescent and adult populations. Additionally, women are used to be at home most of the

time looking after their children. In addition, half of the study population among cases (56.7%) aged 50 years and more who already suffer from lacking energy. Finally, this reflect our economic, cultural and agricultural environments in which unlikely for old age especially women to be involved in gymnasium regularly, in addition to lack of recreational places for elderly and middle aged adult may play a part.

Comprehensive approach should emphasize on the importance of healthful lifestyle behaviors, combat sedentary lifestyle and smoking habits, increase the awareness on the importance of physical activity and encourage walking and bicycling for transportation. This should start as early as possible among school students through introducing healthy habits as a part of the school curriculum. All healthcare providers particularly in PHCs can be an effective proponent of physical activity because patients respect physicians' advice and change their exercise behaviors as a result. Physicians should check BP for all clients properly and repeatedly, enquire about risk factors, and offer advice concerning lifestyle and medications. Public health policies should be forced to provide a favorable environment for hypertension control by regulating food industry, providing facilities for physical activity and smoking cessation services as societal, not just an individual problem, therefore, it is demand based multi-sectored, and culturally relevant approach. Finally, future surveys of large sample should consider the inclusion of weekend sampling and explore the prevalence of physical inactivity.

4.3.2 Obesity

BMI provides the most useful measure of obesity. It can be used to estimate the prevalence of obesity within a population and the risk associated with it. BMI values are age independent and the same for both sexes and does not account for the wide variation in body fat distribution. Regarding to BMI distribution, WHO classified BMI into five categories (underweight, normal, overweight, obese, and morbid); the cutoff point was considered as 30 kg/m^2 and more. The researcher classified BMI into two groups ($\geq$30 and<30 kg/m^2). Obesity was highly prevalent among the study population, but it was more prevalent among cases (67.5%) than controls (29.2%), OR was 5.04 (95%CI 2.81-9.08, P=0.000), only 32.5% of the cases was of BMI < 30 kg/m^2. The mean of BMI among cases was (32.7, SD 6.026) higher than among controls (28.8, SD 4.267) (95%CI 2.599-5.255). This reflects positive and statistical significant association between the obesity and the occurrence of HBP. Therefore, obesity is well-known predictors of future

hypertension. Moreover, it was significantly more prevalent in the hypertensive patients than the control group.

Table (4. 7): Distribution of BMI among cases and controls (kg/m²)

Variable	Cases		Controls		P value
	NO.	%	NO.	%	
BMI ≥ 30 kg/m²	81	67.5	35	29.2	0.000
BMI < 30 kg/m²	39	32.5	85	70.8	
Total	**120**	**100**	**120**	**100**	

Since body weight and the trend of CVDs are positively associated in both sexes, obesity is a blamed risk factor because of it is positively associated with increased morbidity from many chronic diseases. Diabetes burden, IHD burden and certain cancer burdens are attributable to overweight and obesity. Chronic overweight contributes also to osteoarthritis – a major cause of disability and so on. Furthermore, excess body fat increases the strain on the heart, raises blood cholesterol levels, TG, lower HDL-c, higher LDL-c levels. The high prevalence of obesity in this study is consistent with several studies in the region and worldwide. A study conducted in Oklahoma by Han (2011), found that, most respondents with hypertension were overweight or obese (63%, 70.2% vs. 59.8%). Another study done in Guatemala by Marini and Gragnolati (2003), showed that, 34% of women 15-49 years of age were overweight. Other studies conducted also in Guatemala showing that, the incidence of overweight in young women (19-30 years of age) was similar among those who lived in rural areas and those who migrated to Guatemala city (28% and 30% respectively). The prevalence among rural and urban young men was 7% and 16% respectively (Torun et al., 2002). Another study conducted in middle–class urban workers found that, the prevalence of overweight was 26% in Guatemala women compared to 42% in men (Pontaza et al., 2007). The positive and significant association between obesity and increased risk of developing hypertension event support the study done by Bacquer et al., (2004) in 15 European centers. The study revealed that, overweight and obese patients had more frequently raised BP and elevated cholesterol after adjustment for age, gender, education, diabetes and centre. In patients, using BP lowering agents, 56% of obese and 51% of overweight patients were still having raised BP compared to 42% in normal weight patients. Additionally, Domingo et al., (2007) showed that, adolescent overweight would increase rates of CHD and other causes attributable to obesity among future U.S. young and middle-aged adults, resulting in substantial morbidity and mortality.

Although there are genetic components to obesity, the increased prevalence of the obesity can be attributed to environmental factors, which lead to increased energy intake and/or to decrease in physical activity that have resulted in a positive energy balance (Gibney et al., 2006). Additionally, regarding a study conducted in Palestine by UPMRC (2001) showed that, overweight was 77%, while obesity was 47% (UPMRC, 2001 as mentioned in MOH, 2005). This is consistent with the result found by Husseini et al., (2009[a]) in two Palestinian communities in the WB showed that, rate of obesity in the urban population were higher than those in the rural community. Obesity was highest in urban women and lowest in rural men. Other study indicated that, obesity is a more potent risk factor in women than men and in younger than older people (Padwal et al., 2001). This may be due to early marriage and striking tendency towards having more children at an earlier age may contribute to sedentary life style, and weight gain during pregnancy may be retained (Croft et al., 1992).

The researcher refers the higher prevalence in this study regarding to obesity for many reasons. In Palestinian society following the outbreak of the second Intifada, poverty increased sharply in Palestine (UN, 2003). Nearly one-half of all Palestinians live below the poverty line. More than 16% of the population cannot afford even basic necessities. The precipitator of this economic crisis has been a multi-faceted system of restrictions on the movement of Palestinian people and goods including the building of the Separation Barriers, unemployment increased from 10% on the eve of the Intifada to about 25% in 2003, this alter Palestinians life towards sedentary lifestyle that increases the risk of obesity (WB, 2004). Poor diet and under nutrition during childhood is associated with increased risks of obesity and chronic diseases in adulthood. Bread and simple carbohydrates are the most food items reflect Palestinian culture regarding the roles of eating habit. Limited socioeconomic and recreational opportunities are all related to obesity.

Interventions should be taken such as establishing a National Task Force to control and treat obesity in the country; raising the public awareness toward this issue and mainly through health education and health promotion activities. Physical activity and healthier food choices are among the critical risk behaviors being addressed, it is vitally important to get this message out to the Palestinian people. Implementation of programs and strategies in order to combat sedentary lifestyle and smoking habits among the population, and to

increase the awareness on the importance of physical activity and create a suitable environment in which people live. Highlight to the public, the role of diet in causing and preventing diet-related chronic disease. Establish a comprehensive dietary surveillance of the population to monitor dietary changes and to evaluate the public awareness as well as the public health programs. In addition, because ingrained behaviors are difficult to change, as people grow older, public health measures need to be as a part of the school curriculum before health-damaging behaviors are adopted.

4.3.3 Family history of hypertension

Table (4.8): Distribution of family history among the study population

Variable	Cases		Controls		Total		P value
	No.	%	No.	%	No.	%	
Positive family history	103	85.8	86	71.7	189	78.75	0.007
Negative family history	17	14.2	34	28.3	51	21.25	
Total	**120**	**100**	**120**	**100**	**240**	**100**	

Table 4.8, revealed that, the prevalence rate of positive family history of hypertension or sudden death of a relative was relatively high in the total population with an overall rate of 78.75%, it was more prevalent among cases (85.8%) than among controls (71.7%), OR was 2.4, with 95% CI (1.2-4.8). This means that, there is a positive and statistically significant association between family history of HBP and the occurrence of the disease (P = 0.007). Furthermore, it was more prevalent among women (79.4%) than among men (77.5%).

Table (4.9): Summary table of selected medical variables

Variable	Case		Control	
	No	%	No	%
One chronic disease	**48**	**46.6**	**47**	**54.7**
HBP	33	68.8	20	42.6
DM	10	20.8	11	23.4
Heart disease	5	10.4	16	34
More than one chronic disease	**55**	**53.4**	**39**	**45.3**
One relationship	**55**	**53.4**	**50**	**58.1**
Mother	31	56.4	17	34.1
Father	11	20	16	32
Sister/Brother	11	20	6	12
Uncle/Aunt	2	3.6	11	21.9
More than one relationship	**48**	**46.6**	**36**	**41.9**

The medical history profile for the study population as it's illustrated in table 4.9, 46.6% among cases have family history of one chronic disease; out of them 68.8% have family history of HBP, 20.8% have DM, 10.4% with heart disease, whereas, 53.4% of cases subjects have family history of more than one chronic disease. On other hand, 53.4% among cases have only one relative with chronic disease; among them 56.4% reported mother, father and sister/brother have similar percentage (20%), uncle/aunt only 3.6%, and 46.6% were reported more than one relative.

While among controls, 54.7% have family history of one chronic disease; out of them 42.6% have family history of HBP, 34% with heart disease, 23.4% have DM, whereas, 45.3% have family history of more than one chronic disease. Additionally, 58.1% among controls have one relative with chronic disease; out of them 32% reported father, 34.1% have mother, 12% sister/brother, 21.9% reported uncle/aunt, and 41.9% reported more than one relative.

The result of this study supports the fact that consistent among review that HBP tends to run in families. Some people inherit a tendency to get hypertension. An inherited predisposition risk for developing hypertension disease increases for people whom having hypertensive relative. Children of parents with hypertension disease are more likely to develop it than those whose relatives are not hypertensive. Some risk factors for getting hypertension can be changed while others cannot. Age, sex, race, and family history are risk factors that a person cannot do anything about and they are impossible to control. People with these risk factors can avoid or eliminate the other risk factors to lower their chance of developing hypertension.

The high trend of positive family history among the study population may be due to relative marriage which contributing to the perpetuation of genetic disorders, or adopting of adverse health behaviors like eating habits and smoking that contribute to development of hypertension disease when interact with a susceptible gene. So genes or behavioral may both be needed for a person to be hypertensive (Rionda and Clements, 2000). Genetic susceptibility plays a large role but this is only permissive, and environmental cofactors can markedly influence the emergence of hypertension (Kannel, 1989). The results of this study congruent with this fact and the finding clearly reveals the strong positive significance relationship between family history and the development of the disease. So no one among literature disagrees with this statement, family history is a strong predictor for

future hypertensive events. This is support with that done by Al-Asadi (2010) in Iraq, revealed that, family history of hypertension was positively associated cumulative occurrence of the disease (P<0.01, OR 1.88) when comparing the rate of hypertension among hypertensive patients with positive family history (64.3%) in comparison with negative family history in both sex (35.7%) (95% CI 1.29 - 2.75). In addition, the present study consistent with the study conducted by UNRWA's NCD screening activities among refugees screened for hypertension and type 2 DM in Jordan, Syrian Arab Republic, Lebanon, GS and WB, in 2007. The study reported that, people whom having hypertensive relatives increased the risk of presenting with hypertension and/or hyperglycemia before 60 years (P<0.05, 95% CI 1.0–1.5). Positive family history was 1.2 times higher development of hypertension compared with negative family history (Mousa et al., 2010). This consistent with the study conducted by Abu-Tawilla (2001), found a significant relationship between family history for CAD (34.4%) and the development of the disease. In addition, the result of this study is consistent with that done by Aygul et al., (2009) among Turkish population, revealed that, family history is the most common risk factors in younger age groups for the development of CHD. Additionally, Nasir et al., (2004), showed that, a positive association between family history of CHD and the presence of any coronary artery calcification. The study revealed that, those with no family history of CHD, family history of premature CHD in parents, or family history in siblings had a prevalence of coronary artery calcification of 55%, 64%, and 78% (P<0.0001) among men and 27%, 36%, and 56% (P<0.0001) among women respectively.

All healthcare providers particularly in PHCs should increase awareness among the individuals with positive family history of hypertension and/or sudden death of a relative should be aware to the presence of other risk factors like smoking, physical inactivity, obesity and others. In addition, they should check BP for all clients properly and repeatedly, enquire about risk factors, and offer advice concerning lifestyle and medications. Moreover, public health policies should be forced to provide a favorable environment for hypertension control by regulating food industry, providing facilities for physical activity and smoking cessation services (Al-Hamdan et al. 2010).

4.3.4 Diabetes Mellitus (DM)

Table 4.10, shows that, the prevalence of DM among the study sample was 13.3%, it was more prevalent among cases (19.2%) than among controls (7.5%), and it was more

prevalent among males (17.5%) than among females (11.3%). OR was 2.9, with 95% CI (1.2-7.2), and there was a positive and statistically significant association between subject's history of DM and the occurrence of HBP (P = 0.008). The average duration of DM among cases and controls was 13.7 years and 7 years, respectively. All diabetic subjects among cases and controls were type 2 DM. This means that DM seems to be a serious health problem among population especially in middle-aged population.

Table (4.10): History of DM and DH among cases and controls

Variable	Cases		Controls		P value
	No	%	No	%	
-Positive history of DM	23	19.2	9	7.5	0.008
-Negative history of DM	97	80.8	111	92.5	
Distribution of the study population by diabetic treatment					
OHA					
- Yes	15	65.2	9	100	
- No	8	34.8	0	0	
OHA and Insulin					
- Yes	5	21.7	0	0	
- No	18	78.3	9	100	
Insulin					
- Yes	2	8.7	0	0	
- No	21	91.3	9	100	
Diet					
- Yes	1	4.3	0	0	
- No	22	95.7	9	100	
distribution of study population by diabetic advice					
- One advice (Deit)	4	17.38	1	11.2	
- More than one advice	19	82.62	8	88.8	
Compliant to follow regime					
-Yes	8	34.8	2	22.2	
- No	15	65.2	7	77.8	
What prevent them to comply following regime					
-Can not proper handling of stress	7	46.7	0	0	
-Economical	4	26.7	2	28.6	
-Can not stop smoking	3	20	4	57.1	
-Like food	1	6.6	1	14.3	
Percentage of control of blood glucose					
-Control	6	26.1	2	22.2	0.82
-Uncontrol	17	73.9	7	77.8	
History of DH					
-Yes	23	19.2	0	0	0.000
-No	97	80.8	120	100	

Fifteen persons (65.2%) among cases who had high blood glucose level were on OHA to lower their glucose level compare with nine persons (100%) among controls, while 21.7% among cases were on OHA and insulin treatment, 8.7% were on insulin, and only one person (4.3%) was on special diet treatment. On other hand, high percent of diabetic people (100%) were advised by a health professional to lower their high blood glucose. About 17.38% among cases asked to follow special diet compare with 11.2% among controls, while 82.62% among cases where reported more than one advice compare with 88.8% among controls. On other hand, the percentage of compliance among the participants was only 31.3% (34.8% among cases vs. 22.2% among controls). Not compliance among study population returned to different factors (table 4.10). Furthermore, the percentage of uncontrolled of blood glucose level among the study population was 75% (73.9% among cases vs. 77.8% among controls), while the percentage of controlled was only 25% (26.1% among cases vs. 22.2% among controls). Additionally, 19.2% among cases who had DH, out of them 52.2% had one-year duration, 13% had two years duration, and 34.8% had three years duration. All DH among cases had medication and were advised by a health professional to control their DH disease.

DM is a group of diseases characterized by high blood glucose levels that result from defects in the body's ability to produce and/or use insulin. Diabetes has several complications of which one is hypertension. Hypertension is more frequent in those with higher level of glucose; being diabetes could be increase the risk of hypertension. Data indicated that at least 60-80 percent of individuals whom develop diabetes will eventually develop HBP (NSRC, 2008). Additionally, CVDs occur earlier and with greater frequency in people with diabetes. Different studies in both developed and developing countries supported this fact. Raised blood glucose causes all diabetes deaths, 22% of IHD and 16% of stroke deaths (NSRC, 2008). The prevalence of type 2 diabetes in this study was (13.3%) included within the range of DM among EMR, which found between 7% and 25% (WHO, 2004[a]). On other hand, comparable with finding in other Arab countries; the finding in this study were around the reported rate in Oman (13%), and more than in Egypt and Tunisia (9%), and in Saudi Arabia 12% (MOH, 2003).

Most researchers congruent with this result, for example, CDC found that diabetes rates continue to soar among racial and ethnic minorities. Among adults, diabetes rates were about 16% for American Indians and Alaska Natives, 12.6% for blacks, nearly 12% for

Hispanics, and 8.4% for Asian Americans in comparison to 7 % for whites. Fully 50 % of people 65 and older have pre-diabetes, and nearly one third have diabetes (Preidt, 2011[b]). According to WHO (2005), revealed that, the association of DM and hypertension is more than that predicted by chance. About 50% of type 1 patients and 80% of type 2 DM have hypertension. The development of hypertension also increases all the complications of diabetes (Khatib and El-Guindy, 2005). Additionally, Gilbert et al., (1995) mentioned that, the presence of HBP in diabetes is associated with a 4-fold increase in death chiefly from heart disease and strokes. The chief reason why people with diabetes develop HBP is hardening of the arteries. Diabetes tends to speed up the process of atherosclerosis. The other fact about diabetes is that it affects both large and small blood vessels in the body. Over time, blood vessels become clogged with fatty depots, and lose their elasticity. All diabetics should know that even mild elevations in BP could be detrimental to health. Studies have shown that diabetics with even a slight elevation in BP have 2-3 times the risk of heart disease compared to individuals without diabetes (Stoltz, 2008). The presence of hyperinsulinemia in hypertensive patient was demonstrated by several studies. Imazu et al., (2001) conducted their study among Japanese-Americans, revealed that, hyperinsulinemia and hyperuricemia were independent predictors of the development of hypertension. Additionally, the high prevalence of diabetes is consistent with a study done by Selvin and Erlinger (2004), showed that, diabetes prevalence rate was 26% risk factor among US population. While Hammoudeh et al., (2006) found that, diabetes was more prevalent among Jordanians men and women with CHD than among men and women without CHD (40% vs. 18% for men, and 64% vs. 24% for women, $P<0.0001$). Similarity, Oba et al., (2008) suggested that, diabetes increased the risk of mortality from CVDs among men, and that from cancer among women in Japan.

Regarding to study conducted in Palestine, the prevalence rate of DM is about 9% (MOH, 2003). In 2002, the incidence of diabetic patients with obesity was 58.7 % out of total diabetic cases (43% males and 69.5% females), while the proportion of overweight diabetic patient was 27.4 % (36.6% in males and 21.1% in females) (MOH, 2005). The number of diabetic Palestinian refugee patients (including those with hypertension) who aged 40 years and above under the supervision of UNRWA in GS was 4.3% in 2000 and 4.7% in 2001 (MOH, 2003). Another study done by Abdul-Rahim et al., (2001) among urban Palestinian population, revealed that, the prevalence of DM was 12% among the surveyed population. This was consistent with the result found by PCBS (2004) showed

that, 2.2% of reported persons cases suffered from DM, this increased to 21.2% among elderly aged 65 years, while it was 11.1% among age group of 40-64 years, and 0.4% among age 18-39 years (MOH, 2005).

The IFG that accompanies DM is a direct effect of many risk factors such as people over age 50 or with a family history of diabetes, overweight, sedentary lifestyle, low HDL-c or high TG, high LDL-c. The high prevalence of diabetes in this study may be due to the high level of these risk factors in the Palestinian community or because of the natural setting of the study (refugees PHCs).

The economic and human costs of diabetes place an enormous burden on its healthcare system as well as on employers, diabetics, and their respective families. Many Medicare Advantage Plans have responded to this burden by implementing Diabetes Case Management Programs (DCMPs) aimed at reducing inappropriate health services utilization, improving health outcomes, and containing costs. There has been a growing emphasis in national practice guidelines on the importance of preventing DM in order to reduce the public health burden of CHD and CVD burdens. The study points to the need for high quality research with larger sample into the effectiveness of patient adherence with management programs. Knowledge of the number of deaths caused by risk factors is needed for health policy and priority setting. Efforts by policy makers are critically important to enhance health awareness and public education to prevent or delay the onset of type 2 diabetes through a healthy lifestyle, change diet, increase level of physical activity, and maintain a healthy weight. HBP is a silent disease and thus it is vital for all diabetics to check their BP on a regular basis. With these positive steps, diabetics can stay healthier longer and reduce their risk of diabetes.

4.3.4.1 Fasting plasma glucose (FPG) and postprandial plasma glucose (PPPG) level means among cases and controls

Table 4.11 shows that, FPG mean level was higher among cases (105.06) than among controls (102.70). The difference between means was not reach statistically significant (P = 0.531). Similarity, regarding to PPPG level, by using t-test to compare these means among cases and controls, it indicated that, PPPG mean level was higher among cases (187.72) than among controls (122.98), and the differences reach statistically significant

(P=0.000). This indicated that, individuals with raised blood glucose level face higher risks for developing hypertension diseases than those with lower levels.

Table (4.11): T-test comparing the means of FPG and PPPG levels (mg/dl) among cases and controls

Variable	Subjects	No	Mean	SD	t	P value
FPG	Cases	120	105.06	38.4	0.63	0.531
	Controls	120	102.70	15		95% CI -5.1-9.8
PPPG	Cases	25	187.72	86.3	4.61	0.000
	Controls	42	122.98	23.4		95% CI 36.7-92.8

Relative changes regarding blood glucose mean level take place between cases and controls in FPG mean level. This may be due to the majority of the cases who had high blood glucose were glucose lowering drug (65.2% OHA, 21.7% OHA and insulin, 8.7% insulin) prescribed by a physician to lower their high blood glucose level, while 100% among controls who had high blood glucose level were glucose lowering drug too (OHA). Additionally, cases are more aware about their high blood glucose level than controls; in addition to that, cases respect physicians' counseling and change their unhealthy lifestyle particularly diet toward relatively healthy diet (approximately 100% of subjects who had high blood glucose level were on special advices by their physician to lower their blood glucose). Finally, this result revealed a good commitment from cases towards the following relatively healthy lifestyle; all have an impact on lowering the high blood glucose level. On other hand, the majority of the changes regarding glucose mean level take place in PPPG mean level. This may be due to small number of the sample contributes in the study regarding PPPG (25 cases vs. 42 controls). This is due to PPPG test performed only to confirm the diagnosis of diabetes when FPG level is still high on the least two consecutive tests within one week.

4.3.5 Lipid and lipoproteins

Table (4.12): Distribution of high blood cholesterol among the study population as conceived by the subjects

Variable	Cases		Controls		Total		P value
	No.	%	No.	%	No.	%	
Positive history of HBC	47	39.2	11	9.2	58	24.2	0.000
Negative history of HBC	73	60.8	109	90.8	182	75.8	
Total	**120**	**100**	**120**	**100**	**240**	**100**	

Table 4.12 shows that, self-reporting of high cholesterol level was 39.2% among cases compared to 9.2% among controls. OR was 6.4, with 95% CI (3-14.03), and it was

statistically significant (P=0.000). The finding revealed that, there was an association between positive history of high blood cholesterol level and the occurrence of HBP disease.

Table (4.13): Distribution of study population by medication and special advice to control high blood cholesterol

Variable	Cases		Controls		P value
	No.	%	No.	%	
Under medication for HBC					
- Yes	14	29.8	1	9.1	0.158
- No	33	70.2	10	90.9	
-Having one advice (deit advice)	10	21.3	2	18.2	
-Having more than one advice	37	78.7	9	81.8	
Compliant to follow regime					0.207
- Yes	16	34	6	54.5	
- No	31	66	5	45.5	
What prevent to comply follow regime					
-Economical	12	38.7	4	80	
-Can not proper handling of stress	9	29	0	0	
-Can not stop smoking	6	19.3	0	0	
-Like food	2	6.5	1	20	
-Can not do exercise	2	6.5	0	0	

On other hand, 25.86% of the study population takes medication for controlling blood cholesterol level (29.8% among cases vs. 9.1% among controls). Meanwhile, approximately 100% of the subjects who had high blood cholesterol level were on special advices by their physician to lower their blood cholesterol, out of them 20.7% of the study sample have advice to control their diet (21.3% among cases vs. 18.2% among controls), while 79.3% were reported more than one advice (78.7% among cases vs. 81.8% among controls). Additionally, regarding to the percentage of compliance among the participants was only 37.9% (34% among cases compared with 54.5% among controls). Not compliance among the study population referred to different factors (table 4.13).

4.3.5.1 Total cholesterol (TC) blood level

In addition to question asked about the history of having elevated blood cholesterol, fasting blood cholesterol level was measured as shown in table 4.14 included nine to twelve hours-fasting blood cholesterol analysis among cases and controls. The population study was classified into three groups. Nearly 7.4% of the study population had cholesterol levels of 240 mg/dl or more (8.4% among cases vs. 6.5% among controls). OR was 1.7, with 95%CI (0.6-5.2), that means there is a positive and not statistical significant association between

increased TC level and the occurrence of the disease (P=0.31). The findings illustrated that, borderline high-risk blood cholesterol level (200-239 mg/dl) among cases (20.8%) is twelve times greater than that among controls in the same group (1.8%), it was positive and statistically significant association with the development of hypertension (P = 0.000).

Table (4.14): Distribution of fasting blood cholesterol level among cases and controls

Variable	Cases		Controls		OR	P value
	No.	%	No.	%		
Desired <200mg/dl	85	70.8	100	91.7	1	0.000
Borderline high risk 200-239 mg/dl	25	20.8	2	1.8	14.7 95%CI (3.2-92.6)	
High risk ≥240	10	8.4	7	6.5	1.7 95%CI (0.6-5.2)	0.31
Total	**120**	**100**	**109**	**100**		

Additionally, the mean level of blood cholesterol was found to be higher among cases (181.9) than among controls (174.62), and the difference between means was not statistically significant (P=0.129). This indicates that, there is a potential link between elevated blood cholesterol level and the risk of BP. Therefore, interventions to reduce TC level could reduce the likelihood of the disease. Patient's prognosis depends more on the sum of his/her risk factors, so as it is difficult to control age, sex, and race, it is also impossible to control family history. It is even more important to treat and control any other risk factors.

Hypercholesterolemia is the presence of high levels of cholesterol in the blood. It is not a disease but a metabolic derangement that can be caused by many diseases, notably CVDs. Elevated cholesterol in the blood is due to abnormalities in the levels of lipoproteins. This is typically due to a combination of environmental and genetic factors. Environmental factors include obesity and dietary choices (high in saturated fat), physical inactivity could increase cholesterol levels. Genetic contributions are usually due to the additive effects of multiple genes, however, occasionally may be due to a single gene defect such as in the case of familial hypercholesterolemia. A number of secondary causes exist including DM type 2 and nephritic syndrome. In this study, 43.8% of subjects among cases and controls were had diabetes and hypercholesterolemia. There is however a correlation between falling cholesterol levels and mortality of CVD death. Globally, one third of IHD is attributable to high blood cholesterol (NSRC, 2008). Additionally, when other risk factors are present, this risk increases even more.

The literature shows that, levels of LDL and HDL are more important for health than TC. Nevertheless, the risk of elevated TC was calculated because there is more information available about average TC levels in populations worldwide (NSRC, 2008). The absolute increase in TC was quite different from culture to culture. Therefore, from a public health perspective it is not enough to focus only on serum cholesterol levels to decrease the burden of hypertension. This stresses the importance of other factors such as smoking, obesity, physical inactivity and diet in the prevention of HBP. Moreover, cholesterol screening and counseling when supported by community-wide cholesterol awareness and education campaign is also important.

There is consistency among literature about the relationship between HBP and TC level. The prevalence rate in this study support the results of the study conducted by Padwal et al., (2001) indicated continuous strong and graded relations between raised serum cholesterol and CAD is seen with TC values above 4.65 mmol/l. Additionally, a report of large cohort studies indicated that, persons with a low CVD risk profile (TC < 200 mg/dl, BP ≤ 120/80 mmHg, and no current cigarette smoking), have 72%-85% lower mortality from CVD, and 40%-58% lower mortality from all causes compared with persons who have one or more of three modifiable CVD risk factors (TNHBPEPCC, 2002). A similar study done by Yasein et al., (2010) showed that, 65% of participants had metabolic syndrome. DM was the most frequent component of metabolic syndrome in males, while low serum HDL-c and high waist circumference ranked first and second components in females. Additionally, a study done in Turkey by Aygul et al., (2009) showed that, the prevalence rate of hypercholesterolemia was 48%. A similar study done in Jordan by Hammoudeh et al., (2006) showed that, the prevalence rate of hypercholesterolemia was 19%. In addition, regarding to studies conducted in Palestine, the finding of the present study consistent with study conducted by Husseini et al., (2009[b]) showed that, the rate of reported hypercholesterolemia was 0·7% at age 40–49 years and 3·2% at 60 years and older.

In the present study, the mean level of TC was found to be slightly higher among cases (181.9 mg/dl) than that of controls (174.62 mg/dl). This may be due to several reasons. 29.8% among cases who had high blood cholesterol were lipid lowering drug (mainly atorvastatin) prescribed by a physician to normalize their lipid profile compare with 9.1% among controls who had high blood cholesterol level were lipid lowering drug too.

Secondly, cases are more aware about their high blood cholesterol level than controls; additionally, cases respect physicians' counseling and change their unhealthy lifestyle particularly diet toward relatively healthy diet (approximately 100% of subjects who had high blood cholesterol level were on special advices by their physician to lower their impaired lipid profile). Thirdly, this revealed a good commitment from cases towards the following relatively healthy lifestyle; all of this contributes in lowering the high blood cholesterol level.

Therefore, there is a need for efforts recommend that clinicians routinely screen men and women aged 40 years and older for lipid disorders and treat abnormal lipids in people who are at increased risk of hypertension disease. They also need to recommend that clinicians routinely screen younger adults (men and women aged 30-40 years) for lipid disorders if they have other risk factors for hypertension. A number of lifestyle changes are recommended in those with high cholesterol including; smoking cessation, limiting alcohol consumption, physical activity, maintaining a healthy weight, and a diet low in saturated fats. In strictly controlled surroundings, a diet can reduce cholesterol levels by 15%. In practice, dietary advice can provide a modest decrease in cholesterol levels and may be sufficient in the treatment of mildly elevated cholesterol.

4.3.5.2 Low density lipoprotein-cholesterol (LDL-c)

Table (4.15): Distribution of LDL-c level among cases and controls

Variable	Cases		Controls		OR	P value
	No.	%	No.	%		
Ideal <130 mg/dl	87	75.7	99	91.6	1	0.000
Increased risk 130-159 mg/dl	16	13.9	2	1.9	9.1 95%CI 1.9-59	
High risk ≥160 mg/dl	12	10.4	7	6.5	1.9 95%CI 0.7-5.8	0.17
Total	**115**	**100**	**108**	**100**		

Table 4.15 presents the distribution of the study population deal with LDL-c level. The finding revealed that, the percentage of subjects with high risk LDL-c (≥160) was higher among cases than among controls, as it was 10.4% and 6.5% respectively. OR=1.9, with 95%CI (0.7-5.8). The difference between cases and controls in high risk LDL-c blood level indicates a positive association between high LDL-c blood level and the development of HBP, and it was not statistically significant (P = 0.17). Similarity, regarding to the increased risk group of LDL-c level (130-159 mg/dl), 13.9% among cases compare with 1.9% among controls were at the borderline high risk levels. OR=9.1, with 95%CI (1.9-

59). Whereas, the percentage of normal LDL-c serum level (< 130 mg/dl) was lower among cases (75.7%) than that among controls (91.6%). The mean level of LDL-c was found to be slightly higher among cases (110.17 mg/dl) than that among controls (93.06). This may be due to the same causes mentioned previously in TC.

LDL-c is one of the major groups of lipoprotein that enable lipid like cholesterol and TG to be transported within the water-based blood stream. Direct LDL particle measurement was recognized as superior for assessing individual risk of cardiovascular events. Since current theory holds that higher levels of LDL particles promote health problems and CVDs, they contribute to artery blockages (plaques). They are often called the bad cholesterol particles (as opposed to HDL particles, which are frequently referred to as good cholesterol or healthy cholesterol particles). Most people should aim for an LDL-c of 100 mg/dl or lower; these guidelines were based on a goal of decreasing death rates from CVD to less than 2%-3% per year (UCSF Medical Center, 2011).

The result of this study is consistent with large population based review cohort studies showed that, the protective effect of HDL-c seems to be at least as strong as the atherogenic effect of the low density fraction, particularly in women (Padwal et al., 2001). In addition, it supports the results of the study done in the U.S. by Pischon et al., (2005) showed that, non–HDL-c (non-HDL-c = TC-HDL-c) is a strong predictors of CHD. Similar study done by Howard et al., (2000) revealed that, LDL-c was a strong independent predictor of CHD. The hazard ratio indicates that a 10 mg/dl increase in LDL-c levels would lead to a 12% increase in CVDs risk.

Treatment is aimed at weight reduction and modification of risk factors such as diabetes, and elevated lipid levels. There are three major components in weight loss therapy: diet therapy, physical activity, and life-style and behavioral modifications. Nutritional consult and diets that limit calories, fat, and carbohydrates; behavioral counseling and support networks. BP, glucose, and lipid levels are regularly monitored, and persistent elevations are treated pharmacologically. Lipid profiles screening and counseling will best serve the community when they are supported by other activities such as a community-wide lipid profile awareness and education campaign.

4.3.5.3 High density lipoprotein cholesterol (HDL-c)

Interestingly, HDL-c is a reverse-transport protein; it removes cholesterol from the arteries

and takes it to the liver out of the body. High levels of HDL-c lower the risk of developing CVDs providing optimal protection. As shown in table 4.16, there was a negative association between HDL-c blood level and the development of HBP. OR was 0.015, with 95%CI (0.002-0.112), and it was statistically significant (P=0.000). The percentage of HDL level of less than 40 mg/dl was higher among cases (38.3%) than that among controls (0.9%). The prevalence rate of low HDL-c (< 40 mg/dl) for all males and females was 20.2%, with higher percentage among males (26.9%) than females (16.6%). This indicates men have an increased risk of atherosclerotic heart disease than women.

Table (4.16): HDL-c level among cases and controls

Variable	Cases		Controls		Total		P value
	No.	%	No.	%	No.	%	
High ≥40 mg/dl	71	61.7	107	99.1	178	79.8	0.000
Low < 40 mg/dl	44	38.3	1	0.9	45	20.2	
Total	**115**	**100**	**108**	**100**	**223**	**100**	

Additionally, the mean level of HDL-c was found to be lower among cases (44.76 mg/dl) than that among controls (57.72). This indicates negative and statistically significant association between HDL-c level and the development of hypertension (t= -7.753, P=0.000).

HDL-c is one of the five major groups of lipoprotein, which enable lipids like cholesterol and TG to be transported within the water-based blood stream. In healthy individuals, about thirty percent of blood cholesterol is carried by HDL. HDL particles are able to remove cholesterol from within artery atheroma and transport it back to the liver for excretion or re-utilization, which is the main reason why the cholesterol carried within HDL particles is sometimes called "good cholesterol". This is going with the fact that HDL-c levels are a strong inverse predictor of cardiovascular events. There is consistent among epidemiological studies that, high concentrations of HDL (over 60 mg/dl) have protective value against CVD such as ischemic stroke and MI. While, low concentrations of HDL (< 40 mg/dl) increase the risk for atherosclerotic diseases (UCSF Medical Center, 2011).

The finding of the present study supports the study done by Barter et al., (2007) found that, men tend to have noticeably lower HDL levels with smaller size and lower cholesterol content than women, so men have an increased incidence of atherosclerotic heart disease

than women. Additionally, the result of this study agrees with the study conducted in GS by El-Dabbakeh (2000); and in Jordan by Hammoudeh et al., (2006) investigated an inverse relationship between HDL-c level and CVDs events.

Certain changes in eating habits and lifestyle can have a positive impact on raising HDL levels such as aerobic exercise, weight loss, smoking cessation, removing trans fatty acids from the diet, adding soluble fiber to diet, increasing intake of cis-unsaturated fats and cholesterol. Screening and treatment of potential abnormalities of lipid and lipoprotein may be necessary.

4.3.5.4 Triglyceride (TG) blood level among cases and controls

Table (4.17): Percentage of TG blood level among cases and controls

Variable	Cases		Controls		OR	P value
	NO	%	NO	%		
Ideal < 150 mg/dl	77	64.7	103	95.3	1	0.000
Borderline high risk 150-199.9 mg/dl	22	18.5	3	2.8	9.8 CI 2.7-42.8	
High risk ≥ 200 mg/dl	20	16.8	2	1.9	13.4 CI 2.9-85.5	0.000
Total	**119**	**100**	**108**	**100**		

Concerning to TG level, table 4.17 presents the major finding for its related variables. Around 9.7% was the prevalence of hypertriglyceridemia (≥ 200 mg/dl) among the total population, but it was much higher among cases (16.8%) than among controls (1.9%). The positive association reveals statistical significant relation between HBP and high TG level. OR was 13.4, with 95% CI (2.9-85.5), P= 0.000. Additionally, the mean level of TG was found to be higher among cases (143.99) than among controls (114.34), and the difference between means was statistically significant (P=0.000). This indicates that, there is a potential link between elevated blood TG level and the risk of HBP.

TG is not cholesterol. They are the compounds in which fat moves through the bloodstream and are measured when cholesterol is checked. TG lower than 200 mg/dl of blood are considered normal. Treatment is usually recommended when they exceed 400 mg/dl. High levels of TG in the bloodstream have been linked to atherosclerosis (hardening of the arteries) and by extension the risk of heart disease and stroke. However, there is a relative negative impact of raised levels of TG compared to that of HDL-c level giving a strong inverse relationship. People who have high LDL "bad" cholesterol and low HDL "good" cholesterol often have high TG, which can be a sign of carbohydrate

sensitivity and insulin resistance.

The results of this study support the result of the study done by El-Dabbakeh (2000); and Abu-Tawilla (2001) revealed that, TG is a strong predictor of CVDs event. Also, the study result is consistent with the study done in U.S. by Fava et al., (2008), indicated that, the degree of coronary atherosclerosis in postmenopausal women is linked to a deregulation of the TG-HDL metabolism, increases in remnant lipoprotein levels, which may be associated with increased lipid deposition in the arterial wall and plaque formation. Fasting plasma TG concentrations reflect the concentration of both TG -rich very LDL (VLDL) and remnants of VLDL and chylomicrons - play a greater role in CVDs risk factor. Additionally, Weil (2005) found that, diets high in carbohydrates (>60% of the total caloric intake) causing a high glycemic index, leads insulin overproduction and increase TG levels in women**.** This is congruent with the study conducted by Sieri et al., (2010) found that, adverse changes associated with carbohydrate intake including TG levels are stronger risk factors for heart disease in Italian women than in men.

However, exercise, omeg3 fatty acid, carnitine, and fibrates can be used to bring down TG substantially; but public health perspective suggest that, it is not enough to focus only on serum TG level to reduce the burden of hypertension disease, it is necessary to reduce and/or modify serum lipid and lipoprotein all together in addition to other risk factors.

4.3.5.5 Comparison of lipid and lipoprotein mean levels

Table (4.18): T-test comparing the means of lipid and lipoprotein levels (mg/dl) among cases and controls

Variable	Subject	No.	Mean	SD	t	P value
TC	Cases	120	181.9	41.92	1.525	0.129
	Controls	109	174.62	28.289		
LDL-c	Cases	115	110.17	38.062	3.615	0.000
	Controls	108	93.06	32.151		
HDL-c	Cases	115	44.76	38.062	-7.753	0.000
	Controls	108	57.72	32.151		
TG	Cases	119	143.99	73.671	3.836	0.000
	Controls	108	114.34	33.563		

As shown in table 4.18, t-test reveals that, when comparing the means for cases and controls, the majority of the changes regarding lipid and lipoprotein mean levels take place between cases and controls in the TG mean levels with relative changes in TC, LDL-c and HDL-c levels. The differences between mean were statistically significant for LDL-c, HDL-c and TG (P = 0.000), while it was not significant for TC (P=0.129).

4.3.6 Smoking

4.3.6.1 Distribution of the study population by smoking habit variables

As shown in table 4.19, smoking was not very common; the overall prevalence of smoking was 12.5% of the study population. The prevalence of current smoking among cases (8.3%) was lower than compare to controls (16.7%). OR was 0.455, with 95% CI (0.2-1) and P=0.05, which indicate negative and statistical significant association between current smoking and the development of HBP. Nevertheless, the lower level of current smoking among cases didn't mean absence of the problem, since 15.5% of cases were smoking in the past, out of them 64.7% had smoked for 5-20 years, 35.3% had smoked for 21-40 years, 88.2% had smoked 20-40 cigarettes/day while 11.8% had smoked 41-60 cigarettes/day. Additionally, 1.7% among cases smoke other forms (sheisha), among of them 33.4% smoked for 3-10 years, 66.6% smoked for 11-17 years, 66.7% smoked one sheisha/day, while 33.3% smoked two/day. On other hand, 93.3% among cases exposed to others' smoke, out of them 87.6% exposed for 1-2 hours/day, while 12.4% exposed for 3-14 hours/day. For current smokers, 90% among cases had smoked for 15-25 years, while 10% had smoked 26-45 years, and 70% of them had smoked 13-40 cigarettes/day, whereas 30% had smoked 6-12 cigarettes/day, so all of this should be considered**.**

Table (4.19): Smoking status among cases and controls

Variable	Cases		Controls		P value
	No.	%	No.	%	
Current smokers					
-Yes	10	8.3	20	16.7	0.05
- No	110	91.7	100	83.3	
Former smoker	17	15.5	1	1	0.000
- Stop smoking between 6-12	3	17.6	0	0	
- More than 12 months	14	82.4	1	100	
Smoke other forms (sheisha)					
- Yes	2	1.7	5	4.2	0.316
- No	117	97.5	115	95.8	
- Previous	1	0.8	0	0	
Exposed to others' smoke	112	93.3	82	68.3	0.001
- 1-2 Hours	98	87.6	60	73.2	
- 3-14 Hours	14	12.4	22	26.8	
Not exposed to others' smoke	8	6.7	38	31.7	

Interestingly, the majority of former smokers among cases (15.5%) were quit smoking within the last 12 months and mainly due to the occurrence of the disease, OR was 18.1, with 95% CI (2.4 - 138.7) (P=0.000), which indicate positive and statistical significant

association between former smokers and the development of HBP. This consistent with the study conducted in Iraq by Al-Asadi (2010) found that, the percentage of ex-smokers among the hypertensive (11.3%) was greater than in comparison to controls (3.6%). This might because patients with hypertension recognized the harmful effects of smoking or had been advised by a physician to quit smoking.

In comparison to men, among cases all women in the present study were non smokers, while among controls only three participants (1.9%) were females, OR=26.66, with 95%CI (7.77 - 91.46) (P=0.000).

Regarding the number of cigarette per day, the finding revealed that, the average number of cigarettes smoked per day among cases was 16.8 (SD 5.35, range 6-20) and among controls 13.1 (SD 8.741, range 6-40). Smokers who smoke ≥13 cigarettes/day for cases (70%) were higher than those who smoke <13 cigarettes/day (30%). While, smokers among controls who smoke ≥13 cigarettes per day (25%) were less than those who smoke < 13 cigarettes per day (75%). This indicated positive and statistical significant association between number of cigarettes smoking and the development of the disease with dose response relation (P=0.026).

As inferred from the literature cigarette smoking can repeatedly produce a temporary rise in BP of approximately 5-10 mmHg (NSRC, 2008). This effect may be most prominent with the first cigarette of the day in habitual smokers. Experts agree that smoking should be avoided in any person with HBP because it can substantially increase the risk of secondary cardiovascular complications such as atherosclerosis, enhance the progression of kidney disease and also increase the chances of men having erectile dysfunction (NSRC, 2008). The risks of pipe and cigar smokers seem to fall between those of non-smokers and cigarette smokers (RR 1.3, 95%CI 1.1-1.5) for IHD with a dose response relation (Padwal et al., 2001). Additionally, people who smoke pipe or cigar seem to have a higher risk of death from CHD and stroke.

The majority of the study's results indicated that, hypertension disease concentrated among smokers. This result is consistent with many studies done regionally and globally. The significant association of this study supports the results of a study done in Egypt by Ibrahim (2003), illustrated that, the risk of premature HBP showed a prevalence rate of smoking 40% among adult Egyptians. Another study done in Sub-Saharan Africa by

Kengne et al., (2007) found that, hypertension was 6 times more frequent in smoker men (P<0.001). A similar study was conducted by El-Dabbakeh (2000) showed that, the prevalence rate of smoking was 29% among cases with CHD. Another study was conducted by Abu-Tawilla (2001) revealed that, AMI dominantly attacks tobacco smokers with a prevalent rate of smoking 51.7%. In addition, the present finding supports the study done by UNRWA among patients with diabetes and hypertension showed that, the prevalence rate of smoking was 16.3% (UNRWA, 2006). A similar study conducted in Bahrain by Abdul-Wahab et al., (2002) revealed that, the prevalence of smoking habit was 29.5% of the male subjects reported to be regular smokers compared to 18.6% of the females. A similar study done by Abdeen (2006) among Palestinian population in Israel showed that, low level of education and income predict higher level of tobacco consumption and increase risk of CHD. Additionally, Padwal et al., (2001) found that, the risk of CVD in smokers is proportional to the number of cigarettes smoked and how deeply the smoker inhales, and it is apparently greater for women than men. Similarity, Hammoudeh et al., (2006) showed that, smoking was highly prevalent among Jordanian men and women with CHD than those without (45% vs. 32% for men, and 11% vs. 7% for women, P<0.0001). While, Erbel et al., (2008) revealed that, current smoking was highly prevalent in Heinz Nixdorf Recall Study (HNR) in German (11.9% for men vs. 13.1% for women), the study showed also, a higher rate of former smokers (48.3% among male vs. 41.3% for women). Another study conducted by Aygul et al., (2009) revealed that, 68% of all the subjects and 88% of those ≤ 44 years old among Turkish population were smokers. Smoking was the only modifiable risk factor in about one third of those ≤ 44-year-old patients, suggesting that, most of the AMI cases in this age group could be prevented only by smoking cessation.

Although, according to the study finding and several studies conducted in our society (Palestinian) support the result of lack of smoking among females, this may be due to smoking among females is not socially acceptable, or may be due to female smoking is underestimated. While in comparison to males, the study showed, high prevalence of smoking among males (33.8%) this may be due to recurrent occupation; stress is inherited in the life of the Palestinians particularly in GS. Political conflict increases the economic and financial burden, and the scarcity of work opportunity; all of these may be associated with the transitions in patterns of lifestyle. Additionally according to data from MOH Annual Report (2003), mentioned that, the prevalence of smoking among individual 12

years and above was 22.1% (18.6% in GS and 23.9% in WB; 40.7% among males and 3.2% among females). The high prevalence among students may be due to the psychological and social stress during Intifada and due to marketing advertisement and lack of health education and health promotion activities, which has an impact on motivated youth to smoke.

Persuading hypertensive individuals not to smoke is the most effective single way the doctor has to reduce their risk. Smoking control is also an integral part of any effort in multifactor primary prevention of CVDs in populations. Identification and implementation of integrated community-based intervention programmed and strategies can be cost effective to increase the awareness on the importance of anti-smoking habits among deep rooted behavioral. Public health policies should been forced to provide a favorable environment for hypertension control by providing facilities for smoking cessation services. Tobacco use is one of the main risk factors for a number of chronic diseases including cancer, lung diseases, and CVDs, despite this; it is common throughout the world. A number of countries have legislation restricting tobacco advertising, and regulating who can buy and use tobacco products, and where people can smoke. Additionally, there are constraints and barriers for tobacco control (WHO, 2011[f]); WHO introduced the MPOWER package of tobacco control measures to further counter the epidemic of smoking (WHO, 2011[f]).

4.3.6.2 Passive smoking

As shown in the table above (4.19), the majority of the subject among cases (93.3%) exposed to others' smoke (SHS). OR was 6.5, with 95% CI (2.7-16). This indicated positive and statistical significant association between exposure to others' smoke and the increasing risk to the occurrence of HBP (P=0.001).

Smoking's negative effect is probably the single most powerful lifestyle measures. It is the most preventable risk factor. Globally, passive smoking increases the risk of death from lung cancers (71%), heart disease, stroke (10%), and chronic respiratory disease (42%). Exposure to smoke - SHS - increases the risk even for non-smokers (UCSF Medical Center, 2011).

The finding of this study support the result of the study done by Nina (2002) mentioned that, about 43% of US children are exposed to cigarette smoke by household members.

Childhood exposure to ETS has been shown to cause asthma and to increase the number of episodes and severity of the disease. The study finding supports the results of a study conducted by the Department of Health and Human Services' Centers for CDC, documented that, measurable levels of serum cotinine (cotinine is a chemical the body metabolized from nicotine) were found in the blood of 88% of American nonsmokers. In other words, nearly nine out of ten nonsmoking Americans are exposed to ETS on a regular basis (Nina, 2002). Moreover, exposure to ETS can contribute to serious health consequences and it is the third leading cause of preventable death in the US (Nina, 2002). Additionally, the result of this study is consistent with the study done in China by He et al., (2008), mentioned that, the prevalence of SHS exposure was 39.5%, with 86.8% exposed at home, and 13.2% exposed in the workplace, the prevalence of CVDs was significantly higher in the exposed than in the unexposed subjects. In addition, Glantz and Parmley (1995) revealed that, SHS exhibit an increased risk of both fatal and nonfatal cardiac events in everyday life among non-smokers. Additionally, meta-analysis of all 19 studies of risk of IHD in lifelong non-smokers who live with a smoker revealed that, environmental exposure to tobacco smoke causes an increase in risk of CVDs by 25% (Law et al., 1997).

The bulk of scientific research supports the health communities' claims that ventilation cannot create a safe indoor environment when tobacco smoke is present. Worth nothing that, research proves that we have no control on smoking since tobacco smoke does not remain within designated smoking areas, but travels easily through a building's open doorways and ventilation system. Formal policies and laws restrict or banning the use of tobacco in public buildings, schools, and workplaces. Therefore, many public and private facilities are establishing a ten-to twenty-five-foot smoke-free zone around all entrances, around operating window, and within stairwells. Schools and day-care centers prohibit tobacco use on their entire campus. These laws do not protect children from tobacco smoke within their homes or automobiles. Many policy makers fear from potential losses of tax revenues if they restrict tobacco industry and/or importing tobacco products and informing smokers about the health dangers of smoking. There is a need for international harmonization of risk assessment, management practices in a global economy, and a variety of actions and programs to minimize unwarranted ETS. Public health professionals should work to educate the public on the importance of establishing smoke-free homes and automobiles for the safety and well-being of their children and nonsmoking family

members. Integrated community-based intervention programmed can be cost effective in produce synergetic effect for influencing environmental and institutional policies. Public education to increase community awareness and a strategy to integrate cessation of smoking into the community approach to primary prevention should start as early as possible among school students. Emphasis should be on the importance of healthful lifestyle behaviors particularly avoiding smoking. Restriction on tobacco production and sales which consider as a key to improve public health and would be benefit for economic in future by reducing tobacco-related health problems.

4.4 Distribution of the study population by diet regimen variables

Table (4.20): Distribution of the study population by diet regimen variables

Variable		Cases		Controls	
		NO	%	NO	%
Diet regimen					
- Yes		52	43.3	43	35.8
- No		68	56.7	77	64.2
-Having one special diet regimen		28	56	15	34.9
-Having more than one diet regimen		24	44	28	65.1
Low salt	Yes	35	67.3	7	16.7
	No	17	32.7	35	83.3
Low fat	Yes	34	65.4	39	92.9
	No	18	34.6	3	7.1
High fruits and vegetables	Yes	3	5.8	6	14
	No	49	94.2	37	86
Low calorie	Yes	2	3.8	11	26.2
	No	50	96.2	31	73.8
Weight reduction diet	Yes	2	3.8	11	26.2
	No	50	96.2	31	73.8
High fiber diet	Yes	1	1.9	2	4.8
	No	51	98.1	40	95.2

Table 4.20, illustrates the distribution of diet regimen variables among population under study and shows high percent of people did not have any diet regimen. Only 39.55% answered that they have a diet regimen (43.3% among cases vs. 35.8% among controls). Several types of diet regimen were included in the questionnaire. 45.45% of the interviewees were followed one special diet regimen (56% among cases vs. 34.9% among controls), whereas 54.55% were followed more than one diet regimen (44% among cases vs. 65.1% among controls). The most diet regimen that was followed by the interviewees; was low fat diet (65.4% among cases vs. 92.9% among controls), low salt diet (67.3% among cases vs. 16.7% among controls), low calorie diet (3.8% among cases vs. 26.2%

among controls), high fruits and vegetables (5.8% among cases vs. 14% among controls), and weight reduction diet (3.8% among cases vs. 26.2% among controls)

This result congruent with the study conducted in Palestine by Obaid (2010) revealed that, high percent of elderly people (63.4%) were asked by their doctors to follow special diet due to prevalence of chronic diseases. About 87.8% were asked to follow low fat diet, 86.3% were asked to follow low salt diet, and 86.7% were asked to follow diabetic diet, but the compliance was only 34.6% among them. Additionally, Khellah (2010) revealed that, adult Palestinian people aged 19-59 years are at risk of chronic diseases. Moreover, approximately 12.1% answered that they have a diet regimen among of them 7.3% was following a low salt diet, 5% was following a low fat diet and 2.2% was following a diet special for DM. Similarity, a report of a clinical trial (2003), mentioned that, adults with hypertension could be lowered BP as much as 38% by making lifestyle changes and participating in the DASH diet, which encourages eating more fruit and vegetables. Lifestyle changes that may reduce BP by about 5-10 mmHg include reducing salt intake, reducing fat intake, losing weight, and reducing alcohol consumption (GEM, 2008[c]).

4.5 Dietary habits of the study population

4.5.1 Impact of diet on the alteration of hypertension disease risk factors

Food is important for health but it can also be the cause of ill health. The foods we eat contain protein, fats, carbohydrates, salts, minerals and vitamins. Each of these has a role to play in sickness and in health (Mehra and Lashkari, 1992). Although genetic factors play a significant role in determining who will become hypertensive, lifestyle factors contribute strongly to the high prevalence of hypertension. Unhealthy diet; diet directly affects the development of atherosclerosis, the underlying cause of CVDs. Diet also affects blood cholesterol levels, body weight, BP, and blood glucose level. Changing these lifestyle habits including the way people eat has been known to be an effective key in managing these risk factors. DASH (Dietary Approaches to Stop Hypertension) is an eating plan low in saturated fat, total fat and cholesterol, high in fruits and vegetables, and low fat dairy foods (the diet provides about 1900 kilocalories with 70 grams protein). The plan is rich in calcium, magnesium, potassium as well as protein and fiber. The diet reduced SBP by an average of 6 mmHg and DBP by 3 mmHg in normotensive individuals; in those with hypertension, the systolic dropped an average of 11 mmHg and the diastolic about 6 mmHg (Edwards, 2001).

4.5.2 Distribution of the study population by food and drink frequency variables

Table (4.21): Distribution of the study population by food and drink frequency variables

Variables	Cases		Controls		P.V
	No.	%	No.	%	
Milk/products (cheese, yogurt, milk drinks,)intake among cases and controls					
Less than once weekly	12	10	7	5.8	0.231
Once or more weekly	108	90	113	94.2	
Eggs intake among cases and controls					
Once weekly or less	64	53.4	67	55.8	0.69
More than once weekly	56	46.7	53	44.2	
Grains (bread, rice, potato, pasta)intake among cases and controls					
Less than once daily	4	3.3	10	8.3	0.09
Once or more daily	116	96.7	110	91.7	
Vegetables intake among cases and controls					
Less than once daily	24	20	23	19.2	0.87
Once or more daily	96	80	97	80.8	
Fruits intake among cases and controls					
Less than once daily	59	49.2	93	77.5	0.000
Once or more daily	61	50.8	27	22.5	
Fish intake among cases and controls					
Less than once weekly	13	10.8	9	7.5	0.37
Once or more weekly	107	89.2	111	92.5	
Sweets intake among cases and controls					
Less than twice weekly	90	75	82	68.4	0.252
Twice or more weekly	30	25	38	31.7	
Lean red meat trimmed from visible fat intake among cases and controls					
Less than once weekly	23	19.2	3	2.5	0.000
Once or more weekly	97	80.8	117	97.5	
White meat intake among cases and controls					
Less than once weekly	4	3.3	4	3.3	0.639
Once or more weekly	116	96.7	116	96.7	
Legumes (bean, pea...) intake among cases and controls					
Less than twice weekly	61	50.8	36	30	0.001
Twice or more weekly	59	49.2	84	70	
Fried food intake among cases and controls					
Less than twice weekly	71	59.2	100	83.3	0.000
Twice or more weekly	49	40.8	20	16.7	
Soft drink intake among cases and controls					
Once or less weekly	76	63.3	100	83.3	0.000
More than once weekly	44	36.7	20	16.7	
Tea, coffee drink intake among cases and controls					
Less than once daily	9	7.5	7	5.8	0.604
Once or more daily	111	92.5	113	94.2	
Pickles, salt intake among cases and controls					
Once weekly or Less	87	72.5	97	80.8	0.13
More than once weekly	33	27.5	23	19.2	

As mentioned in literature, there is an inverse relationship between the consumption of

learn red meat, bran (whole grains), fish, fruits, vegetables, legumes, vegetables oil and the risk of CVDs, whereas, there is a direct relationship between the consumption of desserts, eggs, salty food, coffee and tea, soda beverages and the risk of CVDs. As shown in table 4.21, which illustrates the nutritional status among the participants towards the following healthy intake of the majority of the nutrients

4.5.2.1 Meat (lean red and white), fried food, milk/products

The result of the present study shows that, the percentage of cases (90%) that ate milk/products once or more weekly was lower than controls (94.2%). OR was 1.79, with 95% CI (0.6-5) and P=0.231, which indicate positive and not statistical significant association between lower intake of milk/products and the development of HBP. This result indicates that there is a wrong commitment regarding the relatively healthy intake of dairy products since most of the hypertensive patients did not meet the minimum standards.

The present study shows also, the percentage of the intake of lean red meat trimmed from visible fat once or more weekly was lower among cases (80.8%) than that among control (97.5%). OR was 9.25, with 95% CI (2.5-39.9) and P=0.000, which indicate positive and statistical significant association between lower intake of lean red meat and the development of HBP. This result indicates a wrong awareness among hypertensive patients towards the healthy intake of red meat. This may be due to wrong conception that meat intake is harmful and fats are bad or due to bad economical status and state of poverty that most households suffered, lead people depend more on cheaper food items.

While the percentage of cases (96.7%) who ate white meat once or more weekly was equal the percentage of controls (96.7%). OR was 1, with 95% CI (0.2-4.1) and P=0.639. This indicates a good awareness and commitment among hypertensive patients toward the healthy intake of white meat.

Additionally, the percentage of cases (40.8%) who consumed fried food twice or more weekly was higher than controls (16.7%). OR was 3.5 with 95% CI (1.8-6.6) and P=0.000, which indicate positive and statistical significant association between higher intake of fried food and the risk of HBP. This result indicates a wrong awareness among hypertensive patients toward the healthy intake of fried food.

The recommended total fat intake should be between 20-35% of calories for adults, with

most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as lean red meat, fish, nuts, and vegetable oil (USDHHS and USDA, 2005). Fat is considered as an undesirable constituent of human diets. It linked to obesity and increased the risk of unhealthy blood lipid levels, which in turn, may increase the risk of CHD, but it plays an important role in meeting nutrient requirements, and certain types of fat offer protection from heart disease, BP regulation (Gibney et al., 2006; USDHHS and USDA, 2005). In adults, the lower limits for fat-intake (15% total energy intake) are set to ensure an adequate intake of fat-soluble vitamins and essential fatty acids, and to help meet energy needs. An upper limit (30-35% energy intake) is set to help decrease the risk of obesity. Limits are set on the amount of saturated (usually less than 10% energy), and trans fatty acids (less than 2% energy), present in the diet as high intakes of these fatty acids have been linked to an increased risk of CVDs (Sanders and Emery, 2003). Lean red meat is a rich source of protein and magnesium. The recommended daily intake of protein was 0.75g/kg body weight of adults (Sanders and Emery, 2003). A low intake of fats and oils (less than 20% of calories) increases the risk of inadequate intakes of vitamin E and of essential fatty acids and may contribute to unfavorable changes in HDL blood cholesterol and TG (USDHHS and USDA, 2005). Additionally, olive oil is beneficial for health due to both its high content of monounsaturated fatty acid (omega-9 oil), and its high content of antioxidants substances because it is less processed. Studies have shown that olive oil offers protection against heart diseases by controlling LDL "bad" cholesterol levels while raising HDL "good" cholesterol levels (Willett, 1990). In addition, dairy products (preferable fat free) are the main sources of calcium, potassium, magnesium, zinc, iron, riboflavin, vitamin A, folate, and vitamin D, which are essential components of bone and can protect from osteoporosis. A study conducted by USDHHS and USDA, (2005) mentioned that, adult and children should not avoid milk/product because of concerns that these foods lead to weight gain. There are many fats free are available and consistent with an overall healthy diet plan which recommended 2-3 serving of milk/product daily (serving=one cup of milk or equivalent)

Raising the public awareness toward food based dietary guidelines, which illustrated as a food pyramid that showing the relative proportions of the major food groups and translated into a balanced diet.

4.5.2.2 Eggs

The result of the present study shows that, the percentage of eggs consumption more than once weekly was higher among cases (46.7%) than controls (44.2%). OR was 1.11, with 95% CI (0.1-1.9) and P= 0.69, which indicate positive and not statistical significant association between higher intake of eggs and the development of HBP. This result indicates a wrong awareness from hypertensive patients towards relatively healthy intakes of eggs.

As mentioned previously in literature, many studies were done have indicated a direct relationship between eggs intake and the development of CVDs, BP, and elevations in blood cholesterol as they are rich in cholesterol (Hu et al., 1999; Krauss et al., 1996; Truswell, 2003; USDHHS and USDA, 2005). The recommended daily intake is no more than 300 mg/day of cholesterol and limit consumption of eggs, which contain about 213 mg of cholesterol per egg (Krauss et al., 1996). However, eggs contain many other nutrients besides cholesterol, including unsaturated fats, essential amino acids, folate, and other B vitamins, therefore, consumption of eggs may raise HDL-c levels and decrease blood glycemic and insulinemic responses (Hu et al., 1999). So interviewees should be recommended to meet the minimum standard of egg intake by continuous counseling and health education programmed.

4.5.2.3 Fish

The result of the present study shows that, the percentage of fish consumption once or more weekly was lower among cases (89.2%) than among controls (92.5%). OR was 1.5, with 95% CI (0.57-3.99) and P=0.37, which indicate positive and not statistical significant association between lower intake of fish and the development of HBP. This indicated a wrong awareness from hypertensive patients towards relatively healthy intake of fish.

Fish contain omega-3 fatty acids, mercury, and selenium as well as polychlorinated biphenyls and dioxins, all have anti-arrhythmic effects which may be partly mediated by effects on BP or heart rate, TG-lowering, anti-inflammatory, and diastolic responses. The risk of cardiac death decreased with consumption of 1-2 servings of fatty fish per week compared with no intake (Chan and Cho, 2009; Mozaffarian, 2009; Truswell, 2003). The recommendation for people with CAD is one gram of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) per day (Chan and Cho, 2009). Additionally, USDHHS and

USDA (2005), recommended that, total fat intake should be between 20-35% of calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.

4.5.2.4 Grains (bread, rice, potato, pasta)

The finding of the present study reveals that, bread is the most food item consumed by the participants as most people do in Palestine, which clearly reflects Palestinian culture. The percentage of cases (96.7%) who eat grains (bread, cereals, rice...) once or more daily was much higher than controls (91.7%). OR was 2.64 with 95% CI (0.7-10.3) and P=0.09, which indicate positive and not statistical significant association between higher intake of grains and the development of HBP. This result indicates that, there was a wrong awareness among hypertensive patients towards relatively healthy intakes of grains. As mentioned previously the majority of households were suffering from deep poverty according to income patterns in the GS. This lead that, people depend more on cheaper food items due to bad economical status and state of poverty they suffered, bread and cereals considered the cheapest food in Gaza markets comparing to other food items.

The finding of this study shows also higher percentage of obesity among cases than controls, this encourage hypertensive patients towards changing their unhealthy mixed bread intakes to relatively healthy intakes.

Whole grains are rich with fiber, vitamin E, vitamin B-6, minerals, antioxidants, and phytoestrogens (Jensen et al., 2004). The recommended daily intake of whole-grain foods is 3 serving/day (USDHHS and USDA, 2005); is associated with a reduced risk of CHD, reduce the risk of several chronic diseases, might help with weight maintenance, and might contribute to favorable metabolic alterations. Bran component of whole grains could be a key factor in this relation (Banerjee et al., 2004; Jensen et al., 2004; USDHHS and USDA, 2005).

Intervention by raising the public awareness toward healthier food choices, highlight to the public the role of diet in causing and preventing diet-related chronic diseases, introducing healthy dietary habits as part of the school curriculum, improving dietary habits is a societal, not just an individual problem, therefore it is demand based multisectorial, multi-disciplinary, and culturally relevant approach.

4.5.2.5 Fruits and vegetables

The study finding reveals that, the percentage of cases (80%) that ate vegetables once or more daily was slightly lower than controls (80.8%). OR was 1.1, with 95% CI (0.5-2.1) and P=0.87, which indicate positive and not statistical significant association between lower intake of vegetables and the risk of HBP. Additionally, the percentage of cases (50.8%) that ate fruits once or more daily was higher than controls (22.5%). OR was 0.28, with 95%CI (0.15-0.51) and P=0.000, which indicate negative and statistical significant association between higher intake of fruits and the development of HBP. This indicates that, there is a wrong commitment from hypertensive patients regarding the relatively healthy intake of vegetables, whereas, there is a good awareness among hypertensive patients regarding the relatively healthy intake of fruits.

Fruits and vegetables are low in fat, and contain pectin and other fibers, flavonoids and other antioxidants, and they contain folate, vitamins and minerals (Truswell, 2003). They are good sources of vitamins A and C, folate, and potassium; consumption of whole fruits rather than fruit juice for the majority of the total daily amount is suggested to ensure adequate fiber intake (USDHHS and USDA, 2005). As mentioned in literatures, many studies have indicated that there is an inverse relationship between fruits and vegetables intake and the risk of CVDs through the beneficial combinations of micronutrients, antioxidants, phytochemicals, and fiber. Women with high fruits and vegetables intake were older, smoked less, and exercised more than were women with low fruit and vegetable intake (Liu et al., 2000). Fruit (2-4 serving/day) and vegetable (3-5 servings/day) intake was inversely associated with a higher prevalence of diabetes, hypertension, and high cholesterol, and were associated with lower risk of CVD (Liu et al., 2000). In addition, fruits and vegetables are recognized as a source of a number of nutrients that may interact to reduce LDL-c, BP (lower Na/K ratio), and homocysteine (folate), and to improve antioxidant status, and endothelial function (Samman et al., 2003). Insufficient intake of fruits and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of IHD deaths, and about 9% of stroke deaths worldwide (NSRC, 2008). Dietary interventions to reduce diet-dependent net acid load (e.g., increase intake of fruits and vegetables, decrease intake of meat and cheeses, and increase the ratio of potassium to protein in diets, or treatment with alkalizing supplements) could reduce the risk of hypertension (Zhang et al., 2009). Fruit and vegetable consumption is one element of a healthy diet. It intake varies considerably among

countries; reflecting economic, cultural and agricultural environments (NSRC, 2008).

The researcher refers the finding of this study regarding fruit and vegetable consumption to the sociopolitical situation. GS considered as poor area with low income. The economic situation is usually unstable because of the frequent closure, and the restriction of private commercial imported and exported materials. Political conflict increases the economic and financial burden. This means current diet that lead to hypertension did not be representative of diet in previous years. Additionally, fruits in Gaza's market are from the costly foods unlike vegetables, which are cheaper and more abundant. According to the participants, 80.4% of the interviewees who ate vegetables once or more daily (80% among cases vs. 80.8% among controls), comparing with fruits intake, most of the study population 63.35% (49.2% among cases vs. 77.5% among controls) still far away from the minimum standard, which result a negative impact on health status . Therefore, raising the public awareness towards following current dietary recommendations regarding the relatively healthy intake of fruits and vegetables is consider as a primary preventive and protective measure against CVDs and mainly hypertension.

4.5.2.6 Legumes

The result of the present study reveals that, the percentage of legumes consumption twice or more weekly was lower among cases (49.2%) than among controls (70%). OR was 2.4, with 95% CI (1.4-4.3) and P=0.001, which indicate positive and statistical significant association between lower intake of legumes and the development of HBP. This result indicates a wrong commitment from hypertensive patients towards relatively healthy intakes of legumes.

Legumes are excellent sources of fiber. Eating a high-fiber diet can significantly lower the risk of heart attack, stroke and colon cancer (Monique and Gilbert, 2001). Legumes are low in sodium and rich in potassium, calcium, and magnesium that decrease the risk of hypertension; the recommended daily intake is four times or more per week (Bazzano et al., 2001; USDHHS and USDA, 2005). They are considered part of both the vegetable group and the meat and beans group as they contain nutrients found in each of these food groups (USDHHS and USDA, 2005).

Health education and health promotion programmed should be reinforced and encouraged the public to always read the Nutrition Facts label to find out the amount of, and the type

of, fiber contained in any particular food, to help achieve daily requirements of fiber.

4.5.2.7 Sweets and salty foods

The result of the present study shows that, the percentage of sweets consumption twice or more weekly was much lower among cases (25%) than controls (31.7%). OR was 0.72, with 95%CI (0.4-1.3) and P=0.252, which indicated negative and not statistical significant relationship between lower intake of sweets and risk of hypertension disease. This result indicates a good awareness from hypertensive patients regarding a healthy intake of sweets.

The result of the present study shows also, the percentage of salty foods intake more than once weekly was higher among cases (27.5%) than controls (19.2%). OR was 1.6, with 95% CI (0.84-3.1) and P= 0.13, which indicated a positive and not significant relationship between salty food intake and risk of HBP. This result indicates that, there is a wrong awareness from hypertensive patients regarding relatively healthy intakes of salty food.

Carbohydrate is a major source of energy in most human diets. Diet with low simple carbohydrate is recommended to prevent type II diabetes, obesity, atherosclerosis and heart disease (Fung et al., 2009; Sanders and Emery, 2003). Additionally, USDHHS and USDA, (2005) revealed that, decreased intake of foods, especially beverages with caloric sweeteners, is recommended to reduce calorie intake and help achieve recommended nutrient intakes and weight control. The daily recommended for carbohydrates intake is 45-65% of total calories. Dietary fiber is composed of non-digestible carbohydrates. Diets rich in dietary fiber have been decreased risk of CHD and improvement in laxation. In addition, Fung et al., (2009) mentioned that, women with a higher consumption of sugar-sweetened beverages or soft drinks were more likely to be current smokers, to have lower levels of physical activity, and to have a higher BMI than those with a lower intake. So awareness should be encouraged by continuous counseling and health education programmed for healthy intake of sweet, and more research is needed to study the relationship between the consumption of calorically sweetened beverages and weight gain.

On other hand, salt (or sodium chloride) may cause fluid retention and thereby cause pressure around the blood vessels, which can lead to hypertension (Mayo Clinic, 2010). Most epidemiological studies have shown a positive association between dietary salt intakes, BP levels, and the prevalence of hypertension. Most intervention trials indicated that a reduction in salt intake significantly reduces both systolic and DBP, CHD, and stroke

(Fung et al., 2008; Gibney et al., 2006; Khatib and El-Guindy, 2005; NHLBIDCI, 2008[b]; USDHHS and USDA, 2005). This effect is more evident in hypertensive, diabetic, obese and elderly subjects, while it is less evident in normotensive people (Gibney et al., 2006; USDHHS and USDA, 2005). Therefore, it is recommended to use salty foods sparingly, choose and prepare foods with little salt (less than 2,300 mg of sodium/day); individuals with hypertension and older adults aimed to consume no more than 1,500 mg of sodium per day, and meet the potassium recommendation (4,700 mg/day) with food (USDHHS and USDA, 2005).

4.5.2.8 Distribution of the study population by drink frequency variables

The result of this study shows that, the favorites drink for most of the study sample is tea and coffee. The percentage of coffee and/or tea drinking once or more daily was lower among cases (92.5%) than that among controls (94.2%). OR was 0.8, with 95% CI (0.3-2.3) and P=0.604, which indicated negative and not statistical significant relationship between lower intake of coffee and/or tea and risk of hypertension disease. This result indicates a good awareness and commitments from hypertensive patients regarding the relatively healthy intake of coffee and tea. Siege and bad economy of Palestinians in GS may enforce the majority of the population to a high daily intake of coffee and tea.

The result of the present study shows also, the percentage of soda beverages drinking more than once weekly was higher among cases (36.7%) than controls (16.7%). OR was 2.9 with 95% CI (1.5-5.6) and P=0.000, which indicated positive and statistical significant association between soda beverages drinking and risk of hypertension disease. This indicates a wrong awareness of hypertensive patients towards the relatively healthy intake of soda beverages.

Tea and coffee are beneficial when used in small amounts, but excessive amounts are detrimental to kidney action and may aggravate a tendency to HBP (Mehra and Lashkari, 1992). Coffee contains caffeine that increases BP, cardiac output, and circulating catecholamine. Caffeine is a nonselective adenosine receptor-blocking agent, thus blocking the beneficial effects of adenosine during myocardial ischemia. Among coffee drinkers, the proportion of smokers increased, intake of total and saturated fatty acids and daily total energy increased, while leisure-time physical activity decreased, serum LDL-c concentration increased dose-dependently with increasing coffee intake (Happonen et al.,

2004). As mentioned previously in literature, three studies were done by Happonen et al., (2004); Kleemola et al., (2000); Mehra and Lashkari, (1992), have reported a positive association between coffee and tea drinking and HBP. The maximum allowed amount of caffeine should not exceed 400 ml of coffee daily (1-3 cups daily) (Kleemola et al., 2000).

On other hand, sugar-sweetened beverages, or soft drinks, include carbonated and noncarbonated beverages that contain sugar-based caloric sweeteners and are flavored with fruit juice. As mentioned previously in literatures, two studies were done by Fung et al., (2009); USDHHS and USDA (2005) revealed that, there is a positive association between soft drinks, and weight gain and obesity. In addition, a higher consumption of sugar-sweetened beverages has been linked to an increased risk of developing type II diabetes and CHD.

Continuous counseling and health education and health promotion programmed should be established to highlight the harmful effect of highly intake of caffeine (more than 400 ml/day), and sugar-sweetened beverages.

4.6 Combination of risk factors

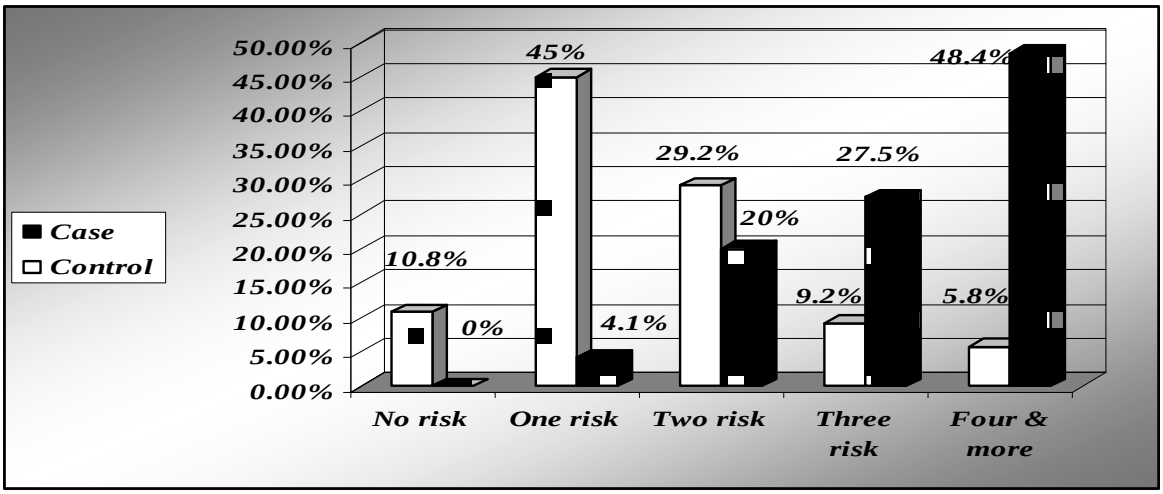

Figure 4.8: Percentage distribution of risk factors combination among study population

Combination of risk factors as it is shown in figure 4.8; 0% vs. 10.8% of subjects among case and controls were had no risk factors. On other hand, 4.1% vs. 45% were had only one risk factors. Similarity, 20% vs. 29.2% were had two risk factors. Additionally, 27.5% vs. 9.2% were had three risk factors. Moreover 48.4% vs. 5.8% were had four risk factors and more. This indicates that the more risk factors the individual has, the more

vulnerable to develop the events.

Each risk has its own causes, and many have their roots in a complex chain of events over time, consisting of socioeconomic factors, environmental and community conditions, and individual behavior. Health risks are in transition and health has become globalized – as patterns of consumption change markedly around the world. Many risk factors interact physiologically in the etiology of HBP. Persons with risk factors combinations are at raising the burden of chronic diseases, such as heart disease and cancers; manifested by high rates of morbidity, mortality, economic loss, and societal stress. In combination, these factors provide a powerful means of predicting risk and preventing disease and death. The finding of this study support the study done by El-Dabbakeh (2000), revealed that, the more risk factors the individual has, the more vulnerable to develop CHD events.

4.7 General comparison with other countries

A number of modifiable factors are responsible for many premature or preventable deaths. Globally, an estimated 47% of premature deaths and 39% of total disease burden in 2000 resulted from the joint effects of the risk factors considered (Ezzati et al., 2003). These risks caused a substantial proportion of important diseases, lung cancer (72%), chronic obstructive pulmonary disease (60%), IHD (83-89%), and stroke (70-76%) (Ezzati et al., 2003). Removal of these risks would have increased global healthy life expectancy by 9.3 years (17%) ranging from 4.4 years (6%) in the developed countries of the Western Pacific to 16.1 years (43%) in parts of Sub-Saharan Africa (Ezzati et al., 2003).

As mentioned before, the most common hypertension risk factors identified by the present study were similar to those derived from other studies conducted either regionally or globally but with some variation in the prevalence of these risk factors. By comparison, the reported trend of hypertension varied around the world, with the lowest rate in rural India (3.4% in men and 6.8% in women) and the highest rate in Poland (68.9% in men and 72.5% in women). Awareness of hypertension was reported for 46% of the studies and varied from 25.2% in Korea to 75% in Barbados. Treatment varied from 10.7% in Mexico to 66% in Barbados, and control varied from 5.4% in Korea to 58% in Barbados (Kearney et al., 2004). Additionally, hypertension becomes a serious medical problem in developing countries like those in EMR. The highest vulnerability of hypertension was reported from Iraq (40.4%) followed by Bahrain with a rate of 38.2%, while the lowest rate of

hypertension was reported from the Islamic Republic of Iran (14.8%), followed by Kuwait and Oman (20.5%). The distribution of hypertension in Egypt was 26.7% and in Jordan 26%, in Saudi Arabia 21.3%, and in Sudan it was 23.6% (WHO, 2011[e]).

The prevalence of the obesity in this study was (67.5%) high and alarming comparable with the finding in the world. Obese in hypertensive patients in Oklahoma were 70.2% (Han, 2011); 51% of non-Hispanic black women vs. 37% of non-Hispanic black men were obese (AHA and ASA, 2011). On other hand, the finding in this study included within the range of obesity among EMR, 51.6% among Jordan hypertensive patients (Yasein et al., 2010), 39.8% in Egypt (Ibrahim, 1996), 37.1% in Iraq (Al-Asadi, 2010), the prevalence of overweight and obesity in Kuwait 75.4%, Saudi Arabia 68.8%, Oman 29.6%, Iran 42.8%, Sudan 53.9%, Syrian Arab Republic 56.3% (WHO, 2011[e]).

The prevalence of physical inactivity was (72.5%) lower than that in Sudan (86.8%) but much higher than that in Syrian Arab Republic (31.15%), in Iran 67.5%, in Oman 69.9%, Egypt 70.4%, Kuwait 64.7%, Saudi Arabia 67.7%, Jordan 51% (WHO, 2011[e]), In Iraq 79.6% (Al-Asadi, 2010). Additionally, physical inactivity among non-Hispanic blacks only 29.3% are considered regularly active (AHA and ASA, 2011), 59% of the New York population reported a sedentary lifestyle (Department of Health, 1999), approximately 60% of all Americans aged 18 years and older reported that they are physically inactive (NSRC, 2008).

The prevalence of DM was (19.2%) within the range of DM among EMR which found between 7% and 25% (WHO, 2004[a]). While the prevalence rate of DM in the world, about 16% for American Indians and Alaska Natives, 12.6% for blacks, nearly 12% for Hispanics, and 8.4% for Asian Americans in comparison to 7 % for whites (Preidt, 2011[b]).

Positive family history of hypertension in the present study (85.8%) was much higher than in Iraq 64.3% (Al-Asadi, 2010). The prevalence of elevated serum cholesterol level (39.2%) was lower than in Jordan (48%), and Iran (43.6%), but higher than in Saudi Arabia (19.15%), Egypt (19.4%), Sudan (19.8%), Oman (27.6%) in comparison to 38.6% in Kuwait, Syrian Arab Republic 34% and 37.5% in Iraq (WHO, 2011[e]). Additionally, the prevalence of smoking habit (8.3%) was lower than in Bahrain (29.5% of the male subjects reported to be regular smokers compared to 18.6% of the females) (Abdul- Wahab et al., 2002), in KSA 20% (WHO, 2006). In addition, the prevalence rate of smoking in Jordan

29%, Syrian Arab Republic 24.7%, Oman 9.3%, Saudi Arabia 11%, Iran 13%, Sudan 12%, Egypt 18%, Kuwait 20.6%, and Iraq 21.6% (WHO, 2011[e]).

This means that we can develop preventive health education and health promotion programs that are applied in other countries to prevent and control HBP disease.

Chapter V
Conclusion and Recommendations

5.1 Conclusion

The aim of this study is to identify the most common hypertension risk factors among UNRWA primary health care adult registered patients suffering from essential hypertension in GS. The study was conducted to address this information gap. The researcher extracted data on exposures to these selected risk factors from adult Palestinian population and highlight the problem as a public in nature that need community-based intervention programs integrated with health education programs. The study might encourage future national efforts to educate the public about the health risks and might support generation of future hypotheses. It might address the associated and predisposing factors of elevated levels of hypertension, diabetes, hypercholesterolemia and obesity before starting any public intervention that is targeted to reduce such high prevalence, enhancing the skills of health-care providers and equipping health-care facilities to provide services related to health promotion, risk detection, and risk reduction. It might support determination of the causes and mechanisms of risk factors, including biologic, social and epidemiologic and influences effective interventions.

Total of (240) adults were included in the current study, data collected in randomized manner by a self-constructed face-to-face interviewed questionnaire, which included demographic, socioeconomic, lifestyle, health profile, and dietary investigation through food frequency questionnaire. Anthropometric measurement, physical examination (BP), and lab test were abstracted from the patient file.

From the study finding, it appears that a number of modifiable factors are responsible for many premature or preventable deaths among adult population in GS. For example, being overweight or obese shortens life expectancy, while half of all long-term tobacco smokers will die prematurely from a disease directly related to smoking. From the current study results, we conclude that hypertension disease can be preventable in many cases; because most of the risk factors are modifiable. Modifiable risk factors fall into three main groups. First, lifestyle risk factors such as tobacco smoking and physical inactivity. Second, there are dietary risk factors such as a high salt intake and a low intake of fruits and vegetables or high intake of saturated fat. Finally, there are metabolic risk factors, which shorten life

expectancy by increasing a person's chances of developing CVDs and diabetes. Metabolic risk factors include high blood cholesterol level, high LDL-c level, low HDL-c level, high TG level, high FPG level, and being overweight or obese. All these factors were associated with the development of HBP. Whereas, the most common non-modifiable risk factors were age 50 years and more, sex (women more than men), family history of HBP. Additionally, these risk factors may work independently or interaction may take place between one and another. On other hand, regarding food intake; the study revealed that, there was a good awareness and commitment from hypertensive patients towards a relatively healthy intake of fruits, desserts, tea and coffee, and white meat. Whereas, those patients followed unhealthy intake (wrong nutritional conception) of milk/products, grains, vegetables, eggs, fish, lean red meat trimmed from visible fat, legumes, soft drinks, fried food, and salty food.

In order to better characterize Palestinian population, it should be possible to reduce preventable deaths by changing modifiable risk factors through introducing public health policies, programs and regulations that reduce exposures to these risk factors. However, it is important to know how many deaths are caused by each risk factor before developing policies that aim to improve a nation's health. In addition, it is imperative to establish new research study with larger sample to assess the pattern and trends of major modifiable dietary, lifestyle, and metabolic risk factors among the Palestinian population using a method called “comparative risk assessment”. This approach estimates the number of deaths that would be prevented if current distributions of risk factor exposures were changed to hypothetical optimal distributions, sharing the responsibilities with different governmental and non-governmental sectors, it promotes healthy living (better diet, more physical activity and tobacco cessation) and healthy societies based multi-sectorial, multi-disciplinary, and culturally relevant approach.

- Great variation observed in relation to gender, females were at higher risk of hypertension, DH, obesity and hypercholesterolemia than males, while males were higher in DM than females. The risk is increased with age (50 years and more).
- Positive family history of hypertension was noticed among cases (85.8%), while it was 71.7% among controls. There was positive and statistically significant association between family history and the occurrence of hypertension.

- Lack of knowledge about hypertension, DM, and the importance of BP, FPG, and PPPG control were associated with poor compliance with non-pharmacological and pharmacological treatments.
- Obesity was highly prevalent among cases (67.5%) compared to controls (29.2%). There was positive and statistically significant association between obesity and the development of HBP.
- History of diabetes among cases was (19.2 %) higher than controls (7.5 %), there was positive with statistically significant association between subject's history of DM and the occurrence of hypertension.
- High-risk blood cholesterol level (≥240 mg/dl) and borderline high risk were higher among cases than controls in the same group. There was positive and not statistically significant association for high-risk, whereas positive and statistically significant association for increased risk group.
- High-risk LDL-c level (≥160mg/dl) and the increased risk group of LDL-c (130-159 mg/dl) were higher among cases than controls. There was positive and not statistically significant association for high-risk group, whereas positive and statistically significant association for increased risk group.
- HDL-c was negative and statistically significant associated with the development of hypertension, so it considered anti-risk factor for hypertension disease.
- The prevalence of hypertriglyceridemia (TG level ≥200 mg/dl) was positive and statistically significant associated with higher prevalence among cases (16.8%) than among controls (1.9%).
- Lifestyle habits were studied and the results illustrated that, high prevalence of leisure time physical inactivity was noticed among cases (72.5%) than among controls (14.2%) with positive and statistically significant association between physical inactivity and the increased the risk of HBP (P=0.000).
- The overall prevalence of current smoking was 12.5% of the study population. In spite of, the prevalence of current smoking among cases (8.3%) was lower compared to controls (16.7%); but this did not means absence of the problem, since 15.5% of cases were smoking in the past, out of them 64.7% had smoked for 5-20 years, 35.3% had smoked for 21-40 years. Additionally, 88.2% had smoked 20-40 cigarettes/day, while 11.8% had smoked 41-60 cigarettes/day. For current smokers, the majority started smoking at early stage, 90% among cases had smoked for 15-25 years, while 10% had

smoked for 26-45 years, whereas, 70% of them had smoked 13-40 cigarettes/day, while 30% had smoked 6-12 cigarettes/day.

- In addition, 1.7% among cases smoke other forms (sheisha), among of them 33.4% smoked for 3-10 years, 66.6% smoked for 11-17 years, 66.7% smoked one sheisha/day, while 33.3% smoked two/day. On the other hand, 93.3% among cases exposed to others' smoke (passive smokers), out of them 87.6% exposed for 1-2 hours/day, while 12.4% exposed for 3-14 hours/day.
- Gender variation regarding to smoking was well expressed, as there is a huge gap between males and females. In comparison to men, among cases all women in the present study were non-smokers, while among controls only three participants (1.9%) were females.
- The majority of cases were at low educational level (0-9 years), which represented approximately 61.7%. The study results shows that, an overt difference between cases (61.7%) and controls (26.6%) within the low educational level; also, an overt difference was noticed within the high educational level, among cases (19.1%) was lower than compared to controls (49.2%). Positive and statistically significant association was found between low educational level and the occurrence of HBP disease (P=0.000).
- The present study provides strong negative association between hypertension and work status. The percentage of unemployed among cases was 75.8% and only 16.7% were work. The percentage of cases that are retired was 7.5%. In contrast, of this finding, the worker among controls (50%) was higher than among cases, which represented one-half of the interviewees. On other hand, the percentage of controls that are unemployed was 45.8% compared with 4.2% who are retired.
- The finding showed that, bad economical situation among cases. The frequency of the data showed that, 85% of cases was below poverty line (less than 2200 NIS), they were classified into 2 groups: 75.8% was less than 1700 NIS (extreme poverty) and 9.2% was average monthly income between 1700-2200 NIS, compared with only 15% which was above poverty line (more than 2200 NIS). In contrast, the percentage of subjects with monthly income less than 1700 NIS/month was lower among controls (34.2%) compared to cases (75.8%). This indicates a negative and statistically significant association between subject's monthly income (salary) and the occurrence of HBP (P =0.000).
- Marital status had some effect; the majority of the surveyed adults were married. 81.7% of cases were married compared with 87.5% of controls. Moreover, the burden of diabetes, hypertension and hypercholesterolemia was higher among married subjects.

- Comparing our findings with the national studies, the prevalence of diabetes, hypercholesterolemia, and current smoking was less and the prevalence of the obesity is markedly elevated, while the prevalence of family history of hypertension, physical inactivity, and hypertriglyceridemia was higher.

5.2 Recommendations

The finding of this study give the researcher chance to highlight the problem as a public in nature and help her to provide number of recommendations and suggestions to be as a cornerstone in the prevention and control of hypertension disease.

5.2.1 The study recommendations

1. Health systems need to be reoriented to accommodate the needs of chronic diseases prevention and control.
2. Counseling and careful communication should be implemented from physicians to educate or increase the patient's awareness about hypertension risk factors and their role in controlling their BP particularly in issues related to dietary treatment and other non-pharmacological lifestyle measures.
3. Preventive strategy to integrate healthy lifestyle into the community approach to primary prevention should start early among school students, to combat the bad behavioral habits among vulnerable groups such as children and adolescents, to emphasize on the importance of physical activity and encourage walking and bicycling for transportation and alleviation of deleterious psychosocial factors related to hypertension.
4. Establishing a National Task Force to control and treat obesity. Increase public awareness about the health risks of being overweight and obese, how to achieve and maintain a healthy weight, how to prevent inappropriate weight gain, and about methods of obesity measurement.
5. Nutritional consult and healthier food choices mainly toward reducing intake of fat, protein, and simple carbohydrate, and encourage the intakes of vitamins, minerals, and fiber (fruits, vegetables, whole bread, and legumes) are among the critical risk behaviors being addressed. Highlight to the public the role of diet in causing and preventing diet-related chronic disease.
6. Hypertension family history and lipid profiles screening programs should be implemented in schools, universities, and at work places to determine high-risk group. Treatment of potential abnormalities of lipid and lipoprotein all together in addition to

other risk factors supported by community-wide lipid profile awareness and education campaign.

7. Efforts by policy makers are critically important to enhance health awareness and public education to prevent or delay the onset of type 2 diabetes through a healthy lifestyle, change diet, increase level of physical activity, maintain a healthy weight, and check BP on a regular basis.

8. Antismoking campaign to prevent smoking in homes, public places and work sites should be implemented to reduce the harm of SHS.

5.2.2 Future research recommendations

- Large better-funded research should be carried out to verify the finding of this study and should consider the inclusion of weekend sampling.
- Further research should be conducted as community based study with larger sample to estimate the prevalence of hypertension, DM, and dyslipidemia in the Palestinian society
- More studies are needed to assess tobacco control and estimate the prevalence of tobacco consumption and the correlation between smoking and other hypertension disease risks within the community.
- Further research with larger sample and most comprehensive study (community based study) for a deeper understanding of the relationship between risk factors and the incidence of the HBP disease, such as physical activity, dietary practice, and stress.
- Further research to determine the causes and mechanisms of overweight and obesity, effective interventions to prevent obesity in children and adults, and the effectiveness of weight loss counseling by physicians
- More studies are needed to estimate direct and indirect economic cost regarding control, prevention, and treatment of hypertension.
- Further studies with large sample are needed to estimate the true prevalence of employment status and to highlight the relationship between it and hypertension disease.
- Solid research is essential to help explore the relationship between hypertension and income status in more political stable period.
- High quality research with larger sample is needed for the effectiveness of patient adherence with management programs.
- More research is needed to study the relationship between the consumption of calorically sweetened beverages and weight gain.

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Annex (1)

Map of Palestine

(PCBS, 2007[b])

Annex (2)

Helsinki Committee Approval Letter

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

التاريخ : 07/03/2011

Name: **Seham Abu Haddaf**

الاسم: سهام أبو هداف

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

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

" Risk Factors of Hypertension at UNRWA primary Health Care Centers in Gaza Governorates: Case Control study. "

In its meeting on March 2011

و ذلك في جلستها المنعقدة لشهر 3 2011

and decided the Following:-

و قد قررت ما يلي:-

To approve the above mention research study.

الموافقة على البحث المذكور عاليه.

Signature
توقيع

Member
عضو

Member
عضو

Chairperson

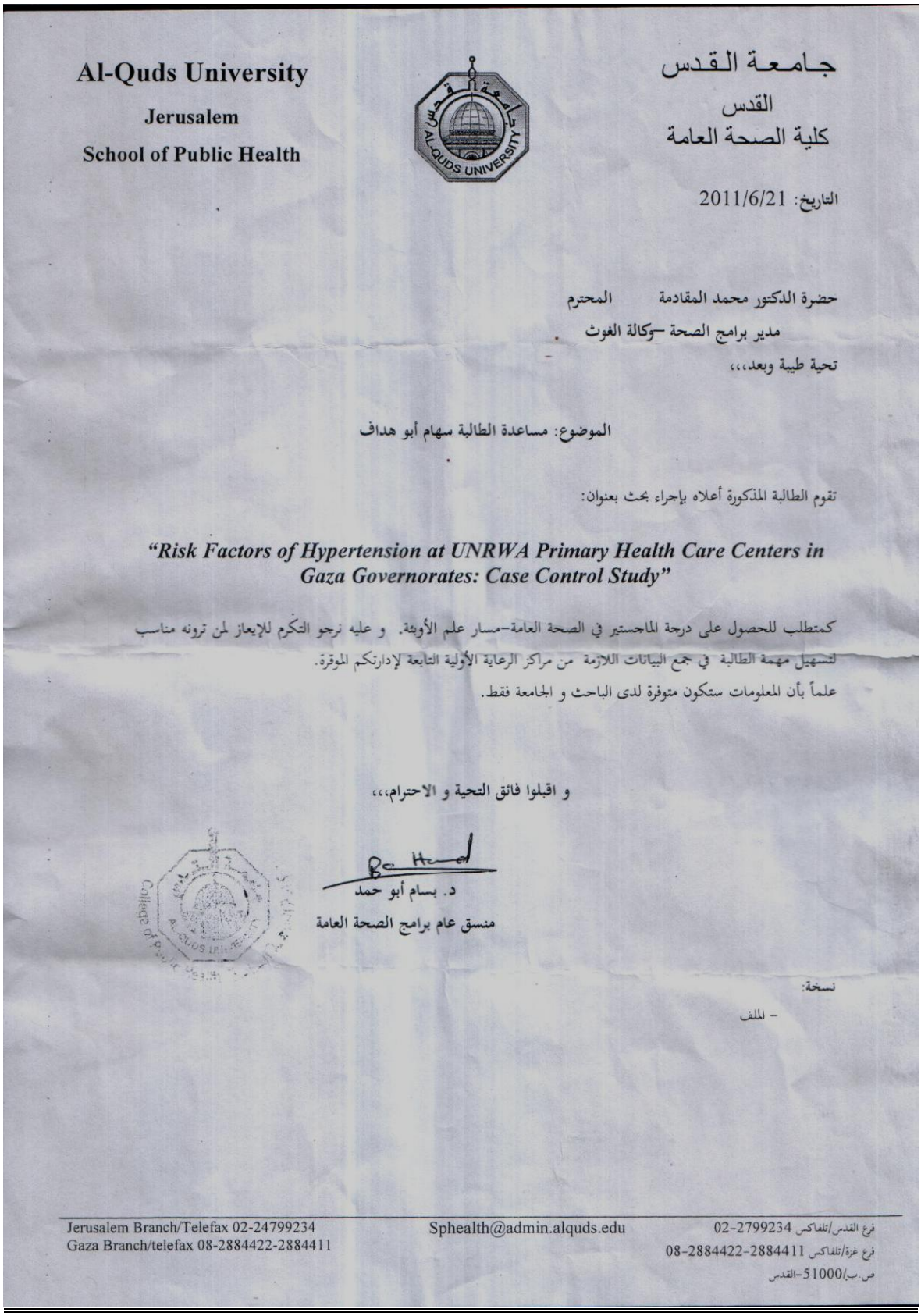
Conditions:-

- 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.

19

Annex (3)

An Official Letter of Request



Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/21

حضرة الدكتور محمد المقادمة المحترم
مدير برامج الصحة –وكالة الغوث
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالبة سهام أبو هداف

تقوم الطالبة المذكورة أعلاه بإجراء بحث بعنوان:

"Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates: Case Control Study"

كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار علم الأوبئة. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالبة في جمع البيانات اللازمة من مراكز الرعاية الأولية التابعة لإدارتكم الموقرة.
علماً بأن المعلومات ستكون متوفرة لدى الباحث و الجامعة فقط.

و اقبلوا فائق التحية و الاحترام،،،

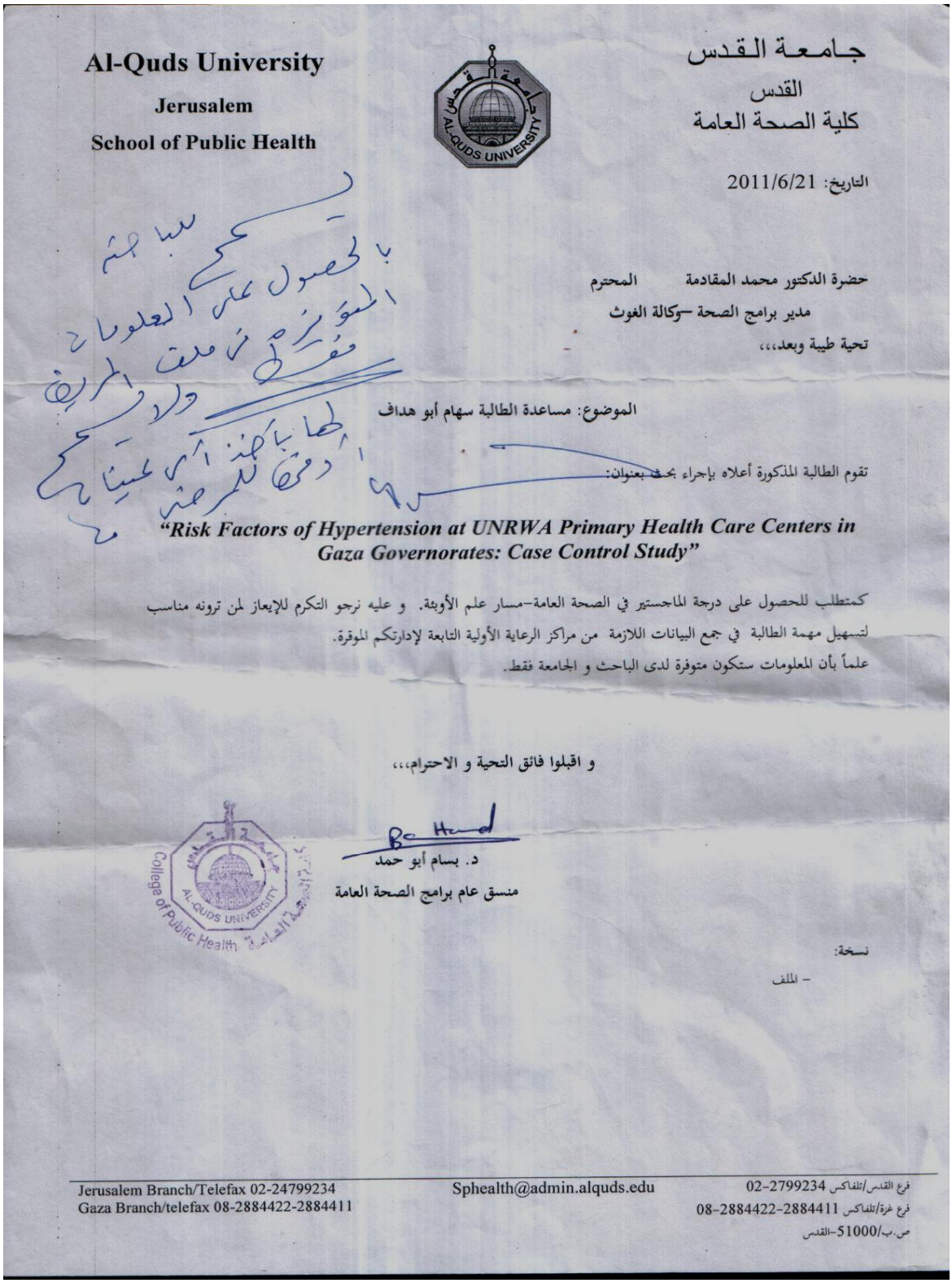
د. بسام أبو حمد
منسق عام برامج الصحة العامة

نسخة:
- الملف

Jerusalem Branch/Telefax 02-24799234
Gaza Branch/telefax 08-2884422-2884411
Sphealth@admin.alquds.edu
فرع القدس/تلفاكس 02-2799234
فرع غزة/تلفاكس 08-2884422-2884411
ص.ب/51000-القدس

Annex (4)

Agreement Letter from UNRWA Chief Field Health Program, Gaza Field Office



Al-Quds University
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جامعة القدس
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Annex (5)

Cover Letter and Consent Form

Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates: Case Control Study

Dear participant:

You have been randomly selected to be in the above-mentioned research study. This study is conducted as a part of the requirement for the Master Degree in Public Health at Al-Quds University.

The purpose of this study is to apply a research about risk factors of hypertension among adult hypertensive patients at UNRWA PHCs in Gaza Governorates. Moreover, you are chosen as a sample in this study. The study will be through patient's file of hypertension at the health centers and face-to-face interviews, answering of related questions at special form, the interview will take place in the health centers and take about 15-20 minutes with one patient for once.

Your participation in this study is voluntary; it is your decision to refuse or to participate in this research study.

If you agree to be in this study, you need to answer the interviewer questions that will be filled. There is no right and/or wrong answers; just give your perspectives. Please reflect carefully and answer all questions as honestly as possible. Your response will be kept confidential and will be aggregated with other responses so individual respondents cannot be identified.

Statement of consent

I have read / know the above information. I have asked question and received answers. I understand that by answering the interviewer questions, I give consent for participation in this study.

Thank you for taking the time to fill out this questionnaire.

Thank you for your participant and patience.

Researcher

Seham Abu Haddaf

Questionnaire

Risk Factors of Hypertension at UNRWA Primary Health Care Centers in Gaza Governorates: Case Control Study

Serial number---------- Date of the interview ----------

Name of person interviewed---------- Time of the interview ----------

Address ---------- Telephone No ----------

Clinic ----------

Subject: 1-Case 2- Control

Governorate: 1- North 2- Gaza 3- Mid-zone
4-Khanyounis 5- Rafah

1- Demographic Information

1- Age in years ----------

2- Sex 1- Male 2- Female

3- Marital status 1- Single 2- Married
3- Widower 4- Divorced

2- Socio-economic Information

4- Education status 1-Illiterate 2-Less than secondary
3- Secondary 4- University 5- Higher education

5- Current occupation: 1- Employed 2- Retired 3- Unemployed

- **If employed, specify**:

1- At UNRWA 2- At Governorate 3- At private sector

6- The approximate household total income per month (Including income from all sources for all members living with you):

1- <1700 NIS 2- 1700-2200 NIS 3- >2200 NIS

3- Medical history

A- Hypertension (for cases only)

7- For how long do you suffer from high blood pressure?

Duration in Years ---------- Years

8- Are you under medication for controlling blood pressure?

1- Yes 2- No. 3- Don't know

If yes,

❖ **Indicate what drug you take.**

1- Diuretics 2- ß-blockers

3- Angiotensin-converting enzyme inhibitors (ACEI) 4- Calcium channel blockers

5- α-blockers 6- Centrally acting agents 7- ARBs 8- Others

9- Have you ever been on a special advice prescribed by a health professional to lower your high blood pressure?

1- Diet 2- Weight reduction 3- Exercise 4- Stop smoking

5- Proper (Healthy) handling of stress 6-Others 7- None

10- Are you compliant with your regime?

1- Yes 2- No. 3- Don't know

❖ **If No, specify**: ----------

B- Diabetes mellitus

11- Do you suffer from DM?

1- Yes 2- No. 3- Don't know

❖ **If no skip to question number 17**

12- Type 1-T 1DM 2- T 2DM

13- For how long? (Duration in Years) ----------

14-How is it treated. 1- Treated with diet 2- Treated with OHA

3- Combined (Insulin + OHA) 4- Insulin treated

15- Have you ever been on a special advice prescribed by a health professional to lower your high blood glucose?

1- Diet 2- Weight reduction 3- Exercise 4-Stop smoking

5- Proper (Healthy) handling of stress 6-Others 7- None

16- Are you compliant with your regime?

1- Yes 2- No. 3- Don't know

❖ **If No, specify**: ----------

C- Diabetes and hypertension (D.H) (Double burden)

17- Do you suffer from D.H?

1- Yes 2- No. 3- Don't know

❖ **If no skip to question number 22**

18- For how long? (Duration in Years) ----------

19- Are you under medication for controlling D.H?

1- Yes 2- No. 3- Don't know

If yes

❖ **Indicate what drug you take.** ----------

20- Have you ever been on a special advice prescribed by a health professional to lower D.H?

1- Diet 2- Weight reduction 3- Exercise 4- Stop smoking

5- Proper (Healthy) handling of stress 6-Others 7- None

21- Are you compliant with your regime?

1- Yes 2- No. 3- Don't know

❖ **If No, specify**: ----------

D- Blood cholesterol

22- Have you ever been told by a doctor or a health worker that you have high blood cholesterol?

1- Yes 2- No. 3- Don't know

If yes,

❖ **Are you under medication for controlling blood cholesterol?**

1- Yes 2- No. 3- Don't know

23- Have you ever been on a special advice prescribed by a health professional to lower your high blood cholesterol?

1-Diet with low saturated fat 2-Weight reduction 3-Exercise

4-Increase eating fruits and vegetables 5- Stop smoking

6- Proper (Healthy) handling of stress 7-Others 8- None

24- Are you compliant with your regime?

1- Yes 2- No. 3- Don't know

❖ **If No, specify**: ----------

25- Is there any of your family members suffering from a chronic disease?

1- Yes 2- No. 3- Don't know

❖ **If yes, specify**:

1-HBP 2- Heart diseases 3- D.M.

4- High cholesterol 5- DH 6- Renal disease

7-Obesity 8- Others

❖ **If yes, what is the relationship?**

1- Father 2- Mother 3- Sister/ Brother

4- Grandfather/mother 5-Uncle/Aunt 6- Others (specify)

4- Lifestyle

A- Smoking

26- Do you smoke cigarettes now?

1- Yes 2- No. 3- Don't know

❖ **If no skip to question number 29**

27- Age of starting smoking cigarettes regularly ---------- Years

28- On average, how many cigarettes do you smoke per day at present?

---------- Cigarettes / day

29- If you do not smoke cigarettes now, did you smoke cigarettes before?

1- Yes 2- No. 3- Don't know

If yes

- **When did you stop smoking cigarettes regularly?**

1- Between 1-6 months 2- Between 6-12 months 3-More than one year

- **No. of years of smoking ....., No. of cigarettes / Day……..**

30- Do you smoke other forms of smoking (e.g. sheisha, pipe, etc)?

1- Yes 2- No 3- Previous smoker

If Yes,

- **For how long (Duration in years of smoking)……, No. / Day ……...**

31- For how many hours on average each day you are closely expose to other people's tobacco smoke. ---------- Hours

B- Leisure time physical activity

32- Do you practice exercise at leisure time?

1- Yes 2- No. 3- Don't know

If yes,

- **What type and duration of physical activity do you practice at leisure time?**

Type of physical activity	One hour	Two hours	Three hours	Four hours and more
Walking (including walking to work), shopping, etc.				
Cycling (including, cycling to work) and during leisure time.				
Gardening				
Physical exercise such as swimming, jogging, aerobics, football, tennis, gymnasium, etc.				
Housework, such as cleaning , washing, cooking, childcare, etc.				

33- Have you ever been advised by a health professional to practice exercise?

1- Yes 2- No. 3- Don't know

If yes

- **What is the main purpose for being advice by a health professional to practice exercise?**

1- Maintain good health 2-Weight control

3- Alternative treatment for health problem 4- Other

C- Dietary habits

34- Do you follow any special diets?

1- Yes 2- No. 3- Don't know

❖ **If yes; specify**

- Low fat
- Low salt
- Low calorie diet
- Weight reduction diet
- Vegetarian
- High fiber
- High fruits and vegetables diet
- Other (give details) ----------

35- Food Frequency Table:

How often do you eat the following foods	Once or more daily	2-5 times weakly	Once/ weak or more	Never	Rarely	Don't know
1- Milk/products (cheese, yogurt, Milk drinks...)						
2- Eggs						
3- Grains (bread, rice)						
4- Vegetables						
5- Fruit						
6- Fish						
7- Sweets						
8- Lean red meat						
9- White meat						
10- Legumes (bean, pea...)						
11- Fried Food						
12- Soft drink						
13- Tea, coffee						
14- Pickles, salt						

36- Anthropometric measurements:

1- Weight ----------

2- Height ----------

37- Blood pressure reading

Measurement	Systolic (mmHg)	Diastolic (mmHg)
1st measurement (The last reading)		
2nd measurement (one of the last two measures)		
Controlled/Uncontrolled		

38- Lab test results

1- Diabetes mellitus

Test	Result
Fasting plasma glucose (≥126 mg/dl)	
Postprandial plasma glucose (≥200 mg/ dl)	
Controlled/Uncontrolled	

2- Lipid profile

Test	Result
HDL-c (mg/ dl)	
LDL-c (mg/dl)	
TG (mg/ dl)	
TC (mg/dl)	

Thank you for cooperation

Interviewer

Name ----------
Signature ----------
Date: ------/----------/ 2011

Annex (6)

Questionnaire (Arabic Version)

موافقة لإجراء بحث صحي

المشترك الفاضل:

أنا طالبة في جامعة القدس أبو ديس – كلية الصحة العامة، أقوم بإعداد بحث بعنوان " عوامل الخطر التي تؤدي للإصابة بمرض ارتفاع ضغط الدم في الرعاية الصحية الأولية بوكالة غوث وتشغيل اللاجئين في محافظات غزة" باعتباره متطلب للتخرج و الحصول على درجة الماجستير وقد تم اختياركم كعينة لهذه الدراسة، ستتم الدراسة عن طريق عملية جمع المعلومات عن المريض من ملف الضغط لدى العيادة المسجل فيها و من خلال المقابلة الشخصية و الإجابة عن الأسئلة المتعلقة بذلك في نموذج خاص، ستجرى المقابلات أثناء ساعات الدوام الرسمي للعيادة و من المقدر أن تستغرق المقابلة مدة 15 دقيقة تقريبا.

تهدف هذه الدراسة إلى تحديد عوامل الخطر المصاحبة لمرضى ضغط الدم في قطاع غزة، مما يساعد على تحسين الجهود و الوسائل الرامية لمقاومته و تحصين الجمهور بالمعلومات اللازمة حوله.

مشاركتكم طوعية يمكنكم رفض الإجابة على أي سؤال و أرغب أن أؤكد لكم أن المعلومات التي سيدلى بها ستكون مصدر ثقة و سرية و ستستخدم فقط لغرض البحث العلمي و بدون ذكر الأسماء، لذا أرجو أن تكون الإجابات دقيقة.

هذه الدراسة ليست ممولة من أي جهة كانت و لا تستهدف تحقيق أي مكاسب مادية و لن يترتب على مشاركتك فيها التزامات أو مزايا مادية معينة، ولن تكلفك أكثر من الوقت اللازم لإجرائها معك.

قرأت وفهمت تماما و أقر بها و اشهد على صحة ذلك.

و اقبلوا التحية،،،

شاكرين لكم تعاونكم معنا

توقيع الباحثة **سهام أبو هداف**

توقيع المشارك في البحث (إن رغب بذلك)

التاريخ: / /

استبانه خاصة بدراسة عوامل الخطر التي تؤدي للإصابة بمرض ارتفاع ضغط الدم في مراكز الرعاية الصحية الأولية بوكالة غوث وتشغيل اللاجئين في محافظات غزة

الرقم المتسلسل.....	**تاريخ تعبئة الاستبانة.....**
اسم الشخص (اختياري).....	**وقت المقابلة .....**
منطقة السكن.....	**رقم الهاتف .....**
اسم العيادة	

الحالة المرضية

1- مصاب 2- ضابطة

العنوان (المحافظة)

1- الشمال 2- غزة 3- المنطقة الوسطى

4- خان- يونس 5- رفح

1- البيانات الديموغرافية

1- العمر بالسنوات .....

2 – – الجنس 1 - ذكر 2 – أنثى

3 – الحالة الاجتماعية 1- أعزب / آنسة 2- متزوج/ة

3- أرمل/ة 4- مطلق/ة

2- المعلومات الاجتماعية و الاقتصادية

4 – المستوى الدراسي 1- أمي 2- أقل من الثانوي 3- الثانوي

4- جامعي 5- دراسات عليا

5- الوظيفة الحالية 1- يعمل/تعملين 2- متقاعد/ة 3-لا يعمل/لا تعمل

❖ **إذا كان يعمل، حدد**

في الوكالة 2- في الحكومة 3- في القطاع الخاص

6- دخل الأسرة الإجمالي التقريبي شهريا (الدخل بما في ذلك جميع المصادر لجميع الأعضاء الذين يعيشون معك)

1- أقل من 1700 شيكل 2- من 1700- 2200 شيكل 3- أكثر من 2200 شيكل

3- التاريخ المرضي

أ- مرض ارتفاع ضغط الدم (للمصاب فقط)

7– ما هي المدة الزمنية بالسنوات التي تعاني بها من ارتفاع ضغط الدم؟..... سنة

8 -- هل تتناول أي علاج للسيطرة على ضغط الدم؟

1- نعم 2- لا 3- لا أعرف

إذا كانت الإجابة بنعم

❖ **حدد نوع العلاج؟**

1-Diuretics 2- ß-blocker

3- Calcium channel blockers 4- Angiotensin-converting enzyme inhibitors (ACEI)

5- Centrally acting agents 6- α-blockers

7- Others 8- ARBs

9- هل سبق و أن نصحك طبيب أو عامل في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للتحكم بضغط الدم؟

1- حمية غذائية 2- إنقاص الوزن 3- ممارسة تمارين رياضية

4- وقف التدخين 5- التعامل الصحي مع التوتر 6- لا 7- أخرى

10- هل يتم الالتزام بالنظام؟

1- نعم 2- لا 3- لا أعرف

❖ **إذا كانت الإجابة لا، ما المانع؟ حدد/ي .....**

ب- مرض السكري

11- هل تعاني من مرض السكري؟

1- نعم 2- لا 3- لا أعرف

❖ **<u>إذا كانت الإجابة بلا، انتقل إلى السؤال رقم 17</u>**

12- حدد نوع مرض السكري الذي تعاني منه؟

1- نوع 1 2- نوع 2

13- حدد المدة الزمنية بالسنوات..... سنوات

14– للتحكم بارتفاع السكر أتلقى العلاج التالي:

1- حمية غذائية **2-** أقراص

3- أنسولين وأقراص **4-** أنسولين

15- هل سبق و أن نصحك طبيب أو عامل في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للتحكم بمرض السكري؟

1- حمية غذائية 2- إنقاص الوزن 3- ممارسة تمارين رياضية

4- وقف التدخين 5- التعامل الصحي مع التوتر 6- أخرى 7- لا

16- **هل يتم الالتزام بالنظام؟**

1- نعم 2 -- لا 3- لا أعرف

❖ **إذا كانت الإجابة لا، ما المانع؟ حدد/ي .....**

ج- مرض السكري و ارتفاع ضغط الدم (عبء مزدوج) (DH)

17- هل تعاني من مرض السكري و ارتفاع ضغط الدم؟

1- نعم 2- لا **3-** لا أعرف

❖ **إذا كانت الإجابة بلا، انتقل إلى السؤال رقم 22**

18- ما هي المدة الزمنية بالسنوات التي تعاني بها من مرض السكري و ارتفاع ضغط الدم؟ ..... سنة

19- **هل تتناول أي علاج للسيطرة على مرض السكري و ارتفاع ضغط الدم؟**

1- نعم 2- لا 3- لا أعرف

إذا كانت الإجابة بنعم

❖ **حدد نوع العلاج؟ .....**

20- هل سبق و أن نصحك طبيب أو عامل في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للتحكم بمرض السكري و ارتفاع ضغط الدم؟

1- حمية غذائية 2- إنقاص الوزن 3- ممارسة تمارين رياضية

4- وقف التدخين 5- التعامل الصحي مع التوتر 6- أخرى **7-** لا

21- هل يتم الالتزام بالنظام؟

1- نعم 2- لا **3-** لا أعرف

❖ **إذا كانت الإجابة لا، ما المانع؟ حدد/ي .....**

د- كولسترول الدم

22-- هل سبق و أن أخبرك طبيب أو عامل في الحقل الصحي أن لديك ارتفاع نسبة الكولسترول في الدم؟

1- نعم 2- لا 3- لا أعرف

إذا كانت الإجابة بنعم

❖ **هل تتناول أي علاج للمحافظة على معدل الكولسترول؟**

1- نعم 2- لا 3- لا أعرف

23 - هل سبق و أن نصحك طبيب أو عامل في الحقل الصحي لإتباع أحد النصائح التالية (غير الدوائية) للمحافظة على معدل الكولسترول؟

1- إتباع نظام غدائي خالي من الدهون	2- إنقاص الوزن	3- ممارسة الرياضة بنظام
4- زيادة تناول الفاكهة والخضار	5- وقف التدخين	6- التعامل الصحي مع التوتر
7- أخرى	8- لا	

24- هل يتم الالتزام بالنظام؟

1- نعم	2- لا	3- لا أعرف

❖ **إذا كانت الإجابة لا، ما المانع؟ حدد/ي .....**

25- هل يعاني أحد من أفراد أسرتك من أمراض مزمنة؟

1- نعم	2- لا	3- لا أعرف

❖ **إذا كانت الإجابة بنعم، حدد نوع المرض؟**

1- ارتفاع ضغط الدم	2- أمراض القلب	3- السكري
4- ارتفاع كولسترول الدم	5- السكري وارتفاع ضغط الدم	6- أمراض الكلى
7- السمنة	8- أخرى	

❖ **إذا كانت الإجابة نعم، ما هي صلة القرابة ؟**

1 - الأب	2- الأم	3- الأخت / الأخ
4- الجد/ الجدة	5- عم/ عمة	7- أخرى(حدد)

4- العادات السلوكية

أ- التدخين

26 -- هل تدخن التبغ حاليا؟

1- نعم	2- لا	3 - لا أعرف

❖ **إذا كانت الإجابة بلا، انتقل إلى السؤال رقم 29**

27 -- كم كان عمرك عندما بدأت التدخين بانتظام؟ ..... سنة

28- في المتوسط كم سيجارة تدخن في اليوم الواحد في الوقت الحاضر؟

..... السجائر/ يوميا

29- إذا أنت غير مدخن حاليا، هل كنت تدخن السجائر سابقا ؟

1- نعم	2- لا	3- لا أعرف

إذا كانت الإجابة بنعم

❖ **متى أقلعت عن التدخين بانتظام؟**

1- ما بين 1- 6 شهور 2- ما بين 6 أشهر و 12 شهرا 3- أكثر من عام

❖ **عدد سنوات التدخين .....، العدد في اليوم .....**

30- هل تدخن أنواع أخرى غير السجائر (شيشة، بايب، --الخ)؟

1- نعم 2- لا 3- مدخن سابق

إذا كانت الإجابة بنعم

❖ **عدد سنوات التدخين .....، العدد في اليوم .....**

31- كم ساعة يوميا في المتوسط تتعرض بشكل وثيق للدخان من قبل الآخرين؟.....ساعة

ب- النشاط البدني في أوقات الفراغ

32- هل تمارس أي نوع من الرياضة في أوقات الفراغ ؟

1- نعم 2- لا 3- لا أعرف

إذا كانت الإجابة بنعم

❖ **ما هو نوع الرياضة و كم من الوقت تقضيه في ممارسة الرياضة أسبوعيا في وقت الفراغ؟**

نوع الرياضة	ساعة	ساعتين	ثلاث ساعات	أربع ساعات أو أكثر
1- المشي				
2- ركوب الدراجة الهوائية				
3- العمل في الحدائق				
4- تمارين (السويدي) و السباحة والتنس، الركض، الخ				
5- الأعمال المنزلية، مثل التنظيف والغسيل والطهي ورعاية الأطفال، الخ				
6- أخرى (حدد)				

33- هل سبق و أن نصحك طبيب أو عامل في الحقل الصحي بممارسة الرياضة؟

1- نعم 2 – لا 3- لا أعرف

إذا كانت الإجابة بنعم

❖ **ما هو السبب الرئيسي الذي من أجله نصحك الطبيب لممارسة الرياضة؟**

1- للمحافظة على الصحة 2- للتحكم في الوزن

3- كعلاج بديل لمشكلة صحية 4- لأسباب أخرى

ج- العادات الغذائية

34- هل تتبع/ين نظام غذائي معين ؟

1- نعم 2- لا 3- لا أعرف

❖ **إذا كانت الإجابة بنعم ،حدد**

1- قليل الدسم 2- قليل الملح 3- قليل السعرات الحرارية

4- غذاء خاص بتخفيف الوزن 5- نباتي فقط 6- غذاء يحتوي على نسبة عالية من الألياف

7- غذاء يحتوي على نسبة عالية من الخضار والفواكه 8- أخرى

35- نظام الغذاء الخاص بالمبحوث

من هذه المجموعات أذكر عدد مرات الاستهلاك:

النوع	مرة يوميا أو أكثر	5-2 مرات أسبوعيا	مرة/أسبوعيا أو أكثر	لا يتناول بتاتا	نادرا	لا أعرف
حليب ومشتقاته(لبن،جبن،..)						
بيض						
حبوب/نشويات(خبز/أرز)						
خضروات (طازجة/مجففة)						
فواكه (طازجة/مجففة)						
سمك (طازج/مجمد/معلب)						
حلويات أو سكاكر أو شيبس						
لحوم حمراء منزوعة من الدهون						
لحوم بيضاء(طازج/مجمد/ معلب)						
بقوليات(عدس/فول/لوبياء..)						
مقالي						
مشروبات غازية						
شاي و قهوة						
أملاح و مخللات						

36- القياسات:

1- الوزن.....كلغم

2- الطول.....متر

37- Blood pressure reading

Measurement	Systolic (mmHg)	Diastolic (mmHg)
1st measurement (The last reading)		
2nd measurement (one of the last two measures)		
Controlled/Uncontrolled		

38- Lab test results

1- Diabetes mellitus

Test	Result
Fasting plasma glucose (≥126 mg/dl)	
Postprandial plasma glucose (≥200 mg/ dl)	
Controlled/Uncontrolled	

2- Lipid profile

Test	Result
HDL-c (mg/ dl)	
LDL-c (mg/dl)	
TG (mg/ dl)	
TC (mg/dl)	

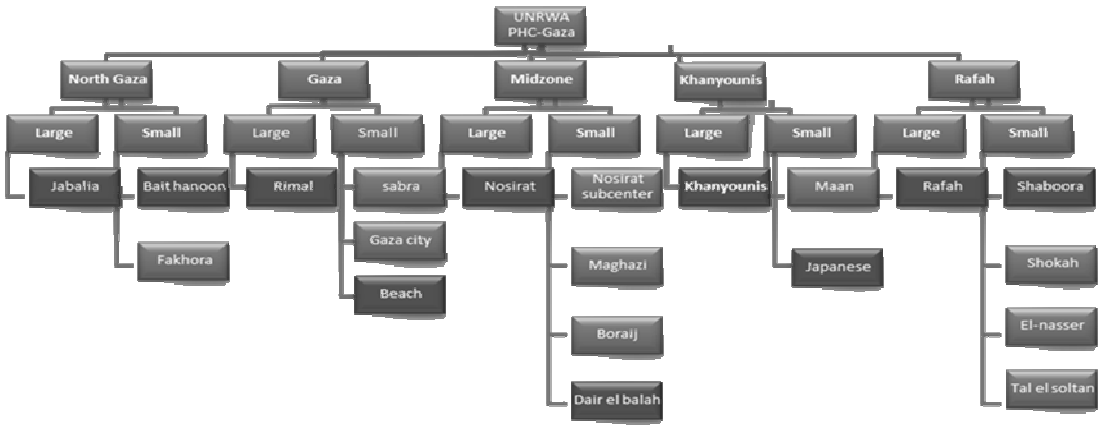
Annex (7)

List of Expert Names who Review Study Questionnaire

Dr. Bassam Abu-Hamad	Master Programs Coordinator at Al- Quds University
Dr. Yousef Abu-Safieh	Minister of Environment
Dr. Faisal Abu Shahla	Consultant Internist and Nephrologist-PLC Member
Dr. Suhail Kishawi	Head of Medical Department- Shifa Hospital- MOH Advisor in Endocrinology and Diabetes
Dr. Ayoub El Alem	Former Chief Field Health Program, UNRWA
Dr. Adnan Al-Whedi	Medical Director of Ard El-Insan
Dr. Ali Al-Jash	Medical Director of Patient's Friends Benevolent Society
Dr. Ashraf El- Jedi	Dean of the Faculty of Nursing-The Islamic University
Dr. Isa Saleh	FDCO- UNRWA Gaza Field
Dr. Mohammed Habib	Head of Cardiac Catheterization Center- European Gaza Hospital

Annex (8)

Distribution of UNRWA PHCs in GS according to size and location



UNRWA health centers included in the study

Governorate	Large health centers	Governorate	Small health centers
North	Jabalia	Mid-zone	Dair Al-Balah
Gaza	Rimal	Rafah	Shaboora
Khanyounis	Khanyounis		

Annex (9)

Calculation of sample size

Epi Info Version 6 Statcalc November 1993

Unmatched Case-Control Study (Comparison of ILL and NOT ILL)

Probability that if the two SAMPLES differ this reflects a true difference in the two POPULATIONS (Confidence level or 1-α): **95.00 %**

Probability that if the two POPULATIONS differ, the two SAMPLES will show a "significant" difference (Power or 1-ß) : **80.00 %**

#NOT ILL/#ILL (1 means equal sample sizes) **1: 1**

Expected frequency of exposure in NOT ILL group : **30.00 %**

Please fill in the closest value to be detected for ONE of the following:

Odds ratio (OR)--closest to 1.00 **: 2.33**

Percent exposure among ILL group--closest to % for NOT ILL : **50.00 %**

NOT ILL Conf.	Power	:ILL	Exposure in ILL	Odds Ratio	Sample Size NOT ILL	ILL	Total
95.00 %	80.00 %	1:1	50.00 %	2.33	**103**	**103**	**206**

عوامل الخطر التي تؤدي للإصابة بمرض ارتفاع ضغط الدم في مراكز الرعاية الصحية الأولية لوكالة غوث وتشغيل اللاجئين في محافظات غزة

إعداد: سهام أحمد أبو هداف

إشراف: د. يحيى عابد

ملخص:

مقدمة

تشير الوثائق الصادرة من الهيئات والمنظمات الدولية إلى أن مرض ارتفاع ضغط الدم هو من أهم أمراض العصر الحالي المنتشرة بشكل واضح والمساهمة في حدوث أمراض خطيرة وقاتلة، مثل أمراض اعتلال القلب والأوعية الدموية والكلى، مما تسبب في معاناة بشرية كبيرة وتكاليف هائلة للرعاية الصحية. زيادة هذا المرض يمكن أن يعزى إلى شيخوخة السكان ، وارتفاع معدلات التدخين والتغيرات في العادات الغذائية والسلوكية.

تهدف هذه الدراسة في أنها تتقصى لظاهرة ارتفاع ضغط الدم ومعرفة عوامل الخطر الأكثر شيوعا المصاحبة لهذا المرض بين السكان البالغين في محافظات غزة خاصة هؤلاء المسجلين كمرضى ارتفاع ضغط الدم في مراكز وكالة الغوث وتشغيل اللاجئين وذلك للمساهمة في تطوير برامج وقائية لمنع الإصابة بهذه الأمراض ووضع التوصيات اللازمة.

أهداف الدراسة

- معرفة عوامل الخطر الأكثر شيوعا التي تؤدي إلى الإصابة بمرض ارتفاع ضغط الدم بين هؤلاء المسجلين كمرضى ارتفاع ضغط الدم في مراكز وكالة الغوث وتشغيل اللاجئين بالرعاية الصحية في محافظات غزة.
- تحديد العوامل التي يمكن تجنبها والمتعلقة بمرض ارتفاع ضغط الدم.
- فحص العلاقة بين الممارسات الغذائية ودورها في حدوث مرض ارتفاع ضغط الدم.
- تحديد العلاقة بين المتغيرات البيولوجية (السكر- الدهون الثلاثية – الكولسترول – البروتينات الدهنية) وحدوث مرض ارتفاع ضغط الدم.
- تقديم توصيات واقتراحات للحد من انتشار مرض ارتفاع ضغط الدم.

منهجية الدراسة

هذه الدراسة هي دراسة تحليلية، درست الحالات المرضية مقارنة بعينة (مجموعة) ضابطة.

عينة الدراسة

تكونت عينة الدراسة من 120 حالة مرضية بأعمار مختلفة تتراوح ما بين الثلاثين عام أو أكثر والذين تم تشخيصهم بأنهم مصابون بمرض ارتفاع ضغط الدم وتم اختيارهم من مختلف محافظات قطاع غزة حيث تم اختيار عينة نسبية لتحديد عدد الحالات من كل محافظة. اختارت الباحثة بشكل عشوائي مراكز صحية (3 عيادات كبرى و2 صغرى) من

مراكز الرعاية الأولية التابعة لوكالة الغوث وتشغيل اللاجئين في كل محافظة، وتم استخدام عينة عشوائية منظمة لاختيار الحالات من كل عيادة. عدد مماثل من الضوابط تطابقوا في العمر و الجنس و المكان و الذين لا يعانون نفس المرض تم اختيارهم من نفس المراكز الطبية للوكالة (عيادة فحص الأمراض الغير معدية) بالإضافة لمراكز الرعاية الأولية بالحكومة، وكانت نسبة الاستجابة 97.5% لكلا المجموعتين.

كيفية جمع البيانات

جمعت البيانات من خلال تعبئة استبيان خاص لهدا الغرض من إعداد الباحثة لجمع المعلومات الشخصية والطبية والاجتماعية وبعض العادات السلوكية مثل الرياضة البدنية ، التدخين، والعادات الغذائية. وقد تم استخلاص الفحوصات الطبية و المخبرية من ملفات المرضى واشتملت على قياس الوزن والطول وضغط الدم وتحاليل مخبريه (لقياس نسبة السكر، والبروتين الدهني، والدهون الثلاثية، والكولسترول) وقد تم فحص صدق وثبات الأداة من قبل محكمين بالإضافة لتطبيق الاستبانة على عينة استطلاعية قبل البدء في البحث. كما التزمت الباحثة بالمعايير الأخلاقية البحثية كالحصول على موافقة لجنة هلسنكي و المشاركة الطوعية.

تحليل البيانات

تم استخدام البرنامج الإحصائي "SPSS" لمعالجة البيانات إحصائيا وتم اختبار النتائج باستخدام " odds ratio, p.value, chi-square, independent sample t-test" لفحص العلاقة بين المتغيرات.

أهم النتائج

- بينت نتائج هذه الدراسة العديد من عوامل الخطر الشائعة والتي يعتقد بأن يكون لها الأثر المباشر في الإصابة بمرض ارتفاع ضغط الدم والتي يمكن التحكم بها و كان لها دلالة إحصائية وهي:

- قلة النشاط الجسماني، و السمنة، و السكري، وارتفاع مستوى الكولسترول في الدم، و انخفاض مستوى الكولسترول الحميد، وارتفاع مستوى الدهون الثلاثية في الدم، و التدخين. كل هذه العوامل ارتبطت ارتباطا وثيقا بالمرض.

- كما أظهرت الدراسة أن الأشخاص ذات المستوى العلمي المتدني و ذات المستوى الاقتصادي المتدني لديهم خطر أعلى للإصابة بالمرض من الأشخاص ذات المستوى العالي وكان ذو دلالة إحصائية واضحة.

- أما عوامل الخطر الأخرى الشائعة و التي لا يتحكم بها هي العمر فوق سن الخمسين، و الجنس، و التاريخ العائلي لمرضى ارتفاع ضغط الدم، حيث أظهرت الدراسة أن وجود أقرباء لهم تاريخ مرضي في العائلة أكثر عرضة للإصابة بالمرض. و كانت علاقة الارتباط عالية و ذو دلالة إحصائية بحدوث المرض.

- بخصوص تناول الطعام، فقد أظهرت الدراسة أن هناك وعيا و التزاما جيدا من مرضى ارتفاع ضغط الدم بتناول غذاء صحي نسبيا من الفواكه، و الحلويات، والقهوة و الشاي، واللحوم البيضاء، في حين كان هناك تناول غير صحي من الألبان ومنتجاتها، الحبوب (الخبز والأرز)، و الخضروات، و البيض، و السمك، و اللحوم الحمراء المنزوعة من الدهون الظاهرة، البقوليات، و المشروبات الغازية، المقالي و الأطعمة المالحة.

- كانت نتائج هده الدراسة منسجمة مع الدراسات المماثلة التي أجريت في بلدان أخرى.

التوصيات

أهم التوصيات

من أهم التوصيات التي خرجت بها هده الدراسة هي:

- تدريب الطواقم الصحية و إعادة توجيه النظم الصحية لتلبية احتياجات الوقاية من الأمراض المزمنة و مكافحتها.
- تعزيز التثقيف الصحي و نشر الوعي العام اتجاه اختيار طعاما صحيا نحو الحد من ارتفاع الدهون والبروتينات والكربوهيدرات البسيطة و تشجيع أخذ الفيتامينات والمعادن والألياف (الفاكهة، الخضراوات)، وتسليط الضوء أمام الجمهور نحو دور النظام الغذائي في التسبب ومنع الأمراض المزمنة، وإجراء برامج تثقيف صحي خاصة للأشخاص الذين لديهم عوامل خطر معروفة بحاجة إلى مزيد من الانتباه و المتابعة وذلك لخفض معدلات الاعتلال و الوفيات من مرض ارتفاع ضغط الدم.
- تحديد وتنفيذ برامج واستراتيجيات لمكافحة العادات السلوكية السيئة مثل عادات التدخين بين السكان- تناول ملح الطعام – تخفيف الوزن.
- تطبيق برامج نوعية لمكافحة وعلاج عوامل الخطر المتعلقة بمرض ارتفاع ضغط الدم، و زيادة الوعي حول أهمية النشاط البدني وتشريع قوانين لمقاومة ومنع التدخين في الأماكن العامة وأماكن العمل لتقليل ضرر التدخين اللاإرادي.
- وضع وتنفيذ نظام مراقبة شامل لرصد التغيرات في النظام الغذائي ولتقييم الوعي العام فضلا عن برامج الصحة العامة.
- تطبيق العادات الغذائية الصحية و تقديمه كجزء من المناهج المدرسية.
- تطبيق برامج مسح لضغط الدم و السكري و لمستوى الكولسترول بالدم لتحديد الفئات ذات المستوى العالي.

توصيات بحثية

- إجراء دراسة شاملة لتوثيق نتائج هذه الدراسة و لتحديد معدل انتشار مرض ارتفاع ضغط الدم وانتشار مرض السكري وارتفاع كولسترول الدم في المجتمع الفلسطيني.
- إجراء دراسة أخرى بعينة دراسية أكبر و أشمل(Community based study) لدراسة تأثير عوامل الخطر في معدل الإصابة بالمرض مثل النشاط الجسماني والتدخين والسمنة والممارسات الغذائية والضغط النفسي.